Cooperation and competition in urban redevelopment

Samarbeid og konkurranse i bytransformasjon

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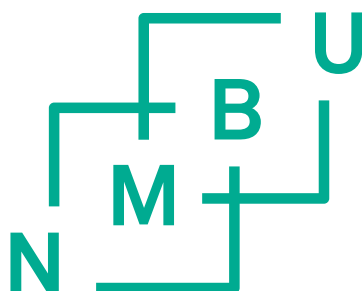# Cooperation and competition in urban redevelopment

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Philosophiae Doctor (PhD) Thesis

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Sammendrag

Denne oppgaven gir ny kunnskap om samarbeid mellom eiendomsutviklere i områder der fabrikker, varedeponier og lignende blir transformert til boliger, kontorer og tjenesteytere. Slik bytransformasjon er viktig for god og bærekraftig utvikling, men det er vanskelig. Tomtene er dyre, og det er kompliserte prosesser med mange involverte aktører. Dette gjør det vanskelig for én enkelt eiendomsutvikler å transformere et stort område av gangen, men etter hvert som én del transformeres øker markedsinteressen for å transformere også resten av området. Det er derfor ofte mange utviklere involvert i hvert område.

Utviklerne i samme område har en felles interesse i å lage et salgbart nabolag. Dersom en utvikler bygger billig, høyt og tett så de skjermer for utsikt og sol kan de redusere kostnader og bygge mer, men det bli vanskeligere å selge objektene deres. Dette skaper imidlertid også negative ringvirkninger, eller eksternaliteter, for de andre utviklerne i området, da også disse får problemer med å selge sine enheter. Det finnes mye litteratur om slike negative eksternaliteter i bytransformasjon, men denne oppgaven fokuserer på positive eksternaliteter. Når utbyggere investerer i goder som fine fellesarealer, arkitektur, og markedsføring av transformasjonsområdet, skaper de positive eksternaliteter for hverandre. Isolert sett vil hver utvikler bare investere i disse godene inntil å investere én ekstra krone bare gir én ekstra krone i nytte til denne utvikleren. I en situasjon der flere utviklere både produserer slike eksternaliteter, og nyter godt av eksternalitetene de andre utviklerne genererer, vil det som regel produseres færre eksternaliteter enn det som er optimalt for utviklerne. De kan ha en felles interesse i å samarbeide om å investere mer i slike goder enn hva som er optimalt for hver utvikler isolert sett. Dette kan skje ved at de som nyter godt av andres eksternaliteter kompenserer de som genererer dem, eller at de går sammen om felles investeringer i slike goder. For eksempel ved markedsføring av et nytt nabolag i et transformasjonsområde kan det være hensiktsmessig at utviklerne i området enten markedsfører det sammen, eller at de som nyter godt av andres markedsføring, kompenserer dem for dette. Utviklere kan også ha interesse av andre typer samarbeid, som å bygge nødvendig infrastruktur sammen for å nyte godt av stordriftseffekter. Disse utbyggerne er imidlertid konkurrenter, som kan vanskeliggjøre slikt samarbeid.

I mye økonomisk litteratur brukes utrykket 'coopetition', en sammentrekning av 'cooperation' og 'competition', for å beskrive slikt samarbeid med konkurrenter. Dette temaet kan studeres fra mange forskjellige vinkler, både knyttet til samarbeid generelt og økonomisk samarbeid mellom bedrifter. Avhandlingen baserer seg på litteratur om samarbeid fra foretaksøkonomi, velferdsøkonomi, spillteori, og adferdsøkonomi, i tillegg til generell litteratur om eiendomsutvikling i transformasjonsområder.

Beslutninger om samarbeid med konkurrenter er svært komplekse, og det er sjeldent mulig å være sikker på hva som er den mest hensiktsmessige strategien. Der det ikke er mulig å regne seg fram til den beste strategien vil beslutninger ofte påvirkes av ubeviste tommelfingerregler og magefølelser. Avhandlingens empiri baserer seg derfor i stor grad på adferdsøkonomiske eksperimenter for å analysere faktorer som ubevist påvirker samarbeidsgrunnlaget til eiendomsutviklere. Eiendomsutviklere og andre knyttet til utviklingsprosesser har spilt enkle spill, der de blir presentert for et scenario og må fatte en beslutning. Ved å endre detaljene i scenarioet observeres hvordan forskjellige faktorer påvirker samarbeidsvillighet og andre egenskaper knyttet til beslutninger om samarbeid: risikovillighet, tillit, og ideer om rettferdig fordeling. Avhandlingen sammenligner også resultater fra spilleksperimenter i Norge med Belgia, Nederland, og England. I tillegg til spillene bruker avhandlingen intervjuer med prosjektledere i

transformasjonsområder i Oslo for å analysere deres erfaringer og strategier omkring 'coopetition'.

Avhandlingen tar for seg tre forskningsspørsmål: *Hvorvidt samarbeider utviklere i transformasonsområder? Hvordan påvirker eiendomsutvikleres tommelfingerregler og magefølelser samarbeid? Er det sosiale og kulturelle grunnlaget for samarbeid annerledes i Norge enn i andre land?* Den finner først og fremst at utviklere er positive til å samarbeide, men gjør det i liten grad. At partene er konkurrenter er ikke i seg selv noe problem for å samarbeide med dem, men de vil ikke budsjettere for samarbeid eller endre fremdriftsplanene sine for å akkomodere det. Derfor er det samarbeidet som eksisterer stort sett om ting som ikke medfører ekstra kostnader, som å utveksle informasjon eller å gjøre felles investeringer dersom disse eventuelt måtte gjøres individuelt. Spillene indikerer at utviklere er grunnleggende positive til samarbeid, men er mindre positive i situasjoner med større risiko, eller om samarbeidspartnerne har ujevne styrkeforhold. Norske utviklere er også mer positive til samarbeid enn nederlandske og spesielt belgiske utviklere. Dette gjenspeiler at disse landene har utviklingssystem som i større grad styres av det offentlige enn i Norge, så utviklerne har mindre erfaring med å forholde seg til hverandre.

Denne avhandlingens faglige bidrag er å se på hvorvidt eiendomsutviklere i transformasjonsområder klarer å samarbeide med sine konkurrenter, når det ikke framtvinges av det offentlige. Mens 'coopetition' er mye studert i andre fagfelt og for andre industrier er slikt samarbeid mellom utviklere lite studert. Internasjonalt handler litteraturen om samarbeid i eiendomsutvikling i stor grad om samarbeid mellom det offentlige og private, eller mellom forskjellige aktører i verdikjeden som grunneiere og anleggsfirmaer. Det finnes også noe litteratur om joint ventures mellom utviklere, og tilfeller der kommunen pålegger utviklere å delta i felles prosjekter, men disse går i liten grad inn på spenningen som oppstår når firmaer vurderer å samarbeide med firmar som senere i prosessen er direkte konkurrerende. Avhandlingen er metodologisk nyskapende innenfor en aktør-basert tilnærming til eiendomsutvikling og bytransformasjon: Det finnes eksempler på bruk av spillteori og adferdsøkonomi for å analysere eiendomsutvikling og bytransformasjon, men kombinasjonen av disse fire feltene er forholdsvis lite utviklet og avhandlingen bidrar til å utvide og belyse dette forskningsfeltet.

Avhandlingen konkluderer med at større grad av samarbeid mellom eiendomsutviklere i transformasjonsområder kunne ført til mer effektive prosjekter. Grunnene til at samarbeid ofte er vanskelig i praksis antyder at kommuner burde styre framgangen i transformasjonsområder, og påta seg en rolle for å organisere slikt samarbeid. Det vil si at kommunen bør ta større rolle i å tilrettelegge transformasjonsprosessene, spesielt der det er mange grunneiere som utvikler side om side.

Summary

This thesis presents new knowledge about cooperation between firms developing industrial, logistical, and similar land into housing and service providers. Such redevelopment is important for sustainable urban growth, but it is difficult. Plots are expensive, and there are complex processes involving many stakeholders. This makes it difficult for a single development firm to redevelop a large area. However, once one firm redevelops a part of an area, the market potential for redeveloping other parts of the area increases. There thus tends to be multiple developers active in each large redevelopment area.

These developers have a common interest in making a sellable neighbourhood. If they build cheap, dense, and tall structures that cut off views and sunlight they can produce more units at lower prices, but it becomes harder to sell or rent out their products. This creates a negative spillover effect, or externality, for other developers in the area, as it depreciates the value of their projects as well. There is much literature on such negative externalities in urban development, but this thesis deals mainly with the less studied positive externalities. Developers create these positive externalities for neighbouring developers when they invest in benefits such as good public spaces, architecture, and marketing of the redevelopment area. In isolation, a developer will only invest additional resources in such goods if it provides them with higher expected revenue, in the form of sales prices or quicker sales, than their expected costs. However, for each such investment a firm makes, positive externalities are created for all the other firms, and this is the case for all the firms involved. In such a situation, there will tend to be an under-provision of the benefits. If one developer spent more resources, the benefit for all developers in sum would be greater than the cost. The developers have a common interest in cooperating, as this would lead to each firm investing more than if they only considered their own preference in isolation. Such cooperation can be achieved if those that benefit from a firm's externalities compensate the provider, or if multiple firms make these investments jointly. For instance, when marketing a new neighbourhood in a redevelopment area, developers could compensate those investing in marketing, or plan joint marketing schemes. Developers might also have an interest in other types of cooperation, such as constructing infrastructure around their projects together to achieve economies of scale. However, these developers are competitors, which might make cooperation difficult.

Economic literature sometimes uses the portmanteau 'coopetition' to denote such cooperation with competitors. This notion can be studied from many different angles, both as an aspect of cooperation in general, and specifically as an economic strategy employed by firms. This thesis relates to literature on cooperation from managerial sciences, welfare economics, game theory, and behavioural economics, in additional to general literature on property development in redevelopment areas.

Decisions on whether to cooperate with competitors are complex, and it is rarely possible to calculate an optimal strategy. Decision-makers often resort to heuristics and biases. The empirical material in this thesis is therefore largely based on economic experiments. Property developers and others from related fields have played simple games, in order to analyse how heuristics and biases influence coopetition strategies among development firms. These games present a scenario and the subjects must make a decision. By changing details in the scenario, the thesis investigates how the specifics of the situation affect the propensity for cooperation and other traits that influence cooperation: risk preferences, trust, and the notion of distributive fairness. The thesis also compares results from the Norwegian game experiments to results from Belgian, Dutch, and English experiments. Furthermore, to compare results of experimental data with those of the real world and learn more about strategies and actual instances of

coopetition, the thesis analyses interviews with 13 project managers in redevelopment areas in Oslo, Norway.

The thesis investigates three research questions: *To what extent do firms developing urban land in the same area voluntarily cooperate in praxis? How do decision-makers' heuristics and biases influence the extent to which developers cooperate with one another? How does the social and cultural basis for cooperation in Norway differ from other countries?* The thesis finds that developers are positive to coopetition, however, coopetition is uncommon. It is not in itself a problem for firms to cooperate with competitors, but they are not willing to change their timelines or budgets to accommodate cooperation. Therefore, the observed cooperation is largely related to things that do not incur additional costs, such as exchanging information or making joint investments if they would have to make these investments anyway. The games indicate that developers are fundamentally positive to cooperation, but less positive in situations with greater uncertainty or if the parties have unequal power in the cooperation scheme. Norwegian developers are also more prone to cooperation than Dutch and particularly Belgian developers are. This reflects that Norwegian redevelopment firms have a tradition for interacting with one another, as property development is largely market-driven. The firms have a wide range of opportunities for designing their projects and interacting with one another.

The main contribution of the thesis is to study cooperation between competing developers when the municipality does not mandate such cooperation. While there is a large literature on coopetition in other fields and for other industries, it is hardly studied in the development industry. Literature on cooperation in property development largely relates to cooperation between the public and the private, or between firms from different parts of the value chain such as between developers, landowners, construction firms or investor groups. There is also some literature on joint ventures between developers, and situations where the public mandates participation on joint projects. However, these lack the tension of deciding on whether to cooperate with a competitor. The thesis is also methodologically innovative: while scholars have previously used game theory and behavioural economics to analyse urban development and property development, examples are rare, and the thesis contributes to expanding this field.

The thesis concludes that greater degrees of cooperation between developers in redevelopment areas would lead to projects that are more efficient. The reasons for the scarcity of real-world cooperation indicate that municipalities should set the pace in redevelopment areas, and assume a role in organising such cooperation. Particularly where multiple developers are working side by side the municipality should organise redevelopment processes.

Contents

Article 1: Developer Coopetition: Cooperating Competitors in Market-Led Urban Redevelopment

Article 2: Urban development and cooperation games

Article 3: Measuring and comparing planning cultures: risk, trust and co-operative attitudes in experimental games

Article 4: Fair shares? Advancing land economics through trust and cooperative game theory

1   Introduction

Figure 1 below shows an industrial area in Oslo, Norway. Three different development firms each own swaths of lands used for factories, warehouses, parking lots and other plots of low utilisation. All of the firms hope to redevelop their plots into a new urban hub with apartments, cafés, offices and other urban functions. This involves radical changes in the physical urban fabric and in the way prospective residents and commercial interests see the area, both of which require substantial investments by the developers. For instance, one of the firms, Oxer, has invested a substantial amount of money in The Tower, a mixed art venue. This attracts people to the area who otherwise would have no reason to travel there, thereby improving the marketability of the project. However, this surely benefits the other developers in the area. Do the firms coordinate these investments? Do the firms compensate Oxer for the indirect benefit they enjoy? Is there an explicit or implicit presumption that they will provide the neighbourhood with other investments that might have similar benefits for Oxer?

Figure 1: Developers in Ulven/Økern, in Oslo, Norway, with development projects marked. Google Earth (2019).

This thesis investigates the relationships between private firms developing adjacent plots within urban redevelopment areas. While these firms share a common interest in creating marketable neighbourhoods, they will compete in eventually selling their products in the same market. There are many ways they can cooperate to achieve their common interest, despite being competitors. The viability of cooperating with competitors (in management science called *coopetition*) depends on many different factors related to the nature of the products, the market they operate in and the relationships between the parties (Giovanni and Giovanna 2002).

There are two ideas that are integral to this kind of cooperation. The first is the presence of economies of scale; the concept that bigger projects are more efficient than smaller ones (Harvey and Jowsey 2004). It is cheaper per unit to build roads, apartments and other structures when

making a lot of them. Material can be bought in bulk, employees gain experience with the project and local area (Arrow 1962), and many costs are only incurred once, such as moving machinery and contracting the right external firms (Mills 1972). This applies up to the point when the economies of scale are exhausted as these effects wane and are counteracted by diseconomies of scale such as – for instance - the need for larger project organisations. Moreover, spatial development has an important economy of scale that is not common in other industries: by-products of developer activities spill over onto neighbouring plots, making these more lucrative for development (Nordahl and Eika 2017). As an area is developed, prospective residents or enterprises increasingly see it as a viable neighbourhood for their activities, from which any other developer with land in the area will benefit. Furthermore, most development projects include land uses that benefit the neighbourhood at large: greenspace, public spaces and services are rarely economically viable in isolation, but they increase the value of the entire redevelopment area (Weigher and Zerbst 1973). Finally, developers can pay for marketing and for cultural and promotional events to make the public perceive an area as a viable neighbourhood in which they can live or work (Dixon, Raco et al. 2008). Marketing, new public spaces and upgraded environments are forms of positive externalities from development activities. They provide incentives for large-scale development; as these externalities are incorporated into the project, later stages will profit from them and yield better results (Fujita, Krugman et al. 2001). If the area is divided between many small projects, this benefit befalls the projects that can wait until the area is mostly developed.

The second idea is the *prisoners' dilemma,* situations with information constraints in which people must choose between doing what is individually optimal and what is optimal for the group (Rapoport, Chammah et al. 1965). In the prisoner's dilemma, the individually rational option is worse for everyone than the option that is good for the group. In theory at least, developers are likely to meet this dilemma when considering cooperation (Blokhuis, Snijders et al. 2012): in isolation, it might be best to only consider maximising the marketability of their own project relative to their competitors rather than engage in activities that enhance the marketability of the entire area. It is also an intuitive strategy to try to benefit from other developers' activities without responding in kind, to minimise costs and avoid strengthening competitors' marketability. Consider, for instance, when developers decide on how much to invest in art projects meant to draw potential customers to a new neighbourhood: a certain level of expenses that generate positive externalities might be rational for the individual developer, but beyond this there will be a point where it is good for the group to use more resources on these activities, but not for the individual. If developers A and B decide how much to invest in these activities, they will at least want to invest until additional investments cost more than the value they provide, in the form of higher sales prices or quicker sales. However, if A invests even more, it provides a small, negative net benefit for A, and a somewhat larger benefit for B. Thus, the best option for the two developers when seen together would be for both to invest heavily in their art projects. However, if A invests moderately and B invests heavily, A might benefit from B's investments while only paying a moderate amount. If B invests moderately, A would at least avoid paying heavily while not getting any additional value from B. Thus no matter what B choses, it is better for A to invest moderately, and it is correspondingly best for B to also invest moderately no matter what A choses. The predicted outcome of this scenario is that neither invests heavily, to the detriment of both. Realistically, in a prisoners' dilemma situation involving developers, there are many reasons why they should avoid the worse equilibrium of everyone investing moderately. In a situation where both clearly have an incentive to contribute assuming the other does likewise, they should be able to coordinate as it is better for both the developers and society if they invest more. Developers can signal their good intentions to each other and even enter into binding agreements on mutually beneficial cooperation. They will often be in similar situations in the

future so 'playing nice' can have its own value, and trying to outmanoeuvre neighbouring developers might carry unforeseen costs in a long time perspective (Adams, Leishman et al. 2012). Also, decision-makers are mere humans, and are thus likely to let factors such as personal relationships and the 'warm glow' from contributing to a common benefit influence their decisions (Andreoni 1990).

Cooperation between humans is widely studied in many different fields using different methods. This thesis draws on theories from microeconomics, game theory, behavioural economics, managerial science and spatial planning. The empirical contributions are three game experiments and an interview study about the conscious strategies of development professionals when interacting with one another. The game experiments reflect the importance of 'gut feeling' (biases) and rule of thumb (heuristics) when dealing with cooperation and prisoners' dilemma-type situations: when what is good for the group is at odds with what is, at least in the short term, good for the individual, strategies depend on factors outside traditional economic theory (Bazerman and Neale 1993). The economic experiments capture some social and economic biases and heuristics that might influence cooperative strategies.

1.1   Research questions

Three research questions derive from these reflections:

- First, while there are several reasons why cooperation between developers could be efficient, there are also reasons why developers would be hesitant to cooperate with competitors. To what extent do firms developing urban land in the same area voluntarily cooperate in praxis?
- Second, how do decision-makers' heuristics and biases influence the extent to which developers cooperate with one another?
- Third, the Norwegian planning system is largely market-driven. Developers have extensive experience of managing complex development projects, including preparing zoning plans and acquiring land. How does the social and cultural basis for cooperation in Norway differ from other countries?

The articles summarised in chapter 5 and found in the appendices help answers these questions. Article 1 uses interviews with property development managers in Norway to learn about how developers in Oslo actually cooperate and why. Articles 2 and 3 use behavioural economics experiments to study the impact of developers' economic biases and subconscious social relations on cooperative decisions. More specifically they measure trust, risk willingness and cooperative attitudes among development professionals and other planning professionals and how these interact. Article 4 assesses benefit distribution inclinations between unequal partners. Articles 2 and 4 compare economic behaviour in development scenarios in Norway, Belgium, the Netherlands and the United Kingdom.

1.1.1   Scope

This thesis focuses on development in Norway and on Oslo in particular. As there is a global trend towards increased private-sector influence over urban development (Heurkens 2017), there are many elements in the market-driven development system in Oslo that are interesting to other countries.

The thesis focuses particularly on redevelopment projects where different landowners/developers develop side-by-side, as *opposed* to greenfield developments and as opposed to brownfield development with a sole developer. The abovementioned externalities are particularly important in such redevelopment areas, where already developed land is transformed from one function to another to accommodate urban growth and economic development (Fox Gotham 2001). High density means that more actors will benefit from positive

externalities. Redevelopment projects remove urban blight, which is an important positive externality (Dixon, Raco et al. 2008). Redevelopment and densification can of course have negative effects, such as removing certain important functions that provides little revenue or increasing congestion if compensating infrastructure is not added to the projects (Acioly Jr 2000). This is, however, not the topic of this thesis, which largely assumes that redevelopment is a good thing. Moreover, it is difficult for developers to exhaust economies of scale: compared to greenfield development, where cities and villages incorporate farmland, woodlands, meadows and so on, redevelopment is less straightforward (Glumac, Han et al. 2013). More economic interests are at stake, land clearing and obtaining the necessary ownership rights are more complex, and more neighbours are affected by these projects. Thus, in market-driven development, where private firms assemble land and afford public works, capital constraints limit the size of the projects (Weiler 2000). Instead of growing the projects to achieve all economies of scale in production and internalising all positive externalities, each project provides the neighbourhood with similar externalities, and production can be less efficient than in large-scale greenfield projects (Fujita, Krugman et al. 2001). The Norwegian state and the City of Oslo both see redevelopment as the best way to grow the city (Hanssen, Hofstad et al. 2015).

The Norwegian media and government see low housing production in Oslo as a problem (Barlindhaug, Holm et al. 2014, Boligvekstutvalget 2016). In the twenty years before the work on this thesis began in 2015, the price for second-hand apartments rose by 647 per cent, and rose a further 129 per cent in the four subsequent years (Statistics Norway 2019). This makes housing important for providing economic motivation for redevelopment. The thesis therefore focuses particularly on housing, although most redevelopment projects have multiple functions.

An important novelty of this thesis is the tension between developers' having common interests in making areas marketable and simultaneously competing in the same market. It therefore considers joint ventures whereby multiple firms establish an organisation to undertake a project as a single entity instead of as a cooperative effort. Once the organisation is formed, the interests of the parties tend to be in unison, although there might still be significant disagreements. Despite this, joint ventures should still be studied elsewhere as cooperative organisms.

There can be many developing entities involved in a redevelopment project (Fox Gotham 2001). Transport authorities often want to redevelop to improve routes, private citizens might want to build their own housing alone or in groups, or public or private organisations might want a new building from which to operate. However, in Norway 'pure' developers, who have development as their sole or primary task, undertake the most significant redevelopment projects (Bjordal 2016). These firms are the primary focus of this study.

The entire redevelopment process revolves around different actors working alongside one another with different goals, but with an overall unifying idea: creating urban areas that answer the city's evolving demands (Gotham 2001). This entire process is an example of cooperation. To make such process researchable, the thesis is limited to assess cooperation in situations where non-cooperation is also possible. For instance, Norwegian municipalities will occasionally *require* neighbouring developers to draw up a zoning plan together or *require* all developers in an area contribute to a joint infrastructure project (Nordahl, Barlindhaug et al. 2011). The dynamics of a relationship like this would also be interesting to examine, but they differ entirely from situations where developers *choose* to undertake a joint project after weighing the costs and benefits of interacting with one another. One particularly important aspect of cooperation that is less relevant when studying such 'forced cooperation' is the importance of inter-human relations. Inter-human relations is an important topic for this thesis.

1.2 Novelty

There is a substantial literature on cooperation in redevelopment, but not on voluntary cooperation between developers as presented in this thesis. Henderson (2010) reports on the difficulties in achieving sustainable cooperation between developers in Paddington, London following a municipal initiative to spark synergetic development in the fragmented site. Similarly, the much debated 'Manchester model' for urban regeneration focuses on partnerships between landowners for redevelopment, but under the guidance and strong support of the public sector (Dixon, Otsuka et al. 2011). Coiacetto (2006) writes about how dominant developers can gain competitive advantages, and about how such advantages can also be gained through cooperation between developers, and can create incentives to engage in illegal collusion. The literature on cooperation between different actors in redevelopment projects is substantially larger, particularly on public-private partnerships, with researchers exploring topics such as division of risk and added value (Grimsey and Lewis 2002), planning and negotiation of schemes (Sagalyn 2007), the value of public scrutiny of deals (Mukhopadhyay 2016), and their overall performance (Hodge, Greve et al. 2018). Others have studied cooperation between private actors in different parts of the value chain, such as strategic alliances between foreign investment firms and local developers (Rohm 2017), development firms and construction firms looking to expand into new markets (Adnan and Morledge), or local politicians (Leffers 2018). More generally, spatial development has increasingly been seen as a collaborative project between politicians, planning bureaucrats, landowners, civil society, developers and other parties (Faludi 1970). Particularly in redevelopment, the breadth and scope of interacting actors have garnered much attention (Healey 1998). Urban 'growth coalitions' between developers, landowners, planners, politicians and local business interests have garnered substantial attention (Harding 1991).

Economic experiments, game theory and cooperation between competing firms are all large areas of study. However, this thesis is novel in its application of these concepts to property development. For instance, Ball (1998) called for the use of game theory as an analytical tool when studying institutions in property development, but the field is still in its infancy. One notable example is the PhD thesis *Games and the City: Applying Game Theoretical Approaches to Land and Property Development Analysis,* which analyses Dutch systems of organising private contributions to public infrastructure (Samsura 2013). Similarly, economic experiments are rarely applied to urban development scenarios, though some examples do exist. Glumac, Han et al. (2015) used game experiments to explain interactions between the public and private sectors in brownfield redevelopment.

The new research presented in this thesis may give stringent examples of behavioural economic experiments focusing on property development. However, high variance and few observations for certain cohorts limit the validity of the experimental findings. Nonetheless, the research is useful as a roadmap for designing experiments. Others designing similar experiments should consider the weaknesses outlined in section 4.3.2 on experimental validity.

Several papers have studied the effect of one developer starting to transform a redevelopment area and getting the ball rolling, as well as other positive externalities from development (Lord, O'Brien et al. 2015, Barlindhaug and Nordahl 2017, Gao, Chen et al. 2017). However, none discussed how developers coordinate to maximise these externalities, or whether this would be feasible. More generally, little research has studied developers' strategies when relating to each other. This thesis introduces the portmanteau *coopetition* (Bradenburger and Nalebuff 1996), often studied in managerial sciences, to urban development.

1.3 Summary of the research process

This thesis was inspired by a prior research project, UrbanPlan [1], studying barriers to redeveloping low-density, industrial and logistical land into denser commercial and residential uses in Norway. The project leaned heavily on case studies of urban areas that had been singled out for redevelopment by municipalities. One important finding was that these areas typically had a large number of different landowners and developers active at the same time (Nordahl and Eika 2017). While our study showed that this was not necessarily detrimental to their progress as long as housing markets are strong, only a few of the areas witnessed much direct interaction between the different developers. This led to the SimsCity[2] project. Running from 2014 to 2018, the work on this project is an essential part of this thesis. NMBU's partners were the University of Liverpool, University of Liege and Radboud University. The most important and time-consuming part of the project was an effort to employ behavioural economics as a tool for analysis in urban redevelopment. This resulted in the article *Measuring and comparing planning cultures: Risk, trust and co-operative attitudes*, found in appendix 3 of this dissertation. We also used behavioural economics to provide empirical data for an article on perceptions of fairness when dividing the added value from cooperation projects; see appendix 4. Note that despite the project name, value capture was not a significant part of this research. The project focused initially on three game experiments to measure risk willingness, trust, reciprocity and cooperative attitudes among developers and public planners. As argued in sections 3.2 and 3.4, risk, trust and reciprocity are essential for cooperation.

This thesis goes beyond the SimsCity project in the article *Urban development and cooperation games.* This article shores up some of the experimental weaknesses in *Measuring and comparing planning cultures*. Moreover, the games employed in the SimsCity article were not derived from a single overarching idea, but from different concepts that would be interesting to study with experimental economics. *Urban development and cooperation games* focused on one of the games, and added treatments to that particular game. More subjects and a clearer connection between the games permitted a more empirical article, as opposed to the theory-driven joint project article.

These games provide some indications of the social dynamics and biases that influence cooperation in urban development, as section 3.4 discusses. However, game experiments are mostly a way to identify subconscious biases. To learn about the conscious ideas that decision-makers employ, it is more natural to ask them directly. The thesis therefore includes one article based on interviews, *Developer coopetition: Cooperating competitors in market-led urban redevelopment*. Although the work on this article began after the experimental articles were mostly finished, it is logically prior to these. The experiments revealed subconscious biases which the interviews did not.

2 Background

This chapter details the background the reader needs to put the present research into context. It first explains why it is worth looking into the dynamics that help and hinder urban redevelopment. It then gives an overview of the economic, social and legal background for urban redevelopment in Norway.

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[1] UrbanPlan: Planning and sustainable land use, funded by the Norwegian Research Council (220561).
[2] Simulations for Innovative Mechanisms for the Self-organizing City: Testing New Tools for Value Capturing. For the project's website, see https://jpi-urbaneurope.eu/project/simscity-valuecap/.

2.1 Urban redevelopment

We live in a rapidly urbanising world. Since the end of the Second World War, each decade has seen an increasingly faster global urbanisation rate (United Nations 2018). The United Nations currently expects this trend to plateau around the writing of this thesis at an annual growth of around 70–80 million people until 2050. This warrants some thought about how we grow our cities. The 'default' growth pattern of cities, when facing no physical or juridical constraints, is to spill over into the surrounding countryside, as land on the outskirts of cities is usually cheaper than in the urban cores and suburbs (Fujita, Krugman et al. 2001). This means that as cities grow, they continually incorporate new land to meet the demand for housing plots, infrastructure and urban commercial real estate.

Most scholars and decision-makers see that this is not a sustainable trend (Bae 2017). When cities spills into the countryside, there is an opportunity cost of reduced farmland and wilderness, both of which provide virtually irreplaceable services for the cities, such as recreational areas, water and air purification and climate control (UK National Ecosystem Assessment 2011). As distances between homes, jobs and services become longer, more of the residents' time and the city's land is spent on transportation. Compounding this effect, mass transit becomes less efficient, as it reaches fewer users with the same investments (Trubka, Newman et al. 2010). This increases automobile usage, which in turn causes congestion, air pollution and vehicle accidents (Brueckner 2000).

When cities grow, the alternative to expanding outwards is to use the space within them more efficiently. As the demand for housing, services and office space grows within a city, it becomes increasingly financially viable to build densely within the urban fabric, even on land that already has some income-generating use (Harvey and Jowsey 2004). This should be seen in parallel with other trends in the economy: industry moving to low-cost countries and being replaced with offices and commerce (Loures 2015); global trade demanding ever deeper and larger ports outside the cities (Hoyle 2000); and more efficient logistics organisation requiring fewer, larger logistics facilities outside of urban areas rather than warehouses and shipping terminals within the cities (Wagner 2010). All of these leave behind urban land for development. The urban fabric often also consists of land with no particular use, as the low land prices when the land was first developed made it less important to use it particularly efficiently. Such 'leftover space' (Hwang and Lee 2019), add further land to redevelopment areas (Hwang and Lee 2019). In the same way, land that was developed when the demand for land was low can be intensified, typically by building more densely and thus releasing land for new functions (Ramsjord 2014).

The specifics of such redevelopment processes vary with the local context (Healey 1994). The most important universal institutions are the owners and right holders of the redevelopment land, regulatory bodies such as municipalities, and entities looking to develop the land. In redevelopment areas, these tend to be private firms motivated by the disparity between the value of the current land use and the potential value, but it can also be a public or private entity wanting to a new location from which to run or expand their operations (Healey 1992). Development is increasingly becoming a co-product of the private and public sectors (Tiesdell and Adams 2011). Furthermore, there will usually be a number of third parties such as consultants, neighbours, public sector interests and financial institutions, each with different interests in the project (Fox Gotham 2001). A single entity can often have multiple roles, such as a public body regulating and developing its own land. While these agents form complex networks, they themselves constitute complex networks of individuals (Doak and Karadimitriou 2007). These individuals form social

relations both within and across organisations based on the intersections of their functions, histories, politics and cultures (Ball 1998).

The public sector exerts heavy influence on who builds what and where by facilitating and managing development, and by strategic planning and policymaking (Healey 1994). While public authorities always play an important role in the process, their role and the tools available to them differ substantially between countries. Furthermore, even public authorities with the same tools and roles can act differently, as they tend to employ the tools they are most familiar with and are slow to adopt new praxis (Tiesdell and Adams 2011). For instance, most countries have systems for expropriating land to obtain the necessary land rights for redevelopment, but the financial cost and the planners' skills and traditions can make local governments reluctant to employ them (Syms and Clarke 2011).

Redevelopment is widely accepted as a viable growth strategy in international academic discourse (OECD 2012). Many states and cities also see it as an instrument for creating more sustainable cities (see, for instance, Stortingsmelding nr. 31 1992-1993). For the planning authorities, channelling growth into such areas not only creates a more compact city, but also removes problematic areas such as slums and blight (Adams, Disberry et al. 2002). The activities in industrial and logistics areas tend to cause air pollution and traffic congestion, and are often unaesthetic (Ball 2002). A more compact city has more functions, such as housing, workspaces and services within a smaller area, reducing the need for transportation (Burton, Jenks et al. 2003). Denser areas can also make mass transit investments more efficient, as a smaller transportation system can cover more trips (Trubka, Newman et al. 2010, Austin and Bysveen 2012). Of course, if infrastructure investments or other compensating efforts do not adopt densification, they can quickly lead to congestion (Camagni, Gibelli et al. 2002). Scholarly criticism of densification from an environmental point of view is largely limited to a few laissez-faire proponents (Gordon and Richardson 2000). A high density of functions can also be beneficial for the social and economic fabric of the city, as described in the seminal *Death and Life of Great American Cities* (Jacobs 1961), and in the Oslo area at least, higher densities tends to lead to greater social well-being and neighbourhood satisfaction due to easier access to urban functions (Mouratidis 2018).

Even where there is broad agreement among politicians and the general population about redeveloping an urban area, many elements can make the process more difficult than infill or greenfield projects (Sousa 2000): the rationality of changing land use in these cases, at least in market economies, is that land yields better returns with new use, but whatever profit the old use yields and the cost of changing it must be subtracted from the bottom line of the redevelopment project (Harvey and Jowsey 2004). When redeveloping industrial areas, there can be unforeseen pollutants that must be dealt with (Dixon, Raco et al. 2008). In addition to the landowners in the development area, people living around it have interests in the new structures (Solitare 2005). These will often be positive towards redevelopment, at least if the current land use is unaesthetic or polluting, and if it is replaced by housing and particularly customer-oriented services (Greenberg and Lewis 2000). However, for instance the size of the new buildings is often a hotly contested topic (Knudtzon 2018). Firms might have to reduce the size of their structures to appease neighbours, and with that the size of their profits. Finally, many different state- and municipal bodies can have interests in a specific area, such as different transport authorities or entities with narrow spheres of interests such as heritage or nature conservation. Such difficulties make it necessary for developers working on urban redevelopment to find new ways to make their projects marketable at the cost for which they can be produced (Tiesdell and Adams 2004).

There is a tendency for the plots in such areas to be small, with many different owners and right holders (Adams, Disberry et al. 2001). Some industrial or logistics firms that own land in such redevelopment areas might be interested in further developing their land themselves, often in collaboration with a professional development firm (Adams, Disberry et al. 2002). More often, development firms will have to acquire this land themselves. In many planning systems the public authorities take on the role of assembling these plots, typically through a combination of normal purchases, compulsory purchases and/or pre-emption in areas designated for redevelopment. They will then sell the land to a developer, either before or after furnishing it with infrastructure (Van der Krabben and Jacobs 2013). In market-based redevelopment – the focus of this thesis – the developers themselves take on the task of assembling land. As this reduces the risk profile and administration costs for the municipalities, several countries are interested in shifting towards such a market-based approach (Miceli 2011, Van der Krabben and Jacobs 2013, Kalbro and Mattsson 2018). However, private firms usually have no or limited access to pre-emption and compulsory purchase, and are limited by capital constraints, making large-scale land assembly difficult. Moreover, long-term horizons of many years or even decades passing from the initial investment to the cost-bearing part of the project, and the high risk of redevelopment (Weiler 2000), give even large firms an incentive to spread their portfolio and invest in different areas and projects with different horizons (Harvey and Jowsey 2004). Depending on the size of the market, developers will also not want to produce too many units, to reduce the risk of over-saturation (Nordahl , Lund 2019).

There are other difficulties in assembling land in redevelopment areas: as soon as a developer invests heavily in an area by buying plots and working on a development plan, owners of neighbouring land gain a strong position when selling their land. A landowner with even a moderately sized plot can hold it hostage against new developments, particularly if the existing land use impairs the earning potential of the new development (Adams, Disberry et al. 2001). This strategy will often be even more beneficial, as the earlier developers have to invest substantially in infrastructure and public spaces that do not yield revenue but that are necessary for the development of the area. A patient landowner can thus freeride on the earlier developers' investments (MacLaran 2003). Even a single, minor landowner might obstruct redevelopment of a substantial area, warranting some form of public intervention such as expropriation or land readjustment (Adams, Disberry et al. 2002).

The price will necessarily also depend on the current financial situation of the landowner. Occasionally a landowner might be in a position to hold out and sell only at an extortionate price but have a need for capital (Adams, Disberry et al. 2002). Other times decent rental income from the current, pre-redevelopment functions may prove an incentive for the landowner to hold off selling until the area has matured (MacLaran 2003). Every now and then one can expect to meet landowners who are more interested in maintaining control of their real estate than in financial profit.

For all these reasons, projects in redevelopment areas where public authorities take a back seat in land assembly are likely to be small. On the other hand, once one firm positions itself to redevelop part of an area, other firms will be interested in the same area as well. This is because they have similar ideas about which areas are relevant for profitable redevelopment and because they can benefit from the efforts made by the first firm to make the area marketable. Urban transformation areas are therefore particularly relevant when studying interactions between developers.

2.2 Redevelopment in Norway and Oslo

Most of the research in this thesis is set in a Norwegian context. Domestic and international migration to the nation's cities is an important backdrop: in the three decades prior to the writing of this thesis, the population of Norway's urban areas grew on average by 1.4 per cent per annum (Statistics Norway 2019). Particularly in Oslo, rampant rises in housing prices have led to a debate on how to meet the demand for housing (Boligvekstutvalget 2016), and save for a few weak years, developers have had few problems selling whatever they can produce (The Competition Authority 2018). For these reasons and because tertiary industries are significantly less spatially demanding than the primary and secondary industries they replace, the need for housing thus dominates Norwegian redevelopment discourse (Nordahl and Barlindhaug 2017). Redevelopment is widely accepted as a viable growth strategy in Norwegian policy and academic discourse, particularly to preserve the nation's limited arable land (Hanssen, Hofstad et al. 2015).

The Norwegian planning system is heavily influenced by neo-liberal policies, although the public sector retains substantial control (Nordahl, Barlindhaug et al. 2011). Land assembly and financing of development are usually left to private firms (Bjordal 2016). However, the overarching ideas for how areas are developed are left to the municipalities, and they have extensive legal tools to halt projects that conflict with them. While Norway is a unitary state in which the central government has the legal right to dictate land use in the municipalities, this only happens in very few cases, and usually only when core national infrastructure is involved (Røsnes 2014). Norwegian municipalities plan the use of their landscape resources through municipal master plans, thematically and geographically limited plans, area zoning plans and detailed zoning plans (Ministry of Local Government and Modernisation 2011). These statutory plans are legally binding, although municipalities can give dispensation for minor deviations.

Through the reconstruction of the building stock following the Second World War up until the 1990s, the public sector was heavily and directly involved in planning, financing and constructing urban areas (Nordahl 2012). The state urged the municipalities to take an active part in supplying land for housing development by providing the majority of the required plots and maintaining a supply for at least 10 years of housebuilding (NOU 1980:8). After furnishing the plots with basic utilities, they would sell them cheap to housing cooperatives or private citizens. This gave the municipalities extensive control over end products, and allowed them to capture some of the price increases from urbanisation and public services (Nordahl 2012). The Norwegian State Housing Bank was heavily involved in the financing of housing construction, offering subsidised loans. The price for housing built by cooperatives was also heavily regulated, which limited the price growth for other types of housing. This ended in 1988, which led to a price boom, followed by a housing market bust in the early 1990s. Housebuilding slowed down, and many municipalities lost money after having invested in plots and utilities. Consequently, most municipalities scaled down or discontinued the active land-supply initiative to improve their finances (ibid.). Many municipalities still owned a substantial amount of greenfield land, but they had substantially reduced economic incentives to make zoning plans where they no longer controlled land and where their ability to control projects through land ownership was reduced (Barlindhaug, Holm et al. 2014). From 1996, the Norwegian State Housing Bank's subsidies shifted from broad subsidies to stimulate and control the housing supply to subsidising marginalised groups in the housing market, thereby further losing direct control (Barlindhaug, Holm et al. 2012). This development has largely been spurred on by neo-liberal demands for efficiency (Kleven 2011).

In Norway, detailed zoning plans can be forwarded by virtually anyone, such as private citizens or public bodies other than the planning authorities, contrary to most comparable countries (Nordahl 2012). In 2018, 75 per cent of all approved zoning plans had been forwarded by entities other than the municipality in question or by organisations that plan on its behalf (Statistics Norway 2019). Such private plans should comply with the master municipal plans and the interests of government agencies such as the Norwegian Public Roads Administration or the Directorate for Cultural Heritage (Ministry of Local Government and Modernisation 2011). The multitude of relevant plans and interests, particularly within the existing urban fabric, can create confusion and uncertainty for both planners and developers (Røsnes 2005)

In the period when most development was on land supplied by the municipalities, they mostly bought greenfields on the urban fringe, on which private developers and housing cooperatives built large-scale suburbs with a focus on construction efficiency (Nordahl 2012). This system provided reasonably priced housing in sufficient quantities to solve the post-war housing shortage (Mäntysalo and Saglie 2010). In Oslo, the agricultural landscape in Groruddalen underwent continuous urbanisation between the 1950s and 1980s. The hills of the valley were used for housing, while spatially demanding infrastructure and industry were placed in the broad valley floor (Ruud 2012). Meanwhile, the largely nineteenth-century housing stock in the inner city was showing signs of decay and inadequate standards (Holm and Søholt 2004).

From the late 1970s, redevelopment of decaying areas in central Oslo began (Ruud 2012). The public sector was heavily involved in a mission to improve the quality of the housing stock, provide better public spaces, increase the home ownership rate and decrease socio-economic housing segregation. In 2001 the City of Oslo opened an office to plan for the redevelopment of the industrial land in Groruddalen as industry began leaving the urban area and public spaces, service providers and transport infrastructure were no longer sufficient (Ruud 2012). While parts of this redevelopment land consisted of single, large plots sold to one developer or small plots where the redevelopment would fill in space in the urban fabric, this redevelopment typically took place in fragmented areas with many different landowners and land-use types (Nordahl and Barlindhaug). Figure 2 illustrates this process.

Because municipalities have scaled back on directly providing land for development and planning or on financing projects themselves, it is difficult for them to instigate redevelopment of designated parts of the city (Barlindhaug, Holm et al. 2014). They are largely dependent on private developers to supply housing, commercial real estate and urban infrastructure. Their main tool to ensure that their land is developed as the political leadership wants is the right to reject private zoning plans. Municipalities can issue conditional zoning rights to achieve their visions for urban areas. This means that the municipalities allow income-generating development provided that the developer also construct roads, greenspace, bike paths and so on (Falleth and Nordahl 2017). This process typically takes the form of a negotiation in which developers try to pass plans that allow more cost-bearing structures and less infrastructure and common spaces (Øyasæter 2018). Municipal politicians are eager to maximise these contributions, providing them with an incentive to allow projects that generate high revenue for developers (Mäntysalo and Saglie 2010). The plans typically specify whether these contributions must be constructed before construction starts on the income-generating structures or before these structures are handed over to the end user. Municipalities also exercise this right to limit growth where it is not wanted, typically on the urban fringe, and to channel development into areas where development is wanted, such as in rundown industrial areas (Kvarv 2003).

While municipal master plans and area zoning plans are made to coordinate spatial use on scales beyond individual projects, they are not necessarily well suited for coordinating redevelopment areas (Bygg 21 2019). Because they are legally binding, they rigidly commit future development to the visions of municipal planners before projects are developed (Øyasæter 2018). Furthermore, municipal planning is a slow process: in Oslo, municipal master plans usually take five to 10 years to develop. According to the 1998-2018 director of the Oslo Agency for Planning and Building Services, this is far too long for a rapidly changing city to wait, and once development starts, the basis for the plans is likely to differ entirely from the reality into which they are to be implemented (de Vibe 2015). In addition to the legally binding municipal master plans and area zoning plans, municipalities are increasingly making plans for common areas and infrastructure in redevelopment areas. These plans, such as the Guideline Plans for Public Spaces (*Veilende plan for offentlige rom* (VPOR)) developed by the City of Oslo, are not legally binding (PBE 2014). Instead, they indicate to developers what investments they will be charged with constructing or affording whenever they develop their plots. These plans have three main functions (Øyasæter 2018): they coordinate these uses across ownership boundaries, providing holistic development in areas being developed at different times by different firms; they provide a method for ensuring that later developers contribute to the early, expensive actions; and they provide developers and landowners with an indication of how expensive their projects will be prior to negotiation with the municipality. The City of Oslo's List of Measure for Public Spaces (*Tiltaksliste for Offentlige Rom* (TOR)) is not even approved by the municipality's political leadership, but rather by the City's Agency for Planning and Building Services (PBE 2015). It is thus more flexible and quicker to develop, but might provide less predictability for developers as the political leadership can stop plans approved by the agency (Støer 2019).

Figure 2: Development of Ulven in Groruddalen. The first two images display aerial photos (Finn.no 2019). The third image is an illustration from the redevelopment firm (OBOS 2018). The project is expected to last for decades. Other firms are redeveloping the surrounding plots.

The complexities of redevelopment iterated in section 2.1 concerning urban redevelopment in general also apply in Norway, particularly the fragmented ownership and the incentive for landowners to hold off development until an area is mostly redeveloped and attempt to freeride on earlier projects (Nordahl and Eika 2017). Norwegian law provides several remedies to these problems. Municipalities can expropriate plots or enact land readjustments to provide redevelopment land, but they are highly reluctant to do so due to the high political cost and insufficient legal expertise (Barlindhaug, Holm et al. 2014). Nordahl et al. (2019) describe more common ways for municipalities to coordinate landowners in fragmented areas: after an area is singled out as viable for redevelopment, municipalities will occasionally gather landowners in forums to facilitate coordination of development and infrastructure provisions, development firms to make joint development plans, or firms to develop the entire area together. These efforts are expensive for the municipalities to plan and get the landowners to agree (Barlindhaug, Holm et al. 2014). Particularly outside the largest urban areas, with limited financial motivation for redevelopment, municipalities can pay up front for some of the infrastructure necessary for a redevelopment. They will organise the developers and landowners in an investment vehicle to secure reimbursement once their projects have the necessary cash flow (Nordahl, Ruud et al. 2019). They will also occasionally provide new plots to voluntarily or involuntarily exchange with landowners in redevelopment areas who are not interested in participating in development (Barlindhaug, Holm et al. 2014). The municipality thus assumes some of the risk of the development, and reduces the landowners' incentive to freeride on each other's infrastructure investments (Nordahl, Ruud et al. 2019). National welfare reforms, such as the universal right to kindergartens, have put a strain on municipal finances (Mäntysalo and Saglie 2010). Because the municipalities' positive tools to influence development tools are costly, their tight finances and lack of access to state subsidies limit their control over development (Barlindhaug, Holm et al. 2014).

Redevelopment is undertaken almost entirely by private firms (Nordahl and Falleth 2011). We can loosely classify three types of developers, based on their motivations and strategies. The standard developer buys land or land rights, draws up a zoning plan after negotiating with the municipality, and hires one or more contractors to build the structures and the required infrastructure (The Competition Authority 2018). Usually they will sell the products afterwards, but many firms rent out office or commercial real estate thought they rarely retain the housing stock. These developers have a strong preference for quick payoffs and for avoiding risk (Bjordal 2016). Even firms with billions in revenues can get by with less than a dozen employees, as managing a project is often a one-person job and external contractors and consultants handle most of the labour-intensive parts of the process (ibid.).

The two other developer types deviate from this in different ways. First, many large firms operate primarily in the construction industry but branch into property development (Barlindhaug 2002). These firms differ from standard developers in that they see development as a way of securing business for their contractors (Bjordal 2016). Thus, while they might have fewer liquidity problems than standard developers, they usually want to move their projects along at whatever rate suits their contractors (The Competition Authority 2018). Finally, a substantial part of redevelopment is undertaken by Norwegian housing cooperatives. These organisations have more than a million members (19 per cent of the population) (Norwegian Housing Cooperatives Organization 2019). The cooperatives became popular in the post-war rebuilding period as a working-class social housing initiative sponsored by the municipalities and the Norwegian State Housing Bank (Barlindhaug, Holm et al. 2014). Since the public sector

has ceased offering development land and subsidies, these cooperatives have increasingly become more similar to standard developers, providing housing in the full market range (Sørvoll 2011). Unlike other developers, they want to maximise the number and quality of the housing units they produce over the long term, but they do this largely by maximising profits and minimising risks, and their directors and managers make decisions on behalf of their members much in the same way as a stock firm makes decisions on behalf of its shareholders (Ingvaldsen 2001). Accordingly, their operations and strategies for issues such as cooperation most likely resemble those of other developers.

These developers have significant scope for reshaping the urban fabric (Sager 2015). In urban areas where redevelopment is possible, the municipalities typically ensure that the broad strokes of the projects are acceptable for them to fulfil their functions and for the local residents, while the developers are largely free to design their projects as they wish within these boundaries. The final product is thus the result of public intervention and the ideas and strategies of all the different developers active in the area. Obviously, a good final product is important not only for the municipality and its citizens, but also for any development firms or landowners invested in the area. This is because all types of urban space generate externalities, as discussed in the next chapter.

3 Theory

This chapter presents the most important theoretical background for economies of scale, externalities, game theory and behavioural economics, and discusses how these relate to cooperation between competing developers.

3.1 Economies of scale and externalities

Most economic activity involves economies of scale: the per-unit cost of producing widgets tends to drop when a firm produces more widgets, up to a certain point (Stigler 1958). In urban development, the term can apply to many different concepts. We can expect to observe similar externalities as in all other production industries: it will generally be less than twice as expensive to build 200 metres of road or 20 apartments than to build 100 metres of road or 10 apartments. In larger projects, machinery need only be moved once, (sub)contractors hired once, and materials bought in bulk (Ariffin, Sulaiman et al. 2016). Large projects allow for mass-produced housing, which is efficient though often less aesthetically pleasing (Benros and Duarte 2009). In a market-driven planning system such as the Norwegian one, the economies of scale present in services and infrastructure are also relevant: until the economies of scale are exhausted, one large kindergarten is more efficient than two of half the size (Mills 1972). Developers' aversion to the risks of over-investing in any one area and over-saturating the market could mean that these economies of scale are more likely to go unexhausted than when the municipality plans them, as in less market-driven planning systems. However, developers might achieve some of these economies of scale through cooperation. The economy of scale that is most central to this thesis, as it is unique for urban development, is the internalisation of positive externalities.

Externalities are secondary effects of an activity that benefits or harms entities other than the one that undertakes it, without the former paying or receiving compensation (Buchanan and Stubblebine 1962). Positive and negative externalities are pivotal for everything that is good and bad about cities (Parchomovsky and Siegelman 2012): humans gather in cities to take advantage of the positive externalities that come from having easy access to many potential employers, goods and services, while employers are similarly drawn to the positive externality of having access to many potential employees, customers and production inputs (Parr 2002). No one would be able to start or run a specialised industry unless thousands of other people had not already

contributed to these externalities, which several scholars classify as economies of agglomeration (Fujita, Krugman et al. 2001). While this thesis deals largely with housing development and externalities therein, agglomeration externalities are of paramount importance for commercial development, also at local level (Parchomovsky and Siegelman 2012). In parallel with agglomeration externalities, having more than just a few dozen humans in the same area for a prolonged period requires some infrastructure to deal with the negative externalities they generate: all humans generate waste and congestion, and most economic and social activities generate additional costs for others (Pigou 2017). While planning in Norway and elsewhere has been geared towards supplying land uses, and particularly housing, at higher levels than the free market would be able to (Barlindhaug, Holm et al. 2014), neo-liberal planning is increasingly dedicated to dealing with externalities (Sager 2011); one can argue that most discussions about successful urban development – such as growth patterns, transportation economics, or regeneration – can be summed up as an attempt to maximise positive and minimise negative externalities.

Closely related to positive (and negative) externalities is the concept of public goods (and public ills). This thesis largely omits these concepts for a number of reasons. Public goods, or rather, goods from which users cannot be excluded and which multiple individuals can use simultaneously (Varian 1992), are – for the purpose of the reasoning in this thesis – virtually the same as positive externalities. Typical examples of public goods, such as street lighting, greenspace and libraries, can simply be framed as generators of positive externalities. Thus, the following discussion about positive externalities could be framed as a discussion of public goods. Above, the agglomeration economy that motivates humans and industries to locate to hubs was framed as externalities generated by many people working, producing and consuming in the same place. However, little would be changed by framing it as a public good to which these people contribute. For the sake of simplicity, this thesis focuses solely on externalities.

End users have a strong preference for housing qualities that are easy to see, such as aesthetic construction (Nase, Berry et al. 2016). A study of projects improving existing housing in Richmond, Virginia in the US calculated the higher sales prices at between 200 and 600 per cent of the investment, with the effect halving about every 300 metres away from the project (Rossi-Hansberg, Sarte et al. 2010). Including some vegetation can increase property values by 7 to 10 per cent in urban areas with little or no greenery, and small parks can affect housing prices more than a hundred metres away (Mei, Zhao et al. 2018). In the same way, housing units are priced higher if they are located close to kindergartens, independent of whether or not they are in the same project (Theisen and Emblem 2018). In redevelopment areas, not only the public, as represented by municipalities or non-government organisations, has interests in the provision of these externalities. As we have seen, there tends to be several developers working in each such area, all of them with an interest in seeing as many positive externalities be provided on neighbouring plots as possible. These goods provide 'windfalls' (Dowall 1979) in the form of direct positive externalities for neighbours with development potential by making the area more marketable as well as indirect positive externalities by reducing municipal requirements for these functions on their plots. Thus, large-scale projects might be inclined to include such uses even if the public authorities do not require them to, while small-scale projects might only prioritise them in order to maximise the volume of cost-bearing residential and commercial structures. In cities with no or weak limits to sprawl, developers will want to internalise these externalities by building over large swaths of greenspace in the edge of the city (Fujita, Krugman et al. 2001 p. 21). These will typically be large, master-planned communities made by developers

aiming at cost-efficient, mass-produced housing and services (Coiacetto 2007). However, if many such smaller developers would band together, they could create as big an incentive to construct these externality-generating land uses as a single large developer would have. These positive externalities would increase the potential payoff for transforming other plots in the area.

The areas which municipalities single out for redevelopment typically have low standing in the housing market (Teaford 2000). In addition to being unattractive 'leftover space' (Hwang and Lee 2019), slums (Andavarapu and Edelman 2013) and industrial sites (Haninger, Ma et al. 2017), these areas often have social problems (Dixon, Otsuka et al. 2011). While the public sector often spends resources on improving the reputation of areas in which it wants to see redevelopment on a macro level (Ruud 2012), developers spend resources on branding not only their individual projects, but also the neighbourhood in which they operate if its reputation is bad (Nordahl 2012). This can create a positive externality for any plot with redevelopment potential in that neighbourhood.

Depending on the specifics, there can be significant positive externalities in marketing. Some marketing relates to specific projects, while other efforts relates to entire redevelopment areas (Nordahl 2012). This has been little studied from the perspective of the land developer, but Marshall (1919) pointed out the difference between what he called combative and constructive advertising. He pointed to the introduction of typewriters and how people would not be persuaded of its advantages over handwriting by anything less than demonstrations by skilled typists. This form of advertisement was very expensive, but once the public authorities were convinced, the firm that had paid for the advertising did not have a strong competitive advantage over typewriter manufacturers who had not paid for demonstrations. This dynamic, he pointed out, is typical for a product that must produce its own demand, as opposed to the majority of new products that simply fulfil an existing demand. In the housing market, this is the equivalent of the difference between a popular area, where marketing efforts only need to distinguish a product from competitors in the first- and second-hand markets, and a run-down area with little initial housing demand. Similarly, Forker and Ward (1993) argue that marketing efforts can be divided into generic advertising, which increases the total market demand, and brand advertising, which primarily aims to increase the market share. For instance, agricultural producers run many campaigns to increase consumption of specific foodstuffs without being affiliated with any one particular producer. Such campaigns are typically financed by alliances of producers which individually are too small to finance a shift in general consumer behaviour.

Firm-specific brand advertising can also create a positive externality for competitors. Roberts and Samuelson (1988) found that cigarette advertising barely increases the advertiser's market share, but rather enlarges the general market for cigarettes. In other words, the extent to which different types of marketing of redevelopment areas spill over onto plots not controlled by the branding firm can prove somewhat counter-intuitive. Insofar as developers create a new market for their product, there will be significant positive externalities for other developers or owners of developable land in the area, while the effect is more dubious where developers simply market to create a demand for their particular product in an existing housing market. Redevelopment of industrial or run-down areas will usually come under the first category, at least in the initial phases.

The literature on place branding is rich, although little of it relates to developers' neighbourhood branding strategies (Govers and Go 2016). Generally, place branding is not much different from branding in other industries: it is a strategy to distinguish one place from competing places to increase profits (Hospers 2006). Individuals with bounded rationality are unable to obtain and

process all relevant information when buying products, and will therefore depend on an existing image of the product (Simon 1957). Branding is simply a way to create or improve this image. For both areas and for more tangible products, it is great to have a good reputation, but a neutral reputation is better than no reputation at all (Rainisto 2003). This is encouraging news for anyone wanting to brand an area, as it is difficult to create from nothing a brand that stands out positively in the minds of users and customers (Weilbacher 1995).

3.1.1 Dealing with externalities

Any activity that provides positive externality is prone to a market failure of under-provision (Alfano and Marwell 1980). Because the developer does not receive the entire benefit of parks, kindergartens, aesthetic architecture, or of neighbourhood marketing, the individual equilibrium where its marginal costs meet marginal benefits from externality-generating activities is lower than the social equilibrium of marginal costs for all developers meeting marginal benefit for all developers (Webster 1998, Dawkins 2000). Similarly, a developer developing an entire redevelopment area would want to invest more in these goods than the total investments of multiple developers sharing an identical area. (Fujita, Krugman et al. 2001). It will also lead developers to find financial partners to accept some of the burden of redeveloping larger projects in redevelopment areas in joint ventures, and thus internalise the positive externalities (Rowley, Costello et al. 2014).

There are many ways in which the public, typically represented by the municipalities, can attempt to provide efficient levels of positive externalities. Public-sector zoning can secure land for utilities, greenspace and social infrastructure, and the public can construct and maintain these uses itself. It can then extract compensation from beneficiary developers and landowners as repayment for windfalls or as compensation for the negative externalities created by their development (Alterman 2012). Municipalities – particularly in the US – increasingly employ tax increment financing, subsidising redevelopment by providing positive externalities in derelict areas financed on the promise of future property tax revenue (Dye and Merriman 2000). As an alternative to zoning, the public sector can regulate development through, for instance, deed restrictions, public land assembly and by leveraging neighbour rights (Qian 2010). Some planning systems allow more expanded internalisation, primarily the system of incentive zoning in many US cities. Here, planners allow higher densities for projects that include socially and environmentally beneficial land use, such as public areas and schools (Feiock, Tavares et al. 2008). These systems are basic forms of Pigouvian planning, whereby the problems of under-provision of positive externalities and over-provision of negative externalities are handled through public-sector incentives and disincentives to internalise them into the project that produces them, and then letting the firms themselves decide the optimal levels (Webster 1998).

The success of Pigouvian planning for ensuring a socially optimal level of positive and negative externalities depends on the planning authority's ability to efficiently calculate the marginal costs and benefits of different land uses (Crone 1983). When deciding what levels of road investment to demand of a redevelopment project, the municipality must appraise the disutility the project produces by adding to congestion: if it under-appreciates the externality, congestion will increase, while if it over-appreciates it, developers will have to shelve some projects that provide more economic benefit than the cost of the congestion. Similarly, a system like the incentive zoning system used in the US can let developers build too densely if the developers over-appreciate the positive externalities from a project. When planning for the real world, and particularly within the existing urban fabric, the number and complexity of externalities render entirely accurate

appraisals impossible. The best we can hope for is a good approximation, which should lead to close to optimal levels of externalities.

Many planning theorists argue that the Pigouvian approach to externalities is less than ideal (Chung 1994). Many of their arguments could be particularly relevant when dealing with the complexity of urban externalities, and particularly the positive ones. At the very least, it is costly for the public sector to find the right levels of externalities and find efficient ways to internalise them into the projects (Sager 2007). Public-sector planners can go too far in offsetting negative externalities by demanding too many resources towards infrastructure and slowing down or choking projects. With limited information in the fluid decision-making environment of a redevelopment, area zoning planning is likely to lead to inefficient outcomes (Sorensen and Auster 1989). Furthermore, the complexity of the network of relevant decision-makers and stakeholders in urban redevelopment scenarios renders this type of hierarchical governance difficult and frequently unpopular (Blokhuis, Snijders et al. 2012).

In addition to the Pigouvian approach, the economic literature discusses another common strategy for achieving efficient levels of positive and negative externalities (Crone 1983). What has been dubbed the Coase theorem (Stigler 1966) dictates that society will generate a Pareto-efficient level of externalities if rational actors can make deals where the producers are compensated by the recipients for producing positive externalities or for ceasing to produce negative ones, or if they compensate the recipients for producing negative externalities (Coase 1960). As an example, an actor A manufactures widgets that yield a diminishing marginal profit but that imply a cost to actor B per widget, as B's cattle farm suffers from the pollution. If B has a right to stop this pollution, B can demand that A compensate B for at least as much as the cost of the pollution to B, whereupon A will limit the production of widgets until the marginal gain of producing widgets meets the marginal cost of the pollution. If A's right to produce widgets takes precedence over B's right not to suffer pollution, B can compensate A to manufacture only as many widgets as the marginal cost to B meets the marginal benefit to A. In either case, A and B will negotiate a deal that is a Pareto improvement over simply letting A manufacture with no regard to the pollution or letting B terminate A's manufacturing.

The theorem assumes clear property rights, zero transaction costs and full information about the value of the externality. The further a scenario is from fulfilling criteria, the more difficult it is to reach a solution. For instance, almost everyone will suffer some disutility from any activity that emits greenhouse gases, but because transaction costs are non-zero, it is unfeasible that any person who releases greenhouse gases should compensate all these people. When a developer builds a park in a city, there are thousands or millions of recipients of the clean air, aesthetics and amenities it provides, but most individuals' preferences are too low and cannot easily be quantified to compensate the developer in a meaningful way, validating at least some public-sector intervention. In other words, proponents of the Coasian solution are not suggesting that there is no role for public-sector planning in the procurement of positive externalities, since that would suggest a world without transaction costs.

While some might derive significant benefits from the park, such as close neighbours who will overlook it from their balconies, the benefit is non-monetary until the neighbours sell their apartments. This makes monetary compensation for the entity constructing the park difficult. Having a large swath of land under development at the same time by different firms allows for a potential Coasian approach to dealing with positive externalities. Unlike most landowners in a redevelopment area, active developers are directly capitalising on positive externalities and can

monetise them when they sell their units. They can incentivise neighbouring developers to provide additional externalities through investments that enhance the area's marketability beyond their indifference point by directly compensating them or by making similar investments in kind. (Webster 1998).

As Coase points out, the compensation system is only perfect in a world with full information about the scope of the externalities so that all parties appraise them equally and accurately, and where the cost of making and enforcing deals is zero. One corollary of the theorem is that in markets with unclear property rights, high transaction costs and/or insufficient information about the scope of the externalities, the free market will supply fewer than optimal positive externalities. In urban redevelopment situations in Norway, the relevant property rights to positive externalities tend to be well defined and universally known because the municipality publicly defines each developers' rights to generate negative externalities and minimum demands for positive externalities. Lowering transaction costs and providing additional information about the value of the externalities offer an alternative to public-sector intervention to make the level of externalities more efficient (Lai and Hung 2008). Costs of transactions between developers in Norway and elsewhere depend upon the dynamics of their relationships and the specifics of the systems employed for redevelopment. This leads us to the main questions in this study: Do developers cooperate to internalise these externalities in praxis? How do their heuristics and biases influence this? And does Norway differ from other countries in this respect? Sections 3.2, 3.3 and 3.4 deal first with the dynamics of such relationships and then with other criticisms of Coasian solutions to externalities from the fields of behavioural economics and game theory.

3.1.2 Negative externalities

The above section and this thesis in general focus on positive externalities as opposed to negative externalities for two reasons. First, it is practical to focus on one, as the line between them can be blurry. For instance, it is not necessarily meaningful to distinguish between *causing* a negative externality by polluting a river, blocking direct sunlight by building tall and dense, or causing road congestion by not upgrading roads when building houses and *diminishing* a positive externality by removing access to clean water, sunlight, or fast transportation. In microeconomic terms these concepts function very similarly (Webster 1998). For most economic purposes it does not matter whether we discuss a situation where A pays B to provide a positive externality or whether A can forgo income for not afflicting B with a negative externality.

In the real world, dissimilarities between positive and negative externalities emerge. It could be more likely to be mendable efficiency losses in the provision of positive than negative externalities. A fundamental finding of behavioural economics is that humans in general will work harder to avoid a cost than to achieve a corresponding gain (Tversky and Kahneman 1991). Correspondingly, we can assume that individuals suffering losses from negative externalities will rarely suffer in silence: if a property is devaluated by reduced sunlight due to development on a neighbouring plot, the owner will be quick to complain. However, a landowner will rarely complain that a neighbouring developer is refraining from investing more in beautification of its project when it is close to its indifference point. Correspondingly, when a developer makes such investments, it is less likely that they will ask neighbouring beneficiaries for compensation for the positive externality it provides because it would represent a mere gain rather than avoiding a loss.

This also relates to land use laws, which tend to go further in protecting people from negative externalities than ensuring the provision of positive ones. Countries tend to have more laws and regulations relating to negative externalities than to positive ones (Parchomovsky and Siegelman

2012). For instance, the Neighbouring Properties Act (1961) in Norway establishes that land use may be disallowed if it provides a neighbour with significant negative externalities, but not that they may continue a use that provides significant positive externalities or that these must be considered when choosing between options of near-equal value. The Planning and Building Act of 2008 states that municipalities may not demand activities that generate positive externalities as compensation for approving a plan beyond those necessary to offset the negative externalities of the plan. Although all public-sector interventions must have a legal basis, municipalities have wide scope to demand that the negative externalities of an activity be compensated for even without specific legal authority (Reusch 2014). In other words, negative externalities are to a larger extent solvable by public-sector intervention and Pigouvian planning. The complexity of positive externalities renders this difficult, so market-oriented solutions and cooperation between developers might yield better results.

3.1.3 Externalities in the Norwegian planning system

In the post-war period, the Norwegian planning system left it to the municipalities to provide efficient levels of externalities through planning (Falleth and Nordahl 2017). They could weigh society's need for various land uses against the externalities they brought, calculate the optimal levels of positive externalities where marginal social benefit met marginal social cost, and find sufficient mitigating efforts to alleviate negative externalities. By contrast, the current Norwegian planning system is largely designed to enable the municipalities to ensure that developers compensate each other and the public for the negative externalities they generate, but does not deal directly with positive externalities. Developers draw up detailed zoning plans, and the municipalities generally do not have the resources necessary for land uses such as greenspace, services and public spaces (ibid). Instead, their legal tools allow them to ensure that new projects furnish such land uses insofar as they can claim it is done to offset the negative effects of the project or if they are necessary for completing the project. This is mostly done through conditional zoning rights, whereby a developer is given the right to develop assuming it can also afford certain benefits such as roads and greenspace to alleviate the problems the development causes. This can include participating in public-private partnerships for infrastructure development (Falleth, Hanssen et al. 2010). The power of this tool depends on the demand for building rights in the area, so municipalities in urban growth areas have far more options for negotiating such deals. This also means that the municipalities must allow a sufficient level of income-generating land use, most often housing, for the developer to carry these costs. These negotiations usually start early in the planning process (Røsnes 2005). However, the municipalities may not participate in legally binding partnerships for infrastructure development until the zoning plan is approved, (PBL §17-4), unlike in Germany, for instance. This can create some uncertainty for developers (Holth 2017).

The Building and Planning Act of 2008 and subsequent amendments place some limitations on such deals: the municipalities may specify types, numbers and pre-emption of housing units, and the provision of infrastructure and other works necessary for fulfilling the plan insofar as these are proportionate to the proposed development and to the burden it places on municipal infrastructure (PBL §17-3). Municipalities may not require developers to afford positive externalities simply to reach Pareto efficient levels, even in situations when a group of developers would benefit from all of them being forced to afford costly externalities. However, since the political leadership in municipalities is free to reject plans with impunity, and since private developers normally have no right of appeal, the municipalities may go beyond these limitations.

They have wide-ranging powers to decide what constitutes improvements 'necessary' for developing a project or to offset negative externalities. As these rules are used by the municipalities, necessity goes beyond what is necessary for the buildings to be safe and sanitary, such as road access for emergency vehicles and access to sewage systems and potable water. For instance, the act specifies that municipalities may not require developers or landowners to pay for social infrastructure such as schools and kindergartens (Ministry of Local Government and Modernisation 2010). However, they will frequently notify developers that kindergartens in an area are at full capacity and will not approve building additional housing before additional kindergartens are constructed. A developer might have to include kindergartens if it wants a project approved, because municipalities typically have tight budgets and an incentive to wait for developers to undertake construction. However, while a kindergarten generates positive externalities by increasing neighbouring housing prices, when requiring a kindergarten to be built before the project is approved the municipality must argue that it is necessary due to the added demand created by the project. The argument that the net externalities generated by the kindergarten exceeds its cost is irrelevant.

There are still some ways developers can internalise the positive externalities they generate. Generating positive externalities such as greenspace, which benefits neighbours, benefits developers by increasing the likelihood of planning approval. Developers can also translate these positive externalities into monetary benefit if they can argue that the plot can sustain more housing units or other cost-bearing functions. Furthermore, section 18-3 of the 2008 Planning and Building Act states that a developer may demand reimbursement from landowners who benefit from common areas, roads, water, sewage or surface runoff systems and even public spaces. For industrial developments they can also demand reimbursement for greenbelts built to shield surrounding areas from new industrial developments, if these greenbelts allows for industrial development on other plots. However, this only applies to investments that are necessary for developing the developer's and the neighbouring landowners' plots, as deemed by the municipality. The municipality and the developer could have a common interest in claiming that large numbers of public spaces are necessary for a project, so that the developer could have this reimbursed later. This would provide it with an incentive to produce numbers of public spaces that are efficient considering the economic interests of all owners of redevelopment land in the area. The extent to which this tool can be used to internalise the positive externalities from these land uses is largely unstudied.

3.2 Coopetition

Developers interacting for mutual gain, such as when compensating one another for externalities or constructing infrastructure, are in a precarious situation because they are simultaneously cooperating and competing. The portmanteau *coopetition* denotes this stance (Giovanni and Giovanna 2002). This section looks at the literature on this subject to try to identify moments that are relevant to indicate motivations for and barriers to coopetitive strategies in urban redevelopment. While the idea of coopetition might be familiar to most redevelopment professionals and scholars, it is mostly unstudied from the perspective of interacting development firms. Fortunately, much of the general literature is applicable, but the peculiarities of the redevelopment industry, particularly regarding the dynamics and pervasiveness of externalities, warrant some caveats.

Before the turn of the millennium, theory on inter-firm relationships usually focused either on competition between firms to achieve advantages over one another or on cooperation for collaborative advantages, which were seen to be diametrical opposites (M'Chirgui 2005). Many

strategy scholars ignored the fact that cooperating firms have multiple goals, some of which converge, some do not interfere, and some conflict (Padula and Dagnino 2007). Brandenburger and Nalebuff introduced the term *coopetition* to the academic and professional world in their book *Co-opetition* (1996). They argued for the use of game theory to develop and justify business strategies and particularly competitive, non-zero sum games. In such games, the players simultaneously try to maximise the size of the pie and their share of it. In such a game, both cooperation and competition can pay off depending on the specifics of the situation. They claim that in the 21ˢᵗ century, a firm that is able to see itself as a node in plus-value networks with other firms will have a huge advantage over a firm with a singular focus on its own endeavours. Citing the cooperation between General Motors and Goodyear, they propose the term *complementors* to denote one actor's products creating a positive externality by improving the market potential for other actors' products. The logic here is similar to the agglomeration externalities created in cities. This complementarity is often neglected by managers, particularly when the complementor is also a competitor (Giovanni and Giovanna 2002).

Technology-intensive industries in particular have usually been in the vanguard of making coopetitive alliances (M'Chirgui 2005), and much coopetition research deals with pooling resources in research and development (Faems, Janssens et al. 2004, Cassiman, Di Guardo et al. 2005, Walley 2007). Research tends to create positive externalities because other market actors can appropriate the technology without paying the price of development (Blomström and Sjöholm 1999), and it might be difficult for any single actor to reach the critical mass needed for big breakthroughs (Ritala and Hurmelinna-Laukkanen 2009). Coopetitors will often first want to cooperate to unlock certain new benefits and then shift to more confrontational competition. Samsung Electronics and Sony Corporation were fierce competitors in the global electronics market, but in 2004 they established a joint venture (Gnyawali and Park 2011). By combining their technologies, massive financial backing, and Sony's strong brand, the project more than doubled their mutual market share over the following four years. The alliance also achieved the scale needed for their technology to become the industry standard, significantly reducing the manufacturing cost per unit. As their market shares grew, so did the competition between them; both constantly released competing TVs using the same technology as well as competing in most other areas of consumer electronics (Gnyawali and Park 2011). Cooperating firms also exchange other forms of knowledge, such as practice and experience, which can be an important motivation for coopetition (Loebbecke, van Fenema et al. 1998).

Real estate development (as apart from construction) is not a research-intensive industry (Coiacetto 2006). There are parallels, however, both in the presence of significant externalities, and in the importance of reaching threshold levels where the positive externalities of housing units and other land use (or the removal of the negative externalities of urban blight) in an area change the nature of the neighbourhood. Both of these dynamics are present when developers rebrand derelict redevelopment areas (Dixon 2007).

Although it is established as an important factor in urban redevelopment, there is little literature on developer-driven area branding in general and cooperatives in particular (Frantal, Josef et al. 2015). In tourism destination marketing, on the other hand, coopetition is a familiar term. Like developers, restaurants, hotels and amenity providers have a mutual interest in attracting people to their areas, but once that is done they are in direct competition with one another. They most often form loose alliances to boost their destinations, but they can also engage in highly integrated cooperation schemes. Wang and Krakover (2008) categorise the different levels of integration, from weak to strong, as informal forms of *affiliation*: *coordination*, where parties align activities, sponsor the same events or work towards the same compatible marketing goals; *collaboration*, where parties formulate common strategies; and *strategic networks,* where parties share a vision

and consistently strategise together. They find that the actors need to have a 'macro business perspective' so that they see the mutual advantages of coopetition, and to have a cooperative mindset: in the long run, a philosophy of maximising the value of the area might yield better payoffs than constantly maximising profits, and trade associations should instil this mentality in their members.

Ritala (2012) looks at what environmental factors affect how well suited a market is for coopetition. Firms can share risks and costs through cooperation, making market uncertainty a motivator for coopetition. Redevelopment is a risky business, and developers have a strong preference for risk-mitigating strategies (Barlindhaug and Nordahl 2011). This might be truer for Norway than for many other markets, as Norwegian developers to a large degree depend on their own funds and bank loans for funding rather than on risk-willing investors (Barlindhaug and Nordahl 2017). Some scholars find that other markets with high network externalities such as telecommunications (Dittrich and Duysters 2007), where users derive greater value from products when others consume similar products, are also likely to spur coopetition. As we have seen, urban development is an industry characterised by high network externalities, foremost of which are the various economies of agglomeration.

Although cooperating to harness economies of scale and internalise positive externalities of development theoretically carries large benefits for developers, there are several reasons they may be reluctant to do so. The literature on inter-firm cooperation gives several indications to why cooperation between developers might be difficult to achieve. If they consider each other as the only relevant competitors, much of the benefit from cooperation, in the sense of higher-value units at a lower cost, will go to end users and landowners because both developers will want to reduce sales prices to out-compete each other (Ginevičius and Krivka 2008). However, how strongly developers in a neighbourhood compete with one another will vary significantly between cases: when developers build apartments in a neighbourhood, they can be seen to be competing only with each other or with developers of all first- and second-hand homes available in the entire city or conurbation. For instance, Coiacetto (Coiacetto 2007) argues that some developers target specific sub-markets and differentiate customers by lifestyle, life stage, income or by whether they have previously owned homes. In Norway, the foremost example of this would be the housing cooperatives, which in the decades following the Second World War heavily focused on working-class families seeking to buy their first home (Barlindhaug, Holm et al. 2014). However, these housing cooperatives are now increasingly selling to the whole market range (Sørvoll 2011), and while some developers particularly target higher or lower ends of the market, they will usually want to spread their products over a wide range (Røisland 2018).

Of course, coopetition can introduce new types of risk and uncertainty, particularly when the participants have limited information about one another's actions (Ritala and Hurmelinna-Laukkanen 2009). Coopetition will likely invoke disagreements regarding tasks, values, personal relationships and roles at both organisational and individual level (Bengtsson and Kock 2015). For instance, managers will often face role conflicts because they have to relate to both their native firm and to the coopetitive organisation, which can incur a cost to both (Dowling, Roering et al. 1996). If such conflicts are not addressed, they are likely to spread, and may paralyze a project (Mele 2011). Although knowledge exchange is a motivator for cooperation, appropriation of knowledge and technologies can be a source of tension (Loebbecke, van Fenema et al. 1998). In some cases, the faster learner can gain a position to later out-compete their partner (Khanna, Gulati et al. 1998). The logical way to avoid this is to limit knowledge sharing between the coopetitors, an example of the tension between creating common value and private benefit (Tidström 2014). In many types of cooperation, the monetary value of the benefit can be difficult or impossible to calculate, which would make both compensation from beneficiaries and

reciprocation schemes difficult to be seen as fair by both parties (Rossi-Hansberg, Sarte et al. 2010).

Urban development in Norway (The Competition Authority 2018) and elsewhere (Coiacetto 2006) is marked by substantial differences in power between firms. In coopetition, one party's market position, size, available resources or technology can enable it to force the alliance to act in a way that works against the weaker party's interests (Osarenkhoe 2010). This shifts the weaker party's interests away from what is good for the alliance towards increasing its own power and decreasing its dependency on its partner (Luo 2005). For a long time, the market for personal computers was split between Apple and a complementary alliance of IBM and Microsoft. IBM supplied the hardware and Microsoft the Windows operating system, despite the fact that IBM was also developing operating systems (Hagedoorn, Carayannis et al. 2001). However, Windows could be installed on PCs made by IBM's competitors, causing an imbalance in power within the alliance. Towards the end of the eighties, both Apple and IBM were rapidly losing market shares (Golnam, Sanchez et al. 2014). Being in such an uncertain market position can often push organisations to seek new allies (Gulati and Gargiulo 1999). In 1991, IBM and Apple formed an alliance and subsequently entered into several joint ventures to develop software and hardware. These ventures used the skills of both firms to develop software and hardware which both firms could use in their computers (Golnam, Sanchez et al. 2014). In urban redevelopment areas, plot locations in particular will likely create asymmetries in the firms' relative power and dependence on cooperative schemes.

Coopetition can sometimes skirt the boundaries of antitrust regulations (Bengtsson and Kock 2000). Adam Smith provides an oft-quoted phrase in *The Wealth of Nations* (1776): 'People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.' Such meetings would indeed qualify for coopetition, though they lie outside the realm of typical coopetition research (Walley 2007). Antitrust regulations can occasionally skewer the odds against coopetition, as the rules are often general and contain grey areas, such as managers' informally indicating prices or production quotas (Ingram and Qingyuan Yue 2008). In the US at least, coopetition research and praxis were until the 1980s hampered by an ideology of seeing all such efforts as collusion (Dagnino 2009). Many of the reasons for fragmentation in redevelopment areas – primarily high start-up costs and limited access to plots – make it difficult for new firms to establish themselves, which may stifle competition and increase the viability of collusion (Barlindhaug and Nordahl 2011).

Coopetition is one of many different strategies that have gained popularity as firms attempt to survive in the increasingly harsh competition of today's globalised world (Osarenkhoe 2010). The redevelopment industry was for a long time less global than other industries (Bardhan and Kroll 2007), although 'world cities' in particular have seen a sharp rise in international investment in the past decade (Lizieri and Mekic 2018). The redevelopment industry in Norway is less exposed to foreign competition. Moreover, most Norwegian housing markets in urban areas have shown steadily upward trends for several decades: the price for second-hand apartments in Oslo grew by 1100 per cent from 1992 to the beginning of 2017, with no setback taking more than a year to regain (Statistics Norway 2018). In other words, the redevelopment industry has arguably not had to innovate to make a profit, unlike other industries.

Several of these barriers to cooperation relate to two different fields of economy which the thesis introduces in the following two sections. First, game theory relates to strategic choices made by rational, profit-maximising agents (Gibbons 1992). The Coase theorem, which section 3.1.1 invoked to propose coopetition as an answer for solving the undersupply of positive externalities in redevelopment, is based on thought experiments in what such rational actors would do in

various scenarios involving externalities (Coase 1960). Despite this, several scholars mentioned below use game theory to criticise the theorem, citing situations where rational actors will be unable to make efficient agreements. The next section will discuss behavioural economics, which relates to how real humans strategise in economic situations, and particularly how this differs from the purely rational actors of classical economics and game theory (Camerer, Loewenstein et al. 2011). Many kinks in human behavioural patterns influence the prospect of cooperation, particularly the transaction costs of deal making.

3.3 Game theory

As a step towards answering the questions posed in this thesis about how and why developers cooperate, it could be viable to look more closely at what is theoretically the optimal solution for perfectly rational entities interacting with one another. The term game theory denotes this type of analysis (Gibbons 1992). The argument of Pareto-efficient cooperation between developers to internalise the positive externalities from building marketable neighbourhoods together is illustrated by the Coase theorem, which is based on such reasoning, while several scholars employ game theory to criticise it. Moreover, when making strategies for achieving economies of scale together, developers are likely to encounter situations that can be described and analysed through game theory.

Game theory has been the topic of research for decades, particularly after the works of Neumann and Morgenstern (1944) on zero-sum two-player games and cooperative games and Nash's work on non-cooperative games (1951). Since then, scholars have applied game theory to a number of different fields. There are a few notable examples of its application to urban redevelopment scenarios. For instance, Weiler (2000) uses game theory to show how redevelopment areas are subject to market failure due to high costs for the first redeveloper: he also points to the positive externalities created by a redevelopment project in a run-down urban area. He models the situation where two developers, A and B, decide whether or not to start development of commercial real estate for renting. Abstaining entirely will always yield no losses or gains beyond the opportunity cost. Entering first will yield either a loss or a profit from having a local monopoly. However, if it yields a profit, the other developer will develop too, and both will receive a smaller profit due to the competition. In other words, the first developer will suffer either a loss or a gain until the other developer completes, at which point the gain will be smaller. This means that if the risk of a loss is more detrimental than the marginal advantage of having a monopoly on real estate for a limited time, both developers have an incentive to wait for the other to develop. This can lead to a situation where neither develops, if the actors are risk-averse, the difference between the monopoly and the competition price of commercial real estate is small or the chance of and potential fallout from a project failure is high. Weiler's game assumes that the developers receive a higher rent for their real estate when they have a monopoly. However, it is entirely plausible that having additional projects in the area, and the agglomeration externality this creates, drive the rents higher after both projects are completed, despite competition (Yang, Pan et al. 2019). In such a scenario, the strategy of waiting will be even stronger, as there is no advantage in developing. Weiler points to the need for public investment into such areas, echoing what other researchers find using other methods (MacLaran 2003, Dixon, Otsuka et al. 2011). He suggests that this could be achieved directly through infrastructure and other investments or through financial incentives for the first redevelopers, because the public authorities will benefit both from social externalities from such a project and from a long-term increase in revenue from the improved area. The positive externalities created by redevelopment create a similar situation in Norwegian redevelopment areas (Nordahl 2012). The main difference is that projects in these areas usually derive most of their profits from housing units, most of which are sold during or on completion of the projects, so that the developers' economic interest in the area ends once their project is completed (Barlindhaug and Nordahl 2018).

This is a type of chicken game, where both players have an incentive to wait till the other acts, but where it is better for either player to act first than for neither to act at all (Rapoport and Chammah 1966). This differs from the more widely known prisoners' dilemma, where two or more actors must decide between doing what is good for the group (cooperating) and defecting (Tucker 1950). If both cooperate, they both receive a medium payoff; if both defect, they both receive a worse payoff. As above, if one defects while one cooperates, the defector receives the maximum reward. The difference from the chicken game is that in the prisoner's dilemma, the cooperator receives a worse payoff if its opponent defects. When players can only decide for themselves, with no way of influencing the other player, the perfectly rational actor will always defect, because no matter what the opponent decides, defection is the better option. In game theory terms, this is known as the Nash equilibrium, as it is a solution where neither player can receive a better payoff simply by changing its own decision (Myerson 1978). However, both players cooperating makes both better off than if both defected, making the Nash equilibrium Pareto inefficient (Luce and Raiffa 1989). Since it is better for a player who thinks its opponent will defect to cooperate in the chicken game, there is no such stable Nash equilibrium.

Situations where behaving both cooperatively and competitively can yield good results can often be framed as prisoner's dilemmas. Typically, it is better for both parties if they act cooperatively towards each other, for instance by creating positive externalities, but both have an incentive to maximise their short-term profits by acting competitively and only create positive externalities when it is rational for themselves in isolation. Here it is worthwhile mentioning *Conflicts and Cooperation in Brownfield Redevelopment Projects* (Blokhuis, Snijders et al. 2012), in which the authors report on a conjoint analysis of Dutch public planners and private developers where the subjects – Dutch development consultants – assess a number of different hypothetical plots. From these assessments, the authors form a picture of how the subjects evaluate different factors and of what is likely to cause friction between developers and planners in scenarios where a planner and a developer have to agree upon a plan. They then analyse these findings in the light of game theory, concluding that conflict in the game between planners and developers of urban redevelopments is not typically a prisoners' dilemma. Rather, the game would reach a unique equilibrium in which one or both players cooperate. The primary factor in determining whether both would choose to cooperate was whether the plans were seen to bring high and equally distributed gain to both players, not the other factors studied, such as the power relationship between the players, the risk and uncertainty of the project or failure to reach a stable equilibrium.

Cooperation can run into problems – even if it is good for all parties – if they fail to agree upon the distribution of the benefits. Hideshima and Okada (1996) envisioned a cooperative game between two landowners and a road authority- The road authority will make a road, either cooperating with one or two landowners, or individually going around them. The grand coalition, whereby all players cooperated, would in such a setting typically be the most efficient way for the road authority to reach its goals and the landowners to service their land, as it would maximise the effect of the positive externalities created by the road and would allow for economies of scale in its construction. However, it will only be reached if the players are able to agree on the distribution of the cost saving that stems from meeting their needs through cooperation. They look on the likelihood of reaching various coalitions depending on the distribution of land between the two landowners, and how much the other parties benefits from their cooperation. To create cooperation that is more robust, they advocate that co-operators divide the benefit from any cooperation proportionately according to how much they will benefit from the project.

Similarly, the Coase solution to externalities can lead to a negotiation of the surplus value as opposed to a fixed market price as indicated in the theorem (Hahnel and Sheeran 2009). If developer A considers constructing a park at a net cost of C that implies a utility of C+U to

developer B, any compensation of developer A greater than C and smaller than C+U will be a Pareto improvement compared to not constructing the park. However, finding compensation within this range can be difficult and can lead to inefficiencies. If this type of transaction happens often, both developers will have an incentive to reject a deal that is close to their indifference point in the hope of receiving better offers in future interactions. Furthermore, even in situations where they can reach a Pareto-efficient level of externalities, it is less likely that they will reach the socially optimal level. The exact level along the Pareto frontier will instead be decided by the dynamics of the negotiation (Hahnel and Sheeran 2009).

In a situation where there is one provider and one recipient of the externality and where the provider has the right not to provide the externality, there is no advantage for the recipient to under-represent the value of the positive externality when negotiating compensation (Coase 1960). This is a significant advantage of the Coase solution over the Pigouvian solution, as it is often impossible for a third party to accurately appraise these values, and there is a clear incentive for the recipient to misrepresent them when a governing body designs a system for handling the externality (Friedman 1989). However, when there are multiple recipients, as with a developer generating positive externalities in a redevelopment area with more than two developers, the recipients can try to freeride on the willingness of others to pay for this externality by signalling less willingness to pay (Ellingsen and Paltseva 2016). For instance, when considering a park or marketing a neighbourhood, it is unlikely that any one beneficiary of the positive externality will have an incentive to compensate the generator of the externality for investments beyond the investor's indifference point, if the beneficiary has no way of ensuring that the other beneficiaries also contribute. This leads to a prisoner's dilemma, in which each beneficiary understates its benefit from the externality, although it would be a Pareto improvement for all of them to represent their preferences accurately. According to Ellingsen and Paltseva (2016), the only game-theoretical way around this problem would be for the parties to enforce participation, although in practice the situation would be more nuanced.

3.4 Behavioural economics

Whereas game theory is primarily mathematical and theoretical, behavioural economics denotes empirical studies of the same systems (Camerer, Loewenstein et al. 2011). Unlike the *homo economicus* found in game theory, humans have limited rationality and calculating powers, and will likely employ certain heuristics, biases and emotions (Adams and Watkins 2014). Where game theory deals with the strategic choices made by perfectly rational actors, behavioural economics attempts to discern ways in which real humans deviate from *homo economicus* behaviour. Behavioural economics is arguably a more viable tool for offering concrete advice (Camerer 2003, Introduction). Because the study of urban redevelopment is not strictly mathematical and the parties are not purely rational profit maximisers, behavioural economics is also more directly applicable to this study. Game experiments in human economic behaviour have provided much insight relevant for understanding redevelopment processes, even when these processes are not the topic of study. For instance, Heyman and Ariely (2004) use several experiments to show that humans tend to differentiate between a default 'social' market and a 'monetary' market that is established in any setting as soon as money is mentioned. This is why a person might be more willing to perform a task for free than for an inadequate payment. Helping your friend move house for one euro is a strictly better deal than helping her move for free, but most people will find it easier to get help without mentioning any payment. In urban redevelopment scenarios, this could illustrate different actors' motivations in the negotiation process, and raises questions such as whether profit-oriented actors valuate non-monetary goods in the same way as non-profit actors.

Behavioural economists frequently study cooperation between actors with different motives (Henrich and Henrich 2007), and such negotiations are often important in urban redevelopment in many different contexts and involving any combination of actors (Ennis 1997). For instance, Farthing and Ashley (2002) analyse negotiations between planning authorities and developers about affordable housing in 92 English housing schemes. As expected, they find significant variance in the planning authorities' negotiating power based on the potential development gain and the political will to use power. More importantly, they find that the negotiation processes tend to be too context-specific to generalise readily, which is an important caveat to many of the discussions in this thesis. On the other hand, Glumac et al. (2016) provide concrete advice to municipalities on what type of developers they should cooperate with. They analyse the negotiation process between the municipality and the developer, combining a game experiment with several other methods that can loosely be grouped as a choice experiment. They use this complex methodology to advise municipalities on partner choice when developing a brownfield area with a given set of attributes, and on what type of agreements they should make.

As behavioural economics studies irrationalities in human behaviour (Camerer, Loewenstein et al. 2011), it behoves us to ask how much the behaviour of individuals can teach us about the behaviour of development firms, which tend to be large and professional institutions. Although individuals make all the decisions in firms, individually or in groups, one might assume that these decisions are only made after careful deliberation by experts calculating the optimal strategy: a firm does the same thing over and over, and will therefore have large incentives and many opportunities to figure out the optimal way to conduct this core business. Moreover, one can expect a certain 'natural selection' to remove less rational market actors (Armstrong and Huck 2010). However, even experts tend to make the same mistakes as laypeople, such as underestimating the importance of sample size when looking for a trend (Tversky and Kahneman 1973) or sunk-cost fallacies (Al-Najjar, Baliga et al. 2008).

Armstrong and Huck (2010) point to several reasons why firms might behave irrationally despite classical economic theory indicating that inefficiencies in firms will eventually be weeded out. In complex and uncertain competitive markets, of which redevelopment is a prime example (Sorensen and Auster 1989), people will sometimes have to make decisions based on incomplete information, and a less-than-optimal strategy can often yield good results by chance (Taleb 2005). This could cause both firms to maintain irrational strategies and competitors to adopt them and disrupt the removal of inefficient firms. Moreover, the decision-makers in the firm might have interests which to some extent conflict with the profit sought by the firm's owners, such as a preference for maximising revenue instead of profits to enhance prestige, or an interest in the firm's activity beyond generating profit (Garen 1994). This could be particularly relevant for urban redevelopers, who can influence the urban fabric and society at large through their decisions. In addition, the incentive structure used to motivate the decision-makers could cause irrational decisions. If either decision-maker fails to reap a large enough share of the profit from implementing new strategies, it may deem it not worth the hassle (Jensen and Meckling 1976).

When studying cooperation between developers, there are five human traits frequently studied by behavioural economists that are relevant: reciprocity, general propensity for cooperation, trust, risk aversion, and the endowment effect. An overview of the research on these traits and how they relate to the questions posed in this thesis is presented in the following section.

3.4.1 Reciprocity

When people experience friendly actions, they tend to be friendlier and cooperative in return than what classical payoff-maximising reasoning predicts. This is not what one would consider avant-garde science: the characters in Homeric literature consider reciprocity important as a way for chieftains and deities to bind their subjects to their cause (Cook 2016). In the *Epic of Gilgamesh*

the Serpent and the Eagle watch each other's children while the other hunts (Cooper 1977). Several biblical passages indicate it as a way for humans to get closer to both God and each other, as in Corinthians 8:14: 'At the present time, your surplus fills their need, so that their surplus may fill your need. In this way things are fair' (International Standard Version 2011). These are examples of 'positive reciprocity', the opposite of which is 'negative reciprocity' (Helm, Bonoma et al. 1972). The *Iliad* and *Odysseus* are largely driven forward by continuous spirals of vengeance, where each slight demands retribution. When the Eagle in the Epic of Gilgamesh eats the children of the Serpent, the Serpent captures the Eagle and leaves him to die. In the Bible, Quran and Torah, resisting the natural urge for such reciprocity and instead leave retribution to God is one of the main themes.

A common economic game experiment, the ultimatum game (Thaler 1988), replicates this negative reciprocity. Here, two players are dividing a good, for instance 10 euro. One player proposes a division, and the second player either accepts or rejects it. If the second player accepts it, they divide the money accordingly, whereas if she rejects it, neither receives anything. Here, the game-theoretical prediction would be that the first player gives the lowest possible non-zero share to the other. As any non-zero payoff is better than nothing, the receiver will accept it, so there is no point in offering anything more. However, when real humans undergo this treatment, many players will reject low offers and most players will offer more. After analysing 37 papers running this experiment, Oosterbeek, Sloof, & Van De Kuilen (2004) found that, on average, people offer over 40 per cent of their endowments, and that 16 per cent of offers are rejected. They also found that people in cultures which traditionally value respect for authority tend to offer less but were not less likely to accept offers, while Asians tended to reject more offers than Americans. Some researchers conducting the experiment in low-cost countries found that offering stakes of three months average wage barely changed the share offered by proposers, but reduced the number of rejections (Slonim and Roth 1998, Cameron 1999).

This willingness to forgo a payoff to keep another player from receiving anything at all is an expression of a powerful force behind human decision-making, namely negative reciprocity. Classical economics, for instance the Coase theorem, suggests that competitors will be able to cooperate on, for instance, internalising externalities or achieving economies of scale when it is mutually beneficial (Coase 1960). As discussed in the above section on game theory, rational actors can have an incentive to offer their opponent small cuts in a situation where they are repeatedly negotiating with others about the division of the payoff from a cooperative scheme. Negative reciprocity, on the other hand, can lead an actor to decline an offer of compensation that makes it better off if feels it is being low-balled by its opponent (Thaler 1988).

While this ultimatum game measures the power of negative reciprocity, other games measure positive reciprocity. Berg, Dickhaut et al. (1995) propose a gift exchange game: player A is given a resource, typically money, and can give an integer of it to player B. Player B receives this amount multiplied by 3, and can choose to give some back to A. When played once, B has no rational motivation to give anything back to A, yet despite this, 70–80 per cent of receiving subjects return some of the payoff to the sender (Fehr and Gachter 2000). In a setting where multiple individuals are frequently in this type of situation, a type of gift economy develops (Cheal 2015). Anthropologists have studied several pre-industrial groups where, rather than trading directly, people give valuable gifts with no direct promise of repayment (Sahlins 1997). Gift-givers assume they will eventually receive gifts in return from other participants in the gift economy.

In competitive market economies, such gifts can still be important. Mathias et al. (2018), studying the persistence of coopetition between craft breweries, found a gift economy to be important: firms 'pay it forward' and provide benefits for competitors under the assumption that competitors will provide similar benefits for them when they have similar opportunities. Note

that this does not have to entail a direct relationship in which one provides a boon for another who later reciprocates. Rather, it creates an environment in which firms help any other firm which the group perceives as helpful parts of the craft beer community. Cultures differ in the value they attach to reciprocity (Buchan, Croson et al. 2000), which implies significant cultural differences in the motivation for coopetition.

Reciprocity is a powerful motivator, even when dealing with strangers with no way of offering future reward (Delton and Krasnow 2014): in repeated interactions, people will want to be seen as dependable and reciprocal when treated well and as vengeful when treated poorly in order to discourage future transgressions. However, people are still reciprocal in situations where they know there is no value in sending such signals. In ultimatum and gift games, people will frequently act trustingly and reciprocally even when they know they will only play once against someone they will never meet again, and even when playing against someone they do not actually meet. The strategic value of reciprocity is so engrained in humans that it overrides the stated knowledge of being in a one-shot situation. Biologists can explain the gift economy and human reciprocity as results of evolution, as it is an advantage for a creature to pay a price to help another *provided this other is also a creature with the same mindset* (Henrich and Henrich 2007). Generally, a tribe of creatures that help each other, even at significant cost to the self, can out-compete a tribe of individualists. However, in a tribe of such helpers, the best evolutionary strategy will be *not* to help others insofar as they can do this without the other members finding out and excluding them from the gift economy. This can be explained by such one-shot situations being very rare in a tribal society, so the strategy of reciprocity in repeated interactions overrides it (Delton, Krasnow et al. 2011). An alternative hypothesis is that these norms are observed during each persons' lifetime and thus become engrained in most individuals, since most societies that survive and reproduce will tend to have reciprocal norms (Richerson and Boyd 2008).

In either case, the result is manifested in most humans having a certain other-regarding preference, or a 'warm glow' feeling that comes from contributing to others' utility (Silk and House 2016). A version of the ultimatum game, called the dictator game, illustrates the preference humans have for the welfare of others, even strangers. As explained above, in the ultimatum game one player proposes a division of a sum of money, and the other player can either accept or reject, where rejection leads to both players receiving zero. However, in the dictator game, the receiver cannot reject the division. The sender simply makes a distribution, and the experiment is finished. Here, too, many people will opt to give something, though less than in the ultimatum game (Cooper and Kagel 2016). In other words, fear of reprisal is one reason why people treat others well, though not the only reason.

3.4.2 *Propensity for cooperation*

Public goods games (Ledyard 1994) test the willingness to cooperate in groups of people. There are many variations, but the basic premise is the same: an experimenter gives each individual in a group of players a resource. The players can choose between keeping the resource for themselves or contributing it to the public good. Contributing it to the public good provides less back than keeping the resource, but provides a positive externality for the other players. The better option for the individual is to keep the resource, but it is better for the group if everyone contributes. This creates a multi-player prisoner's dilemma in which a perfectly rational individual will refrain from contributing but hopes that others will contribute. This leads to the Nash equilibrium of no one contributing, which is worse for everyone than if everyone contributed (ibid). As with the other games, real humans tend to behave differently from this prediction, and depending on the specifics of the game, many people will choose to contribute even if they know with certainty that it is better for them in isolation not to contribute. Providing a positive externality for the other players carries a benefit in itself, on top of the benefit to the

individual of receiving a share in the good they produce (Andreoni 1988). More specifically, people tend to care about maximising three things when deciding whether to contribute: their own payoff, the sum of utility generated by all the players, and the fairness of the distribution (Kolstad 2011). This is the same warm-glow effect or other-regarding preference as when humans reciprocate in one-shot games as described above.

Many experiments change the rules to see how different factors influence contributions. Behavioural economists are thus gradually uncovering mechanisms that enhance and hinder the propensity for cooperation in humans. For instance, Ostrom and Walker (1991) report from a repeated cooperation game where allowing the subjects to talk to each other between sessions increased the contributions from 30 to 98 per cent of the optimum levels, even though it was not revealed who contributed what. By calling the public goods game 'the community game' and framing it as *taking* money from a common pool when *not* contributing, as opposed to the standard framing of contributing to a common good, Dufwenberg, Gächter, & Henning-Schmidt (2006) show that positive reciprocity and guilt aversion also tend to shift people towards cooperative attitudes. Fehr and Gächter (2000) play a similar game where half of the subjects are allowed to punish the defectors after each round. In the last of twenty rounds, for groups that were randomly assigned in each round, those who could not punish defectors contributed an average of 9.5 per cent of their endowment, while those in the punishment treatment contributed an average of 61.5 per cent. Note that the game-theoretical predictions are still to contribute nothing, as perfectly rational actors would not be willing to pay to punish others. By making each group play with the same opponents each round, the average contribution in the last round rose to 91 per cent.

Note also that in the last round of such repeated prisoner's dilemmas there is no signalling effect. Typical for such experiments played over many rounds is that most people will initially be cooperative, but unless there are methods for the subjects to maintain cohesion, some will defect. In subsequent rounds this will erode the cooperative attitude, and more and more people will defect (Fehr and Schmidt 1999). From a game theory point of view, when playing a finite series of prisoner's dilemmas with perfectly rational actors, the dominant strategy is still to always defect: in the last round of the game, cooperating has no future value, so both players will want to defect. Therefore, in the penultimate round, there is no reason to cooperate, as the strategy in the last round is already decided. This logic applies for the third-to-last round, then the round before that and so on until the very start of the series of decisions. From a game-theoretical perspective, the best decision might be to cooperate only if there is an infinite or random number of games in the series. Thus, the number of perceived future interactions will often be an essential part of whether or not cooperation is feasible (Gibbons 1992).

Beyond the specifics of the scenario, game experiments reveal that different cultures approach cooperation differently. Playing similar cooperation games as above with people from 16 different countries, Gächter, Herrmann and Thöni (2010) found only small differences between cultures in contributions in normal games, but while allowing for punishment of non-cooperators had huge impacts on groups in Anglo-American, Protestant Europe and Confucian cultures, it hardly impacted contributions in ex-communist, south European and Arab cultures. The findings demonstrate the importance of positive and negative reciprocity: in cultures where people are willing to pay to punish defectors, cooperation is strong and stable or may even be reinforced as defectors are punished. However, where people do not bother to punish, cooperation might start off at moderate levels but tend to wither.

Another strain of cooperation game research relates to how kinship between the subjects influences contributions. Cooperation, and particularly altruistic cooperation that does not benefit the co-operator, can be explained as an evolutionary strategy to maximise the

reproduction of one's own genes that exist in other people's genome (Henrich and Henrich 2007). This indicates that any perceived trait people share may enhance their willingness to cooperate (Alvard 2009). For instance, Orbell, van de Kragt and Dawes (1988) find that people in an experiment with multiple treatments will contribute more simply by being told that their peers receive the same treatment. Similarly, Lopez and Villamayor-Tomas (Lopez and Villamayor-Tomas 2017) report that groups of forest users in a wood extraction game behave more cooperatively if they built social cohesion by discussing how the game mimics their common background. When studying coopetition, such kinship effects might be particularly important, as the kinship and common backgrounds between the actors may offset some of the difficulties of cooperating with competitors.

3.4.3 *Trust*

In everyday life, we deal with several types of trust (Ashraf, Bohnet et al. 2006). For instance, trust that strangers have a positive, or at least not a negative, preference for our well-being: while there are many rational reasons for vandalism, for instance looting, political statements, or increasing one's status within a group, vandalism simply for the enjoyment of causing damage is not uncommon (Fisher and Baron 1982). Similarly, many people trust others in their society not to cause serious damage to steal low-value items, even if there is no risk of reprisal. In many societies shop-owners will lock the doors of their shops when closing, but not bar the windows, as they assume others will not break the window to steal their goods, particularly if they only have goods of limited value. In other societies, shop-owners lack this trust, whether justifiably or not (Newton 2001).

Behavioural economists most commonly measure trust by the same gift exchange game as described in section 3.4.1 concerning reciprocity (Cox 2004). While the levels of rewards given to the sender reflect the reciprocal nature of the receiver, the levels sent in the first place reflect the trust of the sender. More specifically, it reflects the trust the sender has in the strength of the positive reciprocal feeling within the receiver. This type of trust is more similar to what influences economic relationships such as those studied in this thesis than to trust in other-regarding preferences.

A concept that is closely related to trust in others' good intentions is that of confidence in others. Narrowly defined, trust only pertains to morals in the idea of others' good will, as the two types of trust outlined above (Das and Teng 1998). An expanded interpretation of the term is the belief that these others will keep their end of the bargain not necessarily for moral reasons, but because they perceive it as beneficial. This is rooted in the belief that people have an incentive to maintain good relations with one another and for third parties to see them as trustworthy (Gong and Yang 2010). This makes trustworthiness possible even for perfectly rational actors. As mentioned in the section on cooperative attitudes above, in repeated prisoner's dilemmas, for a finite series of prisoner's dilemma situations between such perfectly rational actors, the optimal solution is to \ defect in each round. However, in real-life cooperation scenarios, the agents typically have many opportunities to cooperate or defect in many different scenarios and with different opponents, which arguably is best captured by a series of prisoner's dilemmas with a finite but unknown number of interactions against occasionally altering opponents. Here, several different strategies can be optimal depending on the situation. High payoff from both actors cooperating, a society characterised by high negative reciprocity, and high reputation cost of defecting make cooperation a better strategy. High payoff from defecting when the other cooperates and high likelihood of few remaining interactions make defection more viable. Finally, high likelihood of the opponent defecting also improves the defection strategy: in repeated prisoner's dilemmas, if you *know* the opponent will cooperate until you defect, both cooperation and defection could be good strategies, but if you *know* the opponent will defect, defection is the only reasonable course

of action. Thus, if a person trusts that their opponent is dependable, they in turn will have a greater incentive to trust them. In other words, this type of trust is not about faith in the goodness or reciprocal nature of the opponent, but rather about trust in the common belief that both actors perceive the market as one where dependability has a high value (Resnick, Zeckhauser et al. 2006).

While it is usually not important which of these types of trust we are dealing with, cooperation between firms is dependent on a certain level of faith that the partners will not behave opportunistically. They can have high incentives to, for instance, cheat, distort information, provide low-quality inputs or appropriate collaborators' resources (Das and Teng 1998). It is possible to envision cooperation entirely without trust, but it would require vast resources to formalise all details of the relationship and monitor the parties. In business, people tend to prefer verbal agreements with dependable parties rather than legally binding contracts (Macaulay 1963). Much criticism of Coasian cooperation for efficiency in externalities relates to the incentive to misrepresent costs and benefits of providing and receiving the externality, and that transaction costs make it less efficient. Trusting and trustworthy partners alleviate both of these problems (Fox 2007). Trust reduces the need to monitor costs, which can be an important expense when implementing cooperation schemes (Smith, Carroll et al. 1995).

Individuals in different organisations within the same field can have strong social ties from common networks and similar backgrounds which foster trust (Bengtsson, Hinttu et al. 2003). Particularly when all parties are intent on continued cooperation or when reputational stakes in the agreement are high, partners have an incentive to be seen as dependable (Williamson 1985). On the other hand, firms that alternate between competition and cooperation as opposed to continuously doing both may hinder the growth of trust but remove some of the need for it (Heydebrand and Miron 2002). Firms engaged in cooperation for efficient production of positive externalities have an incentive to misrepresent the value derived from these, which warrants some trust. As with reciprocity and cooperative attitudes, cultures differ in the value they attach to reciprocity (Buchan, Croson et al. 2000), which implies significant cultural differences in the motivation for coopetition.

3.4.4 *Risk aversion*

Market-driven urban redevelopment is an inherently risky business (Barlindhaug and Nordahl 2011). Urban redevelopment requires large investments from the developers a long time before the projects generate significant income, so in addition to factors that outright reduce income and increase costs, effects that might delay projects imply risk. There are four main sources of risk in Norwegian redevelopment projects (Barlindhaug and Nordahl 2011): planning, financial, construction and market. The negotiation with the municipality for planning rights can go awry by allowing for fewer cost-bearing land uses, costlier demands for infrastructure, and delays in receiving approval from all relevant parties. In addition to the municipal planning departments, other local, regional and national agencies can demand alterations to the plans. If public opinion turns against the project, politicians can also stop a plan dead in its tracks, sometimes sending the project to the beginning or outright cancelling it. Norwegian developers depend on banks to finance construction, with security in pre-sold units (Barlindhaug and Nordahl 2018). There will usually be some uncertainty about the cost of these funds, particularly for smaller firms. The construction in itself carries some risk due to fluctuating labour and material prices. In redevelopment projects there is an added risk in the construction phase stemming from the possibility of soil pollution (Yount and Meyer 1994): while this could be a significant cost, the seller of the plot can assume the risk in full or in part. Finally there is, of course, the risk of a downturn in the market before the project is completed (Barlindhaug and Nordahl 2011). If possible, developers will want to delay their projects in these cases, despite heavy finance costs

from land acquisition and other sunk costs. If the market dips towards the end of the project, developers tend to invest more in the apartments to sell them at stable prices rather than lower the price: lowering the price is not usually an option because it sends a negative signal to the market and leads potential buyers to expect further reductions.

Cooperation can be a tool to reduce risk (Rowley, Costello et al. 2014), but it implies its own risks as well, independent of the trustworthiness of the parties. It is also a very real issue that the recipients will often be unable to appraise benefits from cooperation. For instance, Mei et al. (2018) used a hedonic price model and housing prices in Beijing to find that green vegetation increased property values by around 10 per cent in its vicinity. However, if a developer were to translate this into value added from a park on a neighbouring plot to its specific project, it would need to consider air pollution levels in its area compared to Beijing, access to alternative greenspace for its project, the opportunity cost of forgoing other urban functions and local preferences, and so on. Due to this uncertainty, developers attempting to maximise expected utility from these efforts risk over-paying for them. In markets where trust between the actors is less than perfect, coopetitors must also consider the risk of their peers causing damage by not fulfilling their obligations or otherwise seeking to use the cooperation to gain an competitive advantage (Gambetta 2000).

There are several reasons why such a risk would lead to under-appreciation of positive externalities in a bargaining situation. Firms tend to be risk averse, though performance difficulties, which are not common in contemporary Norwegian redevelopment firms, can push them towards riskier strategies (Bowman 1982). Real estate investors are risk averse, and arguably more so than investors in other industries (Edelstein and Magin 2012). As long as firms expect to meet investors' required returns, the incentive to adopt risky strategies to go beyond that typically not worth the risk, even if the expected return is high (Bowman 1982). This relates to the concept of loss aversion: it is worse to lose something, for instance the expected return on an investment, than win a corresponding gain, such as a higher-than-expected return (Kahneman and Tversky 2013). On the other hand, moral hazards might make firms risk-seeking. Small firms in particular might be able to ship off large losses to investors by going bankrupt (Rose 1992).

The managers and project leaders might have different risk profiles from the firms themselves. They may be more risk averse than what would be rational for the firm, given that decision-makers, like all people, can be expected to display some loss aversion, particularly if their job is on the line (Wiseman and Gomez-Mejia 1998). On the other hand, if the decision-makers receive a portion of the gains, they may be motivated to seek out prospects with good returns but with a high risk of inflicting losses on the firm (Taleb 2005). Similarly, it may be viable for a manager to take a gamble that will turn out good most of the time but that will have catastrophic consequences for the firm if it does not pan out: the manager will then take part in the expected gain, and if the gambit turns sour, the greatest possible loss for her part is her job. These types of 'moral hazard' were at least partially in play in the years leading up to the economic crises starting with the mortgage crisis of 2007 (Lewis 2010). Fiegenbaum and Thomas (1988) study the behaviour of 2,322 US firms in 1960–1979 and find that when firms perform below their target, they tend to seek riskier prospects, while firms that exceed their target tend to be more risk averse. This indicates that managers wait to adopt new strategies until market conditions force them to do so in order to meet their targets. This could be an important factor for innovation in Norwegian redevelopment firms, after two decades of rising housing prices.

Urban redevelopment is an industry with high degrees of uncertainty. In such cases it might be best for a decision-maker to mimic the strategies of others rather than figure out what gives the highest expected returns (Taleb 2005): if the chosen strategy fails, the other decision-makers will face the same problem, and the mimic's reputation will remain relatively untarnished. In a market

where the actions of different decision-makers are compared to each other, swaying from the traditional mode of operation can be daunting unless the manager is certain that the alternate course is better (Scharfstein and Stein 1990). This would lead to slow adoption of efficient cooperation strategies, particularly in markets characterised by high uncertainty.

3.4.5 *The endowment effect*

Standard economic theory dictates that the difference between a person's willingness to pay for a good and her willingness to sell the same good should be miniscule (Willig 1976). If the highest price you would pay for a bar of chocolate when you have zero bars is 5 euro, the lowest price you would need to sell a bar of chocolate for when you have one bar should be 5 euro and 1 cent. The exceptions are income effects, cases where you cannot afford to buy something but you can afford to sell it (Willig 1976). Contrary to this, the endowment effect suggests that people tend to value an object they own more than that same object when they do not own it. For example, Knetsch (1989) demonstrates this effect by giving one group of students a coffee cup and another group a chocolate bar in return for completing a questionnaire. After completing it, they had the option to trade their reward with the experimenter, so that the first group could trade their cups for a chocolate bar and the second group could trade their chocolate bar for a cup. A third group could choose between a cup and a chocolate bar. This third group shows that the students are almost evenly split in their preference for the two goods, with 56 per cent preferring the cup and 44 per cent preferring the chocolate bar. Despite this, only 10 per cent of the students who received either chocolate or a cup chose to trade after the experiment. This relates to the concept of loss aversion discussed above, in that it is more impactful to lose something than to gain something of similar value.

The effect starts as soon as a person takes ownership or simply assumes possession of a good, and grows in intensity with time and exposure to the good (Wolf, Arkes et al. 2008). The effect also exists beyond material goods: Richard Thaler (1980) found that people demanded much more to expose themselves to a 0.1 per cent chance of death than what they would pay to remove a 0.1 per cent chance of death. However, the effect is weak or non-existent for goods that are owned specifically to be resold, such as bullion or most stocks (Kahneman, Knetsch et al. 1990). While development land falls into this category, the decision-makers tend to spend enough time and energy working on their projects to exhibit the same effect when, for instance, comparing their own land to similar plots (Kosavinta, Krairit et al. 2017).

One essential part of the Coase theorem dictates that when the free market handles externalities, property rights are not important to the market's ability to create an efficient outcome as long as they are clearly defined (Kahneman, Knetsch et al. 1990). It is not important whether the right of the polluter to operate its industry takes precedence over the right of neighbours not to suffer pollution: it matters to the wealth distribution of the engaged parties because it dictates the flow of compensation, but the levels of externalities generated would be Pareto efficient either way. However, the endowment effect disrupts this. Farnsworth (1999) looked at 20 cases where one or a few private parties brought a neighbour, either a natural citizen or small firm, to court to stop behaviour that was bothersome but that did not violate zoning rules. The Coase theorem states that if the court rules in favour of the plaintiff, the defendant will try to compensate the plaintiff to be allowed to continue at least part of the activity, while if the court rules in favour of the defendant, the plaintiff will want to pay the defendant to cease at least part of the activity. However, in none of the cases did the winner and loser bargain afterwards. After consulting the lawyers in these cases, Farnsworth concludes that, in addition to the bitterness between the parties, the attitudes the winners held towards their newly established rights made them reluctant to bargain.

When negotiating compensation for providing positive externalities, this indicates that the party who provides the externality appreciates it higher than the party who passively receives it (Steinacker 2006). If, for instance, a developer builds a park exclusively for its project and there is a potential from others to compensate the developer to allow public access to the park, this would represent the loss of a right for the developer. The endowment effect suggests that the developer will over-appreciate this exclusivity. If the value of the exclusivity is worth only slightly less to the developer than the right to use the park is worth to the other parties, they may fail to find a Pareto-efficient compensation scheme. More generally, having a high preference for direct ownership of the various activities and structures that constitute a development project would have a negative effect on willingness to cooperate. Similarly, ascribing a specific value to controlling a construction project makes it more difficult for developers to cooperate on achieving economies of scale in, for instance, infrastructure investments.

3.5   Summar

As we have seen, the rationale for studying cooperation between developers is that they, at least in theory, should be able to make more efficient development projects. A group of developers will get more out of their marketing and public space budgets overall, and they will be able to undertake more efficient construction projects if they are cooperatively minded than if each actor only does what is immediately individually rational. However, both game theory and behavioural economics provide us with reasons why this could be difficult in praxis. So far, most of this is based on purely theoretical conjecture. This thesis uses interviews to establish whether cooperation to achieve economies of scale in internalising positive externalities or constructing infrastructure actually exists. It then augments this with behavioural experiments to gauge to what extent certain human biases and heuristics influence developers' decisions to seek cooperation.

4   Methods

4.1   Research design

This thesis is highly interdisciplinary in terms of both theory and methodology. The theoretical background needed to study how we can develop planning systems that spark cooperation spans traditional planning theory, microeconomics, game theory and behavioural economics. The thesis thus adopts an iterative approach whereby theory, research questions and findings continuously feed into and develop each other. Since the topic of coopetition in urban redevelopment is largely unstudied, it is valuable to simply collect, organise and analyse the knowledge that is readily available among professionals. Therefore, to answer the research questions, the thesis uses qualitative interviews. Although the interviews are based on specific redevelopment areas, and these areas are illustrated to provide context to Article 1 found in the appendices, they are not framed as case studies. While a small-*N* case study as described by Yin (2017) might have been the more traditional approach, too much focus on the areas might distract from the general case of coopetition. While it would be unfeasible to engage in a detailed study of a substantial percentage of the redevelopment areas in the Oslo region, the subjects collectively had extensive first-hand or second-hand knowledge of almost all redevelopment areas in the region.

The interview method is poorly suited to discovering factors that influence developer coopetition beyond their consciously formulated strategies. As argued in section 3.4, heuristics and biases are important aspects of something as complex and fickle as economic cooperation. Behavioural economists are increasingly employing a variety of methods for studying these, such as field data (Gneezy and Rustichini 2004), computer simulations (Angeletos, Laibson et al. 2001) and brain scans (Wilkinson and Klaes 2017). However, economic experiments remain popular and are increasingly important when the design of interaction patterns become a central part of research

(Durlauf and Blume 2016). The thesis therefore also employs quantitative economic experiments to provide deeper analytical power. This chapter introduces the methods the thesis employs in sections 4.2 on the interviews and 4.3 on the game experiments. Chapter 5 presents the scope and methods of each paper in more detail.

4.2 Interviews

The limited body of previous research on cooperative relationships between development firms makes this thesis a somewhat novel enquiry. Many of the topics discussed in this thesis – such as the presence of substantial positive externalities for developers in redevelopment areas – are poorly documented. Even less discussed are the effects these externalities have on the interactions between developers. However, these topics are quite intuitive, and many scholars have preconceptions about them. It was important to establish whether what can be considered 'common knowledge' is in fact true.

The thesis employs semi-structured interviews with 13 property development managers active in redevelopment projects in the greater Oslo area. The interviewers were selected by first identifying parts of the city where multiple development firms were undertaking redevelopment projects close to each other. Maps of these four areas are shown in figures 3-6. Some areas were excluded if they were in already popular areas in the city, where the developers only use branding to differentiate themselves from competitors. As neighbourhood branding is one of the most clearly externality-generating activities developers undertake, it was important to select redevelopment areas where neighbourhood branding is an issue. The few redevelopment areas which were excluded from this were minor sites with few firms, in highly appreciated areas- Five large, multi-developer areas with a demand for branding were found, but one was later removed because redevelopment had been going on there for such a long time and over such a large area that it was difficult to establish who the relevant actors were. Although formerly an important industrial area, it was now largely established as a residential area, and the currently active projects did not have to do anything in particular to sell the neighbourhood.

Figure 3: Redevelopment firms in Ulven, Oslo. Background map from the Oslo Agency for Planning and Building Services (2019).

Figure 4: Redevelopment firms in Løren, Oslo. Background map from the Oslo Agency for Planning and Building Services (2019).
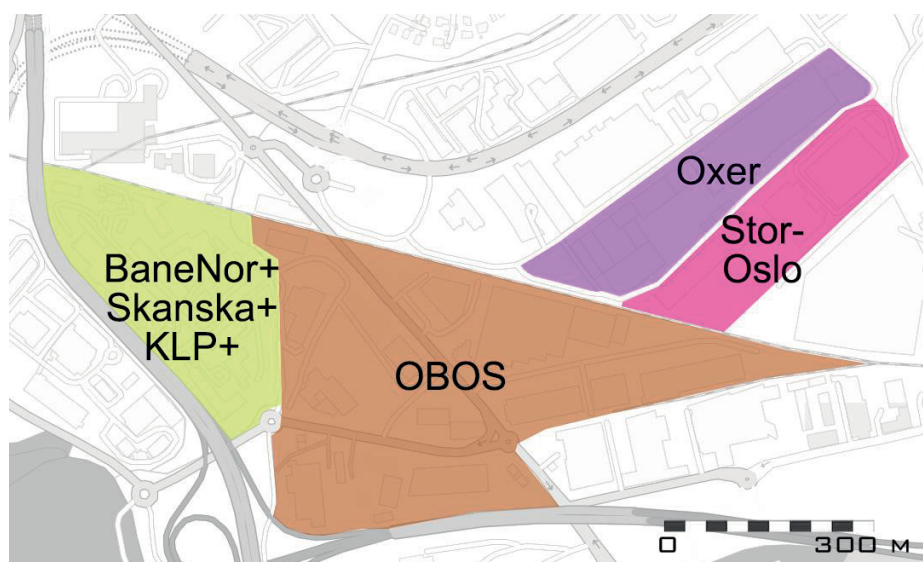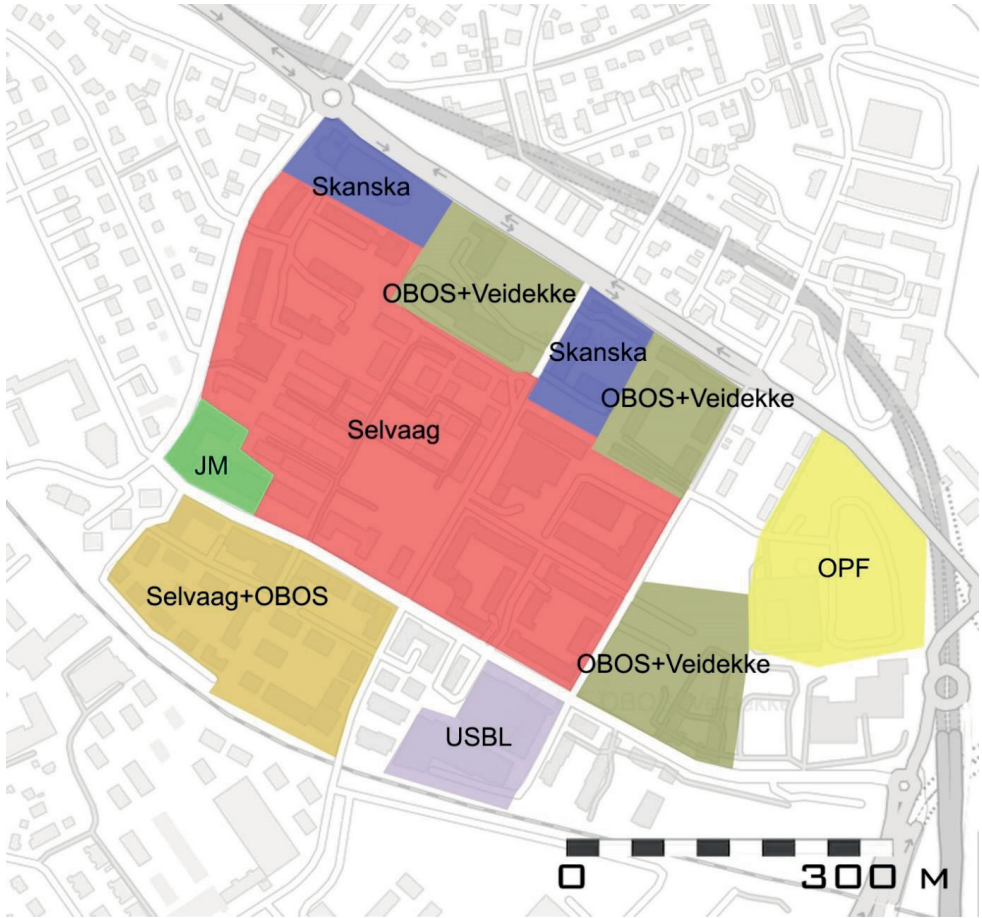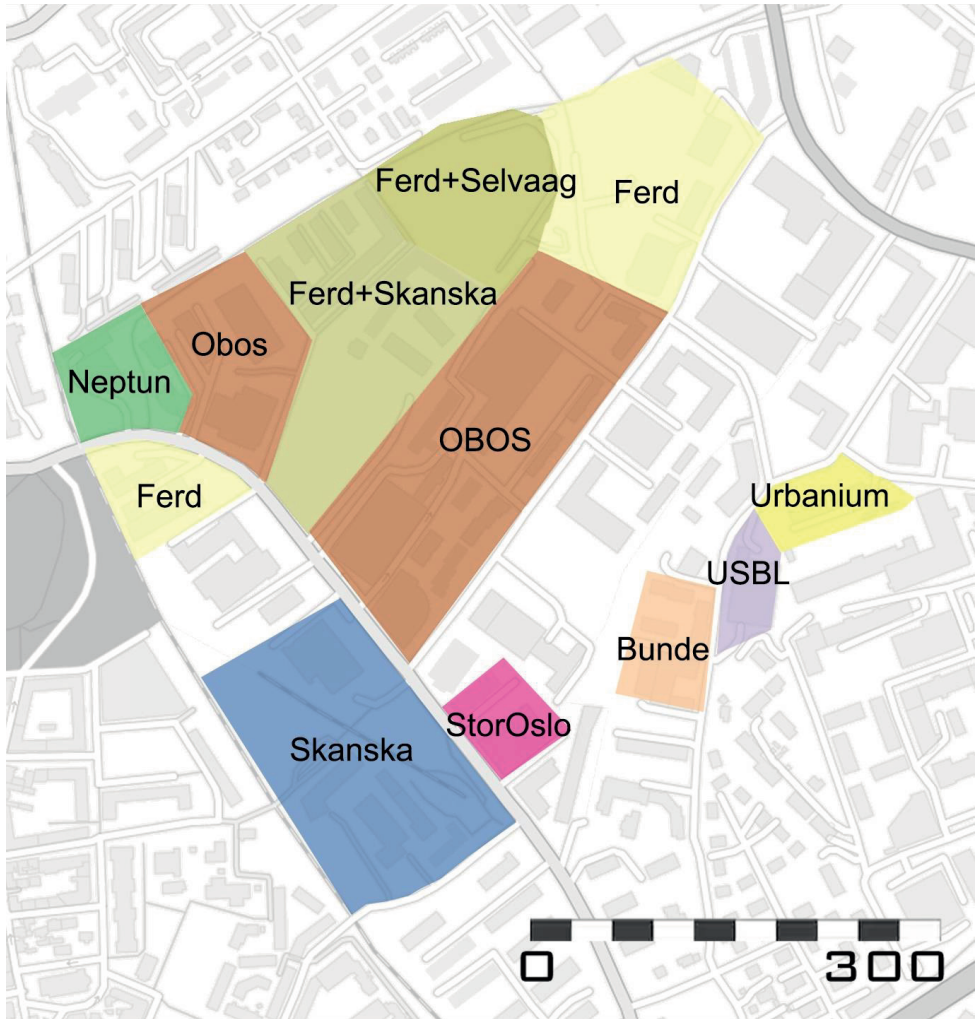
Figure 5: Redevelopment firms in Ensjø, Oslo. Background map from the Oslo Agency for Planning and Building Services (2019).
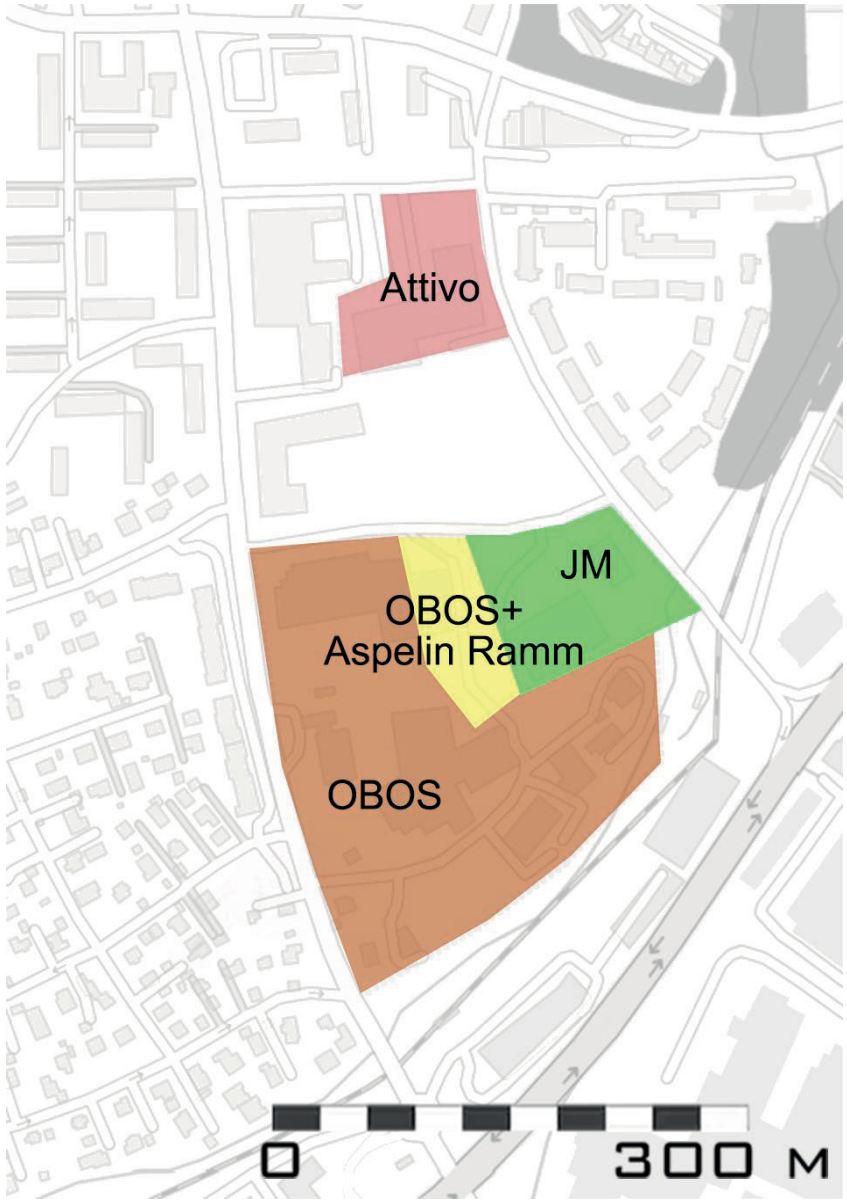
Figure 6: Redevelopment firms in Vollebekk, Oslo. Background map from the Oslo Agency for Planning and Building Services (2019).

Project managers from three firms operating within these four areas were selected. The firm that controlled most territory within each area was contacted. *Controlling territory* here relates to having completed regulation processes, were in process of regulating the area and/or were registered as owning land. Land ownership data was found in the Norwegian cadastre, which is incomplete: to reduce risk exposure, firms will often buy land options early in the process, then buy the land once the zoning plan is in place. Furthermore, it is not mandatory to register land purchases with the cadastre, and many firms refrain from doing so to avoid the 2.5-percent

registration fee and instead transfer ownership straight from the seller to the end users. The registry of initialised regulation processes is also fallible: when a developer initialises a project after buying land or land options in an area, it starts developing ideas for what it wants to do with the plots. Once it has some rough ideas about what it wants to include in its plans, it can hold a start-up meeting with the City of Oslo's Agency for Planning and Building Services, which registers the location of the plan on its online maps. These maps then record all information relevant to the plan until the planning process is terminated or approved and then superseded by a subsequent plan. Note, however, that in the time between when the firm starts developing a project and requesting a start-up meeting, it can be impossible for outsiders to know that there is a project under way. While the start-up meeting is important for the developer for obtaining the information it needs to draw up a plan that will be approved by the municipality, in some cases there might be an incentive to delay it as much as possible. Once one developer signals its intent to start a project in an area, other buildable plots in the same area will become more expensive in the expectation of the potential externalities the project will generate. Thus, it is plausible that there are firms with substantial projects in the earliest phase that are not considered.

These most dominant developers also had long-lasting interests in their areas. In one of the areas a minor project on the fringe was the first redevelopment, while some developers controlled land without initiating development for long periods. But by and large, the most dominant developers were also the ones that sparked redevelopment, which is not strange considering the presence of positive externalities the projects could generate. Thus, these firms had knowledge of the entire redevelopment process and had to play central roles in making the areas marketable. In addition to these firms, two additional firms in each area were selected, based on their centrally located projects and common interests with the dominant firms, bringing the total to three firms in each of the four areas.

In addition to the 12 informants asked to participate in the study, one was brought along with another to provide supplementary information. Two employees from the same firm were interviewed simultaneously, each representing one project. Thus, only 11 interviews were carried out. The subjects represented 10 different firms, as two firms had projects in two areas. Combined, these 10 firms develop 60 percent of all housing in the Oslo area 2016-2018, and the vast majority of inner-city projects. As seen on figures 3-6 above, the same firms tend to be present in many areas. No potential informants declined participation. Gender was not considered when first selecting the subjects, and only one of the subjects was female. This reflects the male dominance in the field, though it is not representative. Most of the interviews lasted almost two hours, one lasted one hour, and one lasted three hours. The interviews were recorded and transcribed by the author. Some of the informants also used maps and models to illustrate, pictures of which were included in the transcriptions.

The informants were eager to talk about their interaction with other developers in the area. Although an interview guide was used (found in the appendix A), the subjects would jump between the topics in the guide without being prompted. They would often diverge from the topics in the interview guide to discuss topics that were more or less relevant. This made interpreting the results somewhat difficult. The themes were generally too fluctuating to allow strict coding as prescribed in much of the interview literature. The interviews were analysed by thematic narratives (Riessman 2005). This involves some arbitrary interpretation and narrative smoothing, and certain omissions (Kim 2015). The interview transcripts were first analysed individually then juxtaposed to find the common themes.

These interviews focuses on coopetition in less popular redevelopment areas, but it carries limited validity to coopetition in well-established areas in more expensive parts of the city. Many of the positive externalities created by developers might be irrelevant and competition would be fiercer. One of the subjects mentioned that in less popular redevelopment areas, where prices were lower, the catchment area was large because newcomers to the city would have low willingness to pay for neighbourhoods with good reputation. Thus, when developers create good areas, they attract more customers, so it is not a hindrance for one developer if other developers also have good products. The projects in expensive neighbourhoods, on the other hand, were primarily of interest to people from the same neighbourhoods. If this is true, developers would have greater disincentive to help their competitors, as marketability relative to the other products in the same neighbourhood becomes more important.

It is plausible that the informants have significant systemic biases in some of the topics discussed. We can assume the subjects to have the limits to rationality as described in section 3.4 dealing with behavioural economics and, for instance, that they want to appear more cooperative than they really are. It was therefore important to focus the debate on the cooperation they actually performed or refrained from performing rather than a more general discussion. Furthermore, they are likely overconfident in their assessment of their own skills and those of their firms: almost all the subjects were intent on retaining as much control over mutual projects as possible, since they perceive themselves to be the most skilled managers. These biases will be carried into this research. It is thus important to remember that the findings reflect the strategising of the decision-makers regarding cooperation, as opposed to the actual economic potential of the cooperation. If developers cite something as a barrier to redevelopment, it should be considered as such a priori, even if the barrier is not rationally valid. To reduce the impact of the researcher's biases, the topics in the interview guide not covered by the informants when discussing manifested cooperation and their specific experiences were pushed towards the end of the interviews. The complexity of the topics makes confirmation bias a significant problem: if the interview topics are brought up by the researcher, the informants are likely to overemphasize them. The semi-structured approach enabled the subjects to prioritise whatever they considered important. Fortunately, there were few disagreements between the different narratives, or controversial opinions, so despite some methodological weaknesses the findings are presented with substantial confidence.

4.3 Game experiments

Three of the four papers in this thesis derive their empiric foundation from game experiments such as those employed in behavioural economic research. In these experiments, the subjects are presented with an urban redevelopment scenario and must make a strategic decision. By recording which subjects make which decisions under which circumstances, the researchers try to establish some causal links. Ideally, the researcher should be able to find certain traits among segments of the population that predict specific types of behaviour, for instance that women are more likely to act a certain way than are men, or that British people strategise differently from Belgian people. To increase the chance of picking up such trends, we follow up the games with surveys, which inform us about different traits among the subjects.

The most straightforward way of experimenting on cooperation is to conduct cooperation experiments. This thesis employs a simple public goods game as described by Ledyard (1994). Three players have 100 points each, and can contribute any integer of these to a common pool. This pool is then doubled and divided among the three. This represents a prisoner's dilemma, as the optimal strategy for each player is to contribute nothing, independent of what the others contribute, while the optimal strategy for the group as a whole is for everyone to contribute everything. This basic game is played in five different iterations, each testing the impact of

different factors on the willingness to cooperate. Article 2 explains these treatments in detail. The effects the different treatments gauge are: heterogeneity in the players' backgrounds; heterogeneity in the players' power levels within the game; and uncertainty and risk in the payoff from the cooperation. In Article 3 the effect of heterogeneity between backgrounds in Norway, French-speaking Belgium and the Netherlands is also compared.

In this research, the game is framed as three developers each constructing a housing project in the same neighbourhood. Each developer has the possibility to invest in beautification and furnishing of the common area between the projects, from which each developer will benefit equally. The interviews revealed that this is a somewhat unrealistic scenario, as such investments are largely dictated by the municipality. It would fit better with the layout of the game to have the subjects split their branding budget between branding individual projects (optimal for the individual) and branding their neighbourhoods (optimal for the group as a whole).

Article 3 also tests risk willingness, trust and reciprocity. To test risk, the article employs an investment game based on the 'bomb risk elicitation task' (Crosetto and Filippin 2013). The subjects are presented with a grid of five by five identical plots, and can buy as many as they want, from zero to 25. Each plot can be developed to provide a 20-point net profit. However, one of the plots contains a serious contamination, the clean-up cost of which will nullify the profit from the project. They achieve the highest expected returns by buying half the plots, but risk aversion or risk seeking can make some subjects buy fewer or more plots, respectively. The experiment testing risk and reciprocity is the same gift exchange game as presented in section 3.4.1 about these topics: one subject can give an integer of 100 points to another subject, who will receive triple that amount and have the opportunity to give back a share of these.

Finally, Article 4 employs a game to test strategies for dividing the profits from a cooperation scheme, as well as the perception of fairness of such strategies. One principal criticism of Coase's solution to externalities, which translates to other forms of cooperation, is that participants have an incentive to not engage in Pareto-efficient cooperation if they do not receive a substantial portion of the benefit from the cooperation. For repeated interactions this might be rational signalling, while in one-shot scenarios some players might be motivated by negative reciprocity if they receive less than what they perceive as fair. This division can be difficult, particularly when the actors have different power levels and those with advantages can impose their will on others. The article employs a game in which three subjects play three developers, and where each pair of developers can enter into dyads, thus leaving one out, or alternatively form a grand coalition of all three developers. The players have to decide on a coalition and agree on a division of the resulting payoff. This grand coalition is so much more efficient than any of the dyads that all three can easily be better off than what they are likely to be without all members. However, the different dyads perform differently, so that if one pair were to 'play hardball' and threaten to expel one of the members, they have different values in the resulting dyad. From a game theoretical point of view, the stronger member should be able to exploit this to threaten the weaker member into giving it a slightly bigger slice of the pie. However, if the stronger member attempts to do this, negative reciprocity might make the weaker member scuttle the entire coalition and choose to take no payment rather than what it perceives as an unfair slice of the pie. Furthermore, the stronger member might also agree to an even split if it perceives this as fairer than having a division slanted in its favour.

4.3.1 Subjects

The initial plan for finding subjects for the SimsCity group, and one of the main goals of the project, was to develop an online platform for collecting and playing with people from relevant backgrounds. Users could register on a website, after which they would occasionally be invited to

participate in economic experiments. The website would also track and pay out monetary rewards. We made the games in the Python programming language and uploaded them to the website. The problem was getting people to sign up to the website: after four months only a dozen subjects had signed up overall, and less than 1 per cent of the people we reached out to had created profiles.

We eventually realised we needed a more pragmatic approach, and the different parties used their own methods: the Dutch team leaned heavily on their networks among planning and development professionals, the Belgians expanded their search to include parts of France and shored up the recruitment by phoning potential subjects from the less-represented cohorts. We used different online survey tools, depending on which ones we were familiar with. The Belgian and Dutch teams were thus able to recruit acceptable numbers of respondents, but the participation rates were still close to only 1 per cent. As the population of Norwegian planners and developers is relatively smaller, we needed a higher response rate. We therefore contacted conferences where planners, developers and others would meet, and were invited to play the games with the participants. To make it more interesting for the subjects and organisers, we introduced the games and had the subjects play them early in the conference, quickly analysed the data, then presented the findings towards the end. Depending on whether or not we had time to punch the data, we used either a physical handout or an online survey tool. The online version compiled the data automatically, but despite it being usable on mobile phones, only about 70 per cent of the conference attendees participated (this number is an estimate, as it was not possible to know exactly how many people were present for this part of each conference). When we used the paper handouts, about 90 per cent participated.

The subjects for the profit-division game were students of property development, urban planning, architecture and related fields at the four universities engaged in the project (Radboud University, University of Liege, Liverpool University, and the Norwegian University of Life Science). This is typical for economic experiments, but not uncontroversial. People from WEIRD (White, Educated, Industrialised, Rich and Democratic) societies are vastly over-represented in economic experiments, and there is an ongoing debate about the generalizability of such WEIRD people (Henrich, Heine et al. 2010). However, the actual developers facing cooperation dilemmas in these countries are no less WEIRD, though this warrants some thought when we generalise our findings to outside of north-western Europe. To increase the external validity of the findings, professional planners, property developers and people with related backgrounds played the cooperation, risk, trust and reciprocity games. These subjects were recruited by consulting professional networks, contacting trade organisations and municipalities, e-mailing and phoning prospective candidates, and attending planning and development conferences.

4.3.2 Experimental validity

Despite these efforts, all the experiments had too few subjects to provide a robust statistical analysis. While the entire sample is large, particularly for the cooperation games, many treatments had few respondents. Across treatments and cohorts the results were also largely dominated by high variance, which limits the validity of the results: while there are some trends towards, for instance, certain groups contributing more than other groups or some treatments reducing contributions, all groups and treatments show some individuals who contribute several standard deviations above or below the average.

In most such economic experiments, the subjects are rewarded payment, either fixed rates for participating proportionate to their performance in the game or both. This is considered a core tenet in economics, but is less strict in other fields that employ such experiments. Contrary to this, no subjects were paid in any of the experiments used in this research. Large payments would be

ideal, but there are three reasons not to pay (in addition to the purely practical ones): the decision situations they mimic deal with values in the millions, from which the decision-makers would not profit directly. It was more realistic to give no payment than to give a payment of any plausible amount; except for the students, the subjects all have at least moderately well-paying jobs. The conferences the games were played in all cost several thousand NOK (several hundred euro) for the participants. Few subjects would bother to stay around to collect payments shy of a few hundred NOK; The literature on experiments like these are inconclusive, but most studies indicate that there is little or no difference between monetary and hypothetical payoffs. A pilot study was done with a public goods game slightly different from the one presented above, where one point was redeemed for NOK 1. Twenty-one subjects played this game twice, earning up to NOK 400 each, which did not produce particularly different results.

Contrary to normal economic experiments, the cooperation, trust and reciprocity games were also entirely hypothetical. As opposed to actually playing the games as described, the subjects were told to *imagine* they were playing a game, which was later described. After they had given their answers, the experiments simply stopped, without any resolution.

This method is not ideal, but it was necessary to provide enough high-quality respondents despite the different venues we employed for recruiting subjects. For the games played at conferences it would not be feasible to give them feedback on each group's payoff in a timely manner, nor to sort subjects in groups according to their background to create the correct heterogeneity. If the subjects playing online were going to play against each other, we would need groups of them to be ready at the same time, which would further reduce participation rates. Thus, both the game and the payoff had to be hypothetical. The specification that it was a hypothetical game was only mentioned once at the beginning before the relevant rules were introduced, which took quite some time, and should not be at the forefront of the subjects' minds when deciding. It is not ideal, but it was necessary to use the relatively large number of high-quality subjects, which is also important for external reliability. It is unlikely to change the directions of any of the trends, although it might increase the variance.

Hypothetical games and real actors

In behaviour psychology cooperation experiments, the use of hypothetical players and hypothetical rewards are somewhat common. Skatova and Ferguson (2011) tested contributions from subjects with different sensitivities to rewards and punishments in a public goods game where the subjects had been observing other hypotetical players contributing high, medium, or low average amounts. Hilbig, Zettler, & Heydasch (2012) asked their subjects 'to imagine that they and four strangers had been randomly selected to play together' in two rounds: first contributing an integer of 100 points to a public good, then again but with the ability to pay points to punish other (hypothetical) players who contributed little. However, the use of hypothetical opponents remains somewhat controversial in psychological experiments, so it should be avoided if using real opponents is a viable option (Schroeder, Nettle et al. 2015). In the economic literature, Hopfensitz and Miquel-Florensa (2014) let their subjects play with hypothetical opponents in a game akin to the one used here, in an experiment on public goods contributions among farmers in Columbia. Beyond this, such methods are less common in experimental economics than in experimental psychology.

There are many experiments that test hypothetical bias, i.e., the difference between playing with real people and money and hypothetical people and money, in different games. For instance, Ben-Ner, Kramer, & Levy (2008) found a smaller variance in hypothetical than in actual dictator games (player A has USD 10 or points, and suggests a division with a real or hypothetical player B, who must accept). Greedy players are less greedy here than generous players when playing with

hypothetical opponents, while generous players are less generous. For open-ended public goods games like the ones used in this thesis, Mitani and Flores (2009) found no difference between hypothetical and real games. They framed the hypothetical ones as follows: 'Please remember that the outcome of this hypothetical stage has no effect on your earnings at all. However, please put yourself in the following situation. Suppose that you faced such a decision [...]' The present games present their hypothetical nature in a way that should make the hypothetical nature of the game less pressing.

Same games, different settings

Articles 3 and 4 present games from several countries to test differences in attitudes. For the validity of the results it is imperative that the experiments be experienced as similarly as possible by the subjects, but this is inherently difficult. The project researchers designed the experiments in collaboration, using English as their working language. While the Norwegian subjects could pressumably do fine with the games presented in English, many Belgians and Dutch subjects might have problems with English literacy. The games were thus translated into Norwegian, Dutch and French and presented by different researchers to different subject pools, which will likely cause some differences despite attempts to the contrary. Even miniscule differences in the game texts and presentations could concievably lead to large variances. For instance, Baker II, Walker, & Williams (2009) find that people contribute more in a similar experiment simply by being told that the baseline payoff from the game, independent of contributions, is provided by an unspecified external source as opposed to simply giving them the baseline without specifying where it comes from. Particularly in Article 4, where the subjects are dividing the profit from a cooperative scheme, it is plausible that the specifics of how the game is presented are important. In Belgium and the Netherlands almost all subjects divided the payoff equally. In Norway at least some subjects initially approached the game from this point of view, but then started looking at how they could eke out some additional payoff. Alternatively, some were very quick to decide on an even split, but then seemed to change their mind. A plausible explanation for this is that they were worried that there was more to the game than what met the eye and that they were missing an element, and so they negotiated further on the division of the payoff. Some of the homogeneous divisions in the Belgian and Dutch games might simply be due to the subjects being given less time or because the games were presented less as a 'game' and more as a survey.

The differences between the nations' planning instutions may alter how the subjects perceived the games, particularly for the games presented in Article 3. Planning and development professionals were asked to contribute a share of their resources to a pool to improve the common area around their projects. In Norway, developers are used to engaging in similar discussions as the one presented in the game, primarily with a municipality but occasionally also with a municipality and other developers. The idea that developers contribute willingly, without ensuring contribution from their peers, requires some suspension of belief also for Norwegian subjects. However, Belgian and Dutch subjects are less accustomed to this type of discussion and might be more hostile to the notion, independent of their general willingness to contribute to common projects. Framing the games in a way that is equally natural to all the subjects would alleviate this problem. Ideally, the game should have been about investments that are made by developers in all the participating countries and that generate positive externalities. A more realistic scenario would be to divide funds between marketing of individual projects, which infers a direct benefit to the player, and marketing of the area, which provides all players with a smaller but equal benefit.

4.4 Relevance and ethical considerations

As we have seen, the rationale for studying cooperation between developers is that they, at least in theory, should be able to design more efficient development projects. This would shift power in urban development somewhat towards developers and away from other parties. As debated in the section on externalities, cooperating developers will typically want to expend more resources on providing positive externalities than will isolationist developers, many of which benefit society as a whole. This section argues that the present research is generally beneficial not only to developers but to society as a whole, also beyond these universally beneficial positive externalities, though with some caveats.

If developers would cooperate to a larger degree on providing externality-generating functions such as greenspace, either by beneficiaries reimbursing them or through bilateral agreements on which benefits they will provide, they would have an additional incentive to provide these goods. In the same way, we can expect contributions to area's branding to be higher in areas where developers coordinate these investments: if an additional unit of money spent on branding means that other developers who benefit from the branding can be persuaded to contribute more, the marginal return from these contributions would be higher. Area branding has an element of a self-fulfilling prophecy: if enough people are under the impression that a run-down neighbourhood was pleasant, it will eventually become pleasant. Moreover, when compared to branding of manufactured goods, much branding might prove more substantial than traditional branding that focuses on imparting information about the product to the population. Many of the informants on area branding efforts in this thesis had experience with marketing efforts that directly contributed to their areas, such as cultural or leisure events and public art. By contrast, the alternative of project-specific branding was more commonly classical advertisements on public transport, in newspapers or on the internet. This provides the population with information, but nothing else.

Insofar as cooperation mitigates some of the problems redevelopment carries compared to greenfield development, it will shift development investments towards existing urban fabric. This allows for faster redevelopment of more derelict land in more run-down areas of a city. As mentioned in chapter 2, this is generally considered a good thing from a social and environmental standpoint. However, urban redevelopment can also raise objections. Gentrification, which is a natural result, is controversial: as the old urban fabric is removed, housing prices rise, which can force out the existing population (Atkinson 2000). In Norway, resistance to gentrification is not typically as large an issue as in many other countries. One reason for this might be that only a relatively small proportion of the population rent their homes (Eurostat 2016). This limits the displacement effect. Among immigrants, however, home ownership rates are significantly lower (Statistics Norway 2002), so one can assume that the displacement effect of gentrification will be stronger in this cohort. Besides displacement, urban redevelopment can conflict with certain socially valuable land uses. Although a land use may be financially unviable and thus a candidate for redevelopment, it may still be important for the social life of the local community (Ahlfeldt 2010).

Systems that improve the efficiency of urban redevelopment projects might improve the profit margin for development firms, but they also allow municipalities to capture more value from redevelopment projects. Assuming that a city has some sort of direct or indirect betterment capture system, such as those described by Alterman (2012), a planning authority should be able to transfer some of the monetary gains from more efficient development systems to the general public by, for instance, demanding more and costlier infrastructure in return for zoning rights. There is a general debate in many countries on whether modern, neo-liberal planning systems

confer too much power to developers, and that planners and other municipal and governmental agencies need stronger tools to protect public interests in the urban fabric. Similarly, cooperation between developers can increase their power relative to that of individual citizens and their interest organisations, in which case the public sector would need to weigh the importance of maintaining such interests against the speed and efficiency of development projects. The market-based Norwegian planning system has already raised concerns about the power balance between growth coalitions of municipal planners and private-sector developers on the one hand and civil society on the other (Fiskaa 2005).

When discussing cooperation between competing firms, we should keep in mind the potential for collusion (Nelen 2008). This topic lies outside the scope of this thesis, but some preliminary thoughts should be included. Developers could perceivably be able to enact and sustain competition-limiting schemes. As a group they often have strong social relations, which is important for sustaining such collusion (Wiley 1988). In Oslo, developers frequently meet 'for merriment and diversion', and one thing they will often divulge is their production volumes. Given that it is common knowledge that the market will absorb a given number of units in an area, a party divulging how many units it intends to produce on the assumption that other parties will adapt their production so as to not over-supply the market would be skirting antitrust regulations. However, as long as these markets fluctuate and remain elastic, this issue is less relevant. As mentioned above, these redevelopment areas typically have large catchment areas, so it is less viable for multiple developers to limit the sum of their outputs to the expected levels of buyers in the area. In fact, developers in these areas frequently benefit from others over-supplying the market, as it leads to faster redevelopment of urban blight into residential neighbourhoods. As long as a developer is able to sell a substantial part its project late in this process, it is arguably beneficial if high supply leads to lower profits early in the project.

5 Articles

The thesis is based on four articles, as shown in Table 1. The theme, methods and findings of each article, as well as how they fit into the overarching research questions of this thesis, are summarised below.

Title	Status	Authors	Methods	Research questions	Findings
Developer Coopetition: Cooperating Competitors in Market-Led Urban Redevelopment	Accepted with major revisions, resubmitted 10.01.2020, Journal of European Real Estate Research	Anders Eika	Interviews	Do developers cooperate? What promotes and hinders cooperation?	Developers want to cooperate, but are hindered by the timing of their projects, the problem of using money for incalculable benefits, and the easier option of leaving coordination to the municipality.
Urban development and cooperation games	Published in Journal of Property Research, 2019	Anders Eika	Cooperation experiments	What promotes and hinders cooperation?	Developers are inherently cooperative. People are in general less likely to cooperate if it incurs risks or the possibility of others freeriding is high, and developers are more sensitive to these than others are.
Measuring and comparing planning cultures: risk, trust and co-operative attitudes in experimental games	Published online in European Planning Studies, 2019	Keyang Li, Perrine Dethier, Anders Eika, Ary A. Samsura, Erwin van der Krabben, Berit Nordahl & Jean-Marie Halleux	Risk, trust, reciprocity, and cooperation experiments	What promotes and hinders cooperation? Is this different in other countries?	Norwegian developers are more prone to cooperation than their Dutch and particularly Belgian peers. Developers in these countries have a strong preference for cooperating with other developers rather than with the public, which is substantially weaker in Norwegian developers.
Fair shares? Advancing land economics through trust and cooperative game theory	Draft, to be submitted February 2020	Alex Lord, Yiquan Gu, Perrine Dethier, Anders Eika, Ary A. Samsura, Erwin van der Krabben, Berit Nordahl, Dag Einar Sommervoll & Jean-Marie Halleux	Cooperation and negotiation experiments	What promotes and hinders cooperation? Is this different in other countries?	Almost all subjects are able to agree on how to divide the value added from cooperation. In Norway and the UK the majority of subjects agree to divisions in which the strong parties take a larger cut than the weak parties, while Belgians and particularly the Dutch are prone to divide evenly.

Table 1: Title, publishing status as of October 2019, authors, and dominant methods used in the four articles that compose the thesis

5.1 Article 1. Developer coopetition: Cooperating competitors in market-driven urban redevelopment

This article introduces the concept of 'coopetition', voluntary cooperation between competitors, to private sector-led redevelopment. It investigates mutually beneficial interactions between competing developers in Oslo. The article is based on interviews with 13 project managers described in section 4.2. It briefly gives the same rationale as presented in the background chapter of this thesis of the presence of economies of scale in urban redevelopment, and particularly in the internalisation of positive externalities. It argues that these economies can be harnessed through cooperation. Most of the topics where developers have common interests with each other, other relevant actors, and particularly the municipality, tend to have strong interests. As discussed in section 3.1.1 regarding externalities and Pigouvian and Coasian planning, public intervention is valuable for providing positive externalities because coopetition alone cannot ensure full efficiency, given constants such as transaction costs. Thus, developer coopetition should be seen in relation to public intervention. This intervention confounds the possibility of cooperation by making complex situations even more complex and the rationales for different strategies murkier. Therefore, the article focuses particularly on strategies for area branding because the common interests are strong and the strategies are independent of public intervention.

The article finds that competing developers often identify mutual interests in infrastructure development and branding activities, and share positive relationships where they will help one another if doing so is practical and cheap. However, in praxis their cooperation is limited by several factors. First and foremost, developers have narrow time frames in which to devise strategies and make investments, and these are usually not aligned with each other. They also have difficulties justifying the monetary costs for incalculable benefits for their respective owners. Moreover, they find it easier to leave coordination to the municipality: they tend to favour the Pigouvian approach to externalities as long as the municipality can provide these in an efficient and fair way, which is far from always. The article concludes that there is a significant unexploited potential for coopetition.

While the article in its published form focuses on these causal links, its most important contribution to this thesis is arguably the description of extant coopetition: it is taking place, and is quite an important factor for firms redeveloping urban areas that are not easily marketable. Regarding the research questions given in section 1.1, this article is thus most geared towards answering how developers cooperate, although the article places more weight on the questions of why they cooperate in this way and what keeps them from cooperating more. It also reveals that coopetition is heavily influenced by the heuristics and social relations of the decision-makers rather than by the purely mathematical *homo economicus* approach of classical economists. This validates the use of behavioural economic experiments as a tool for studying developer interactions.

5.2 Article 2. Urban development and cooperation games

This article focuses on cooperation in a voluntary contribution game. As shown in Table 2, it enhances the normal contribution game described in section 4.3 with three treatments: first of all, subjects are randomly told that they are playing with public planners, private developers or mixed groups. The experiments also test the effects of risk and uncertainty by adding a 50-per-cent chance of whatever payoff the cooperation yields being removed, and a 50-per-cent chance of the added value being doubled. The subjects under the risk treatment were informed of this probability, while those under the uncertainty treatment were told that there was a chance of

only one or the other occurring. Finally, the article employed a treatment to test the effect of heterogeneity on endowments. In the standard game, all subjects start with 100 points, while in this treatment some started with 50 and others with 200.

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.

Table 2: Treatments and findings employed in Article 2, taken from the article.

As expected, introducing a risk element or uneven endowments reduced the average contributions by developers; in fact more so than for the subjects from other professions. The worse-off contribute slightly more as a share of their endowment while the well-off contribute less. In other words, the strong subjects typically do not want to let the others freeride, and thus refrain from contributing much more than they know their weaker peers to be capable of. Although the risk treatment did not change the expected return on investment compared to the normal game, it had quite a substantial effect, reflecting the risk aversion most decision-makers exhibit. Somewhat more surprising is the virtually non-existent difference between risk and uncertainty, as given in this game, as people tend to show quite a strong preference for known risk over unknown uncertainty. However, the data is too shallow to drawn any strong conclusions in either direction on this point.

The article reports on a total of 510 games, but some treatment groups are very small. Moreover, the results here are largely characterised by high variance, with some subjects spread across

cohorts and games contributing much or little, independent of the treatments. This makes more elaborate statistical analysis difficult. When the findings seem to confirm the general literature, such as the presence of risk aversion, one can be fairly confident, but while the numbers point to small preferences for risk over uncertainty, the variance makes it difficult to argue that the impact is negligible. The cohorts for the game with heterogeneous and homogeneous employment backgrounds are larger than for the risk, uncertainty and endowment games, with 269 games played. These findings are thus moderately robust.

5.3 Article 3. Measuring and comparing planning cultures: Risk, trust and cooperative attitudes in experimental games

This article focuses on cultural differences between Norway, Belgium and the Netherlands, particularly in regard to titular traits and interactions between developers and public planners. The article discusses the culturised planning model, as proposed by Knieling & Othengrafen (2009), and argues for the use of game experiments to operationalise and measure attitudes. It reports from the risk, trust and cooperation games described in section 4.3 played by planners, developers and people from related professions in the three countries. In the trust and cooperation games, subjects were organised according to whether they were from the private or public sectors. Some subjects then played with subjects from the same sector, while others played with subjects from opposite sectors. A total of 817 games were played, but these were divided unevenly among the different countries and treatments, and some treatments were played by less than 10 subjects.

Perhaps most importantly, all the experiments revealed that only a small minority of subjects across pools chose entirely rational, profit-maximising strategies. Generally speaking, developers did not contribute less than other players such as public planners or less than what has previously been reported in similar experiments. Heterogeneity in group composition strongly impacted contributions from Norwegian development consultants, planners and other public employees, and from Belgian and Dutch development professionals, but Norwegian developers were far less influenced by whether they played with developers only or with mixed groups. The article finds that the Norwegian subjects were, on average, more cooperative and risk-seeking than the others. As for the trust game, the Belgians stood out as comparatively distrustful.

The sample sizes of the experiments are insufficient for performing a robust qualitative analysis, and all the treatments are largely characterised by wide variances. In other words, while there are some trends in the material, the article is primarily useful as a step towards developing economic game experiments as a method in planning and real estate development research. The topic of cultural differences in planning, and particularly along the parameters discussed, provides important caveats for the external validity of this thesis. Outside the context of Norway, and even Oslo, local culture in addition to planning and development institutions should be considered when debating the dynamics of development interaction.

5.4 Article 4. Fair shares? Advancing land economics through trust and cooperative game theory

This article looks at how development firms share the value added to a group when they cooperate. It focuses particularly on the value added from land consolidation and readjustment. When developers have a choice to cooperate but when cooperation is clearly better than going alone, how do they divide the additional payoff? The most intuitive choice is simply to divide it down the middle, with each party receiving an equal share. As long as all parties benefit more from cooperating than not, this might be the most reasonable solution. The article proposes the Shapley value, a solution concept from game theory. The basic concept is that although cooperation from everyone is better for everyone than non-cooperation, it can still be a viable

strategy for a player or group of players to threaten not to form a grand coalition in order to get a bigger slice of the payoff. While breaking up a grand coalition leads to a worse outcome for everyone, the threat might be realistic if this worse outcome is worse for some than for others. In such a case, the Shapley value can be used as a mathematical means of predicting the division of the payoff from a grand coalition if all other possible coalitions threaten to form. Thus, the payoffs will be based on how realistic it is for each of these alternative coalitions to form, so that players who have less to lose from a breakup of a grand coalition receive a larger cut at the expense of players who have more to lose.

To test whether this Shapley value is likely to arise spontaneously when negotiating the division of a payoff from a common project, the article relies on the profit-division game explained in section 4.3. The experiment revealed that the majority of students divided the payoff equally, while 28 per cent of the subjects reached divisions that were similar to the Shapley value in the sense that the person who would be better off if the players failed to form a grand coalition received more than the person who would be worse off. However, in Norway and the UK the majority of the subjects reached this type of agreement. This illustrates a potential for disagreement over to what extent differences in disutility from breaking up a cooperation scheme should influence the division of payoffs. Because only six of 92 groups (6.5 per cent) failed to reach a grand coalition, this illustrates that the negative reciprocity from receiving what is considered an unfair offer can topple a cooperation project, even when overall it implies substantial benefits for the participants. Because the game was only played once, the reputational cost of accepting low offers was non-existent, which in a more realistic scenario would compound the issue.

6 Discussion

6.1 Results

This chapter will attempt to answer the stated research questions:

- To what extent do firms developing urban land in the same area voluntarily cooperate in praxis?
- How do decision-makers' heuristics and biases influence the extent to which developers cooperate with one another?
- How does the social and cultural basis for cooperation in Norway differ from other countries?

6.1.1 How do developers cooperate?

One core purpose of Article 1 is to answer this fundamental question. The best way to answer it might be to say that at least in Norway, competing developers do not *refrain* from cooperation. If they feel that cooperation is beneficial, they will do so, and will not be dissuaded by the fact that they are helping their competitors. If it can be done without cost, they would rather help their competitors than hinder them. However, when it comes to actual cooperation, and particularly to creative ways of achieving economies of scale and internalising positive externalities, cooperation is the exception rather than the rule. In praxis, they frequently cooperate on gathering and sharing information. They will cooperate on branding and on constructing infrastructure in the same area as long as they can make the investments at the same time and there are no opportunities to freeride. Cooperation on achieving efficient levels of externality-generating land use is uncommon, except for when it is coordinated by the municipality.

This thesis does not firmly argue for or against Pigouvian or Coasian approaches to handling externalities in planning. However, the importance of project timing to the possibility of engaging in developer coopetition in redevelopment areas indicates that if one is looking for market solutions to achieving efficient levels of positive externalities, the public sector should play a role

in setting the pace of redevelopment projects. This research should therefore be seen together with the wider discussion on freeriding and hold-out strategies in urban redevelopment (MacLaran 2003, Nordahl, Ruud et al. 2019). Windfall capture mechanisms such as tax increment financing (Root, Van Der Krabben et al. 2015) would arguably alleviate some of the holdout incentive, and thus timing issue. One could argue that the early stages of a redevelopment project should be subsidised by the public sector, financed by capturing the windfalls in the later stages.

6.1.2 How do decision-makers' heuristics and biases influence the extent to which developers cooperate with one another?

The games presented in Articles 2 and 3, as well as the interviews, reveal that Norwegian developers are fundamentally quite cooperative. They exhibit a bias towards cooperative solutions by contributing much more than what is rational in the classical economic or game theoretical sense. This is not in itself surprising, as similar games have displayed that humans usually will want to contribute to providing one another with such benefits. However, the status of the competitors could conceivably invalidate this bias. Although they are competitors and work in capital-intensive, highly professional industries, developers cooperate much more in game experiments than what is rational in a classical economic or game theoretical sense. While cooperation is not as extensive as one might infer from the background and theory chapters, the interviews reveal that there are substantial economic benefits to be derived from cooperation.

Note that eschewing directly profit-maximising strategies in favour of a more collaborative strategy can often be motivated by potential long-term benefits derived from good reputation and positive relations with other developers. For instance, deciding to give neighbouring developers aerial photos or a socio-cultural study for free rather than sell them might be rational from a purely economic perspective when considering the reputational benefit. However, this reputational benefit only has value in an economy where the participants at least assume that the *other* participants in the economy are motivated by to positive and negative reciprocity. In a world of purely rational *homo economicus,* this reputational benefit has very little value. It is not important to maintain relationships, because others will always cooperate in the future if – and only if – it is profitable for them to do so at that time. However, if such a homo economicus is dropped into a system like the Norwegian redevelopment economy, where she knows that people are motivated by positive and negative reciprocity, her strategies must change to accommodate this. In other words, this willingness to treat other developers well might be motivated largely or solely by profit-maximising interests, and any altruism may be impure, but in praxis the distinction is not important. The interviews revealed that some developers are motivated by a desire to treat others fairly and create good neighbourhoods, while others see treating others well more as a means to an end. However, the purity of the subjects' altruism is not a topic of this study and there is therefore insufficient data to conclude on how endemic these motivations are.

One informant mentioned an important heuristic that kept his firm from cooperating more: *'As soon as we talk about moving money from one firm to another, it becomes difficult.'* When money is already allocated for something, such as branding or an infrastructure project, developers will discuss whether they can do things more efficiently by joining forces. However, as there is no praxis for, for instance, negotiating to ensure greater levels of positive externalities, they will not budget for it and thus will not discuss it. Similarly, while developers contributed to the common pools in the cooperation games at similar rates as other subjects, their preference for cooperating with people from the same group was lower than other groups: their contributions when playing with other developers were lower than, for instance, those of public planners playing with other public planners or those of private-sector consultants playing with developers. The traditional transaction costs of information gathering, bargaining and policing should be very low for this type of agreement: the developers know which externalities they want to generate and who their

potential partners are, and the high trust levels and strong social relations between them should make negotiating and enforcing contracts quite easy. It would seem there is a psychological barrier to such transactions beyond transaction costs. This relates to the endowment effect discussed in section 3.4.5: while it is clear to developers that they all produce the marketability of the neighbourhood together, the interviews reveal that they are not indifferent to who performs the activities that produce this marketability.

The misaligned timeframes of different developers working in the same area described in Article 1 compounds this. Even if developers have some flexibility in making their investments, as with firms that earn good rental income from the existing land use or that expect the price for their products to rise, they do not generally consider altering their schedules to accommodate cooperation. They perceive it unnecessary to negotiate with parties with inflexible schedules because they have to engage in substantial externality-generating activities any way and will have to transform the area into something sellable. However, there may still be a potential to increase efficiency if the later developers compensate the first parties to shift their preference levels to more marketable developments than what is rational for the first developers seen in isolation. When multiple actors with flexible schedules plan their progress, it can be more viable to schedule some activities to be performed at the same time. Depending on the local market's ability to absorb the products, this might be hindered if firms want to plan their projects so that they sell their units at different times.

One important finding in Article 1 is that the developers experience a crowding-out effect when municipalities regulate the production of positive externalities. When a municipality sets levels for how much land and funds projects must allocate for goods like greenspace in a project, developers will not consider debating the viability of a high level. Generally speaking, this will be a problem if the public sector is unable to determine efficient levels. In Norway at least, this also constitutes a problem when viewed in relation to the Planning and Building Act, which stipulates that such requirements must be for investments necessary for the project or be sufficient to offset the negative externalities generated by the project. The municipality's bargaining tools are not supposed to be used to ensure socially optimal levels of externalities, but rather what they deem to be 'good enough'. Thus, even if the sum of utility for multiple developers from constructing public space exceeds its cost, the municipality cannot mandate that the developers construct it without arguing that it is necessary to offset the negative effects of the individual projects. However, the municipality has wide scope for judging what is 'necessary' for a project: for a housing development, the municipality can go beyond demanding what is necessary for people to survive in the development to demanding what is necessary for them to thrive.

Depending on the specifics, cooperation between developers can both mitigate and expose them to risks. Oslo development firms keep transaction costs low by relying largely on informal agreements and conflict resolution. Thus, they would be hesitant to cooperate with actors who have not earned strong trust. This could pose a barrier to new or foreign firms establishing themselves. According to the interviews, trustworthiness is attached both to firms and to individuals, so firms can partially overcome this barrier by hiring developers who are respected in the community. This would also mean that cooperation schemes will gradually become more extensive in the absence of other factors as firms gradually develop stronger relations. This reflects the typical trend seen in many cooperation experiments played over a substantial number of rounds: if the players are able to sustain cooperation in the beginning through, for instance, mechanisms for punishing defectors, cooperation tends to become more intensive throughout the game, save for the last one or two rounds. The games presented in Article 3 should ideally test to what extent risk is an important barrier to cooperation. The risk and uncertainty games did not present sufficient evidence of any causal links to offer any firm conclusions, but they should be

seen together with the data from the interviews and previous behavioural economic research showing risk aversion among developers.

Norwegian municipalities will occasionally instigate some form of cooperation: one of the tools Norwegian municipalities most frequently employ to ensure coherence in urban redevelopment areas is to require developers to make joint redevelopment plans (Barlindhaug, Holm et al. 2014). In other cases municipalities will instigate optional planning forums or similar efforts (Nordahl and Eika 2017). This is also common in, for instance, the UK (Dixon, Otsuka et al. 2011). Much earlier literature on cooperation, trust and reciprocity indicates that people continuously interacting with one another with have an incentive to act cooperatively (Camerer, Loewenstein et al. 2011). Insofar as they refrain from acting opportunistically, they will also develop stronger relations. While this thesis focuses on non-organised cooperation, it should be noted that any public scheme that enforces cooperation is likely to lead to 'self-organised' cooperation (Nordahl, Føreland et al. 2019).

6.1.3 How does the social and cultural basis for cooperation in Norway differ from other countries?

The interviews presented in Article 1, as well as much of the literature cited in this thesis, underline the importance of social and cultural factors to the viability of coopetition. However, both the existence of such differences between countries and how social and cultural differences translate into different bases for cooperation are arguably less obvious than when dealing with differences in purely economic and legal frameworks. The multinational game experiments in Articles 3 and 4 provide some empirical data to answer how the social and cultural basis for cooperation differs between countries. The findings are mostly dominated by high variance, and the analyses are not sufficiently robust to draw strong conclusions, but they do provide some indications.

The experiments in Article 3 reveal that Norwegian developers generally contribute more to cooperative efforts than do their Belgian and Dutch peers. However, developers in these countries differ here: Dutch developers, like most other cohorts across countries, have a stronger preference for contributing with other developers rather than with public actors, which is not an important factor for Norwegian developers. Belgian developers, on the other hand, have a strong aversion to cooperating in groups with only other developers. This may indicate that if Belgium and similarly minded countries continue to move towards market approaches to redevelopment, public control will remain important for coordinating the production of positive externalities. On the other hand, these findings indicate that Dutch developers may be able to do so multilaterally, abating some of the need for public intervention.

Article 4 indicates that there is a difference between Belgium and the Netherlands on the one hand and between England and Norway on the other regarding how to divide the payoff from a cooperative project. In the latter countries there seems to be more intense negotiation with those in good positions trying to get ahead, while the subjects in the former countries overwhelmingly opt for divisions that favour those in weak positions. The skewered strategy favoured by many subjects in Norway and England is not necessarily detrimental to the viability of coopetition. What is important for the possibility of cooperation is the tendency for people to have similar ideas about what is fair, because they tend to have a strong aversion to perceived unfairness. Many weak subjects in groups that employed skewered divisions, who received less than an even share, saw this as reasonable because they felt they contributed less to the project. Thus, in these two countries, where the subjects were more or less evenly split on how to divide the payoff, this could pose a barrier compared to the Netherlands and Belgium, where almost all subjects agreed that the even split was the most reasonable solution concept.

6.2 Validity

While the sections discussing game experiments and interviews debate the validity and robustness of these particular methods as applied in the thesis, this section discusses to what extent the results discussed in chapter 6 can be applied to settings outside Oslo.

One of the main findings of the thesis is that developers are more cooperatively minded than a strictly value-maximising, rational actor playing against other rational actors would be, and that they do not mind helping their competitors. There are some market factors that could make developers see helping their competitors as less of an advantage and more of a problem, as it enhances their ability to produce good products at low costs. In markets with more actors, where firms are more likely to cease operations, the benefit of having positive relations with competitors and the cost of acting unfairly are lower. The firms and individuals developing Oslo often have long experience in dealing with the city authorities and with each other, and usually expect to continue operating in Oslo indefinitely. Some small firms, or firms that are not primarily developers, might operate with the intention of completing a few projects before either entering other areas or markets or disbanding. Adams (Adams, Leishman et al. 2012) find that developers in England see the value of having good relations with other developers to be limited due to firms' frequently going bankrupt. This view is not prevalent among firms in Norwegian redevelopment areas.

Generally speaking, developers in redevelopment areas can benefits from competition if their competitors help transform the area into a marketable neighbourhood. This creates a subtle benefit to cooperating in ways that help competitors run their projects, which requires some market elasticity. If the market in one area is unable to grow when more and better units are produced, competition will be stronger, while the mutual benefit of creating good neighbourhoods together will be smaller. Activities that improve others' products become less viable. Projects in Oslo can arguably have a catchment area covering the entire Oslo conurbation, with some 1–1.5 million inhabitants, depending on demarcation (Statistics Norway 2018). In a neighbourhood where annual sales are more or less fixed, as in an isolated village where all housebuilding happens in one area, the housebuilders are to a larger extent playing a zero-sum game. This could also be the case if the products only appeal to a very limited group of potential end users, as with extremely high-end housing or specific commercial real estate.

This thesis focuses on relationships between developers as opposed to between developers and the public sector. In planning systems where the public sector has more direct control over spatial development, interactions between developers are less important. For instance, countries in which the municipality assembles land, prepares the zoning plans, furnishes it with infrastructure and sells it to developers, many of the topics of cooperation will either be entirely internalised by the municipality or become issues between individual developers and the municipality. In such a system, developers will not discuss collaboration on infrastructure or efficient zoning schemes with one another. But there is also an aspect of a self-enforcing trend: as their interaction on these topics is reduced, so too are their opportunities for discovering mutual interests and informal information sharing.

Looking back at the reasons for why there tends to be many developers in each development area, these are not universal. Due to the presence of economies of scale in development, firms have an incentive to make large projects. In markets that can absorb many units and where there is easy access to risk-willing capital, a developer might simply want to dominate an area entirely, acquiring all redevelopable plots. If the public sector assembles the land, employs compulsory purchases and pre-emption to acquire it, and then sells it to a single developer or joint venture, there will be only one entity developing the entire area.

7 Can we and should we improve coopetition? A case for further research

The present research reveals that cooperation is limited, but argues that more cooperation would be optimal: development projects would be more efficient, allowing for faster development of more problematic sites, and firms would have additional incentives to invest in land uses such as public spaces and services that would enhance a neighbourhood's marketability. The natural question to ask oneself is what developers, municipalities or lawmakers can do to spark more cooperation. As this is not the main topic of investigation in this thesis, the discussion is less firmly anchored in existing theory and the empirical material presented. Instead, it points out directions for further research on cooperation between developers.

When considering how planning systems can be developed to spark cooperation, it is relevant to ask which plausible types of cooperation we want to spark. In this regard, the cooperation that can be observed in the Norwegian market and derived from theory can be loosely grouped into three categories. First, there is cooperation that is entirely within the sphere of developers, which could help them develop more cost efficiently. This includes achieving economies of scale in construction, internalising externalities from branding, and providing each other with information. To the extent that this type of cooperation is possible, it is generally good for society. Second, we have cooperation in areas that are typically seen as the domain of public planning, such as providing land uses that generate positive externalities or designing more holistic land use patterns. Here, the value of cooperation relates to a wider economic and political debate on to what extent the free market or the public sector should supply such solutions. One could make the case that this should be left entirely to public planning, as was largely the case in post-war Norway and many other countries. In that paradigm, cooperation on these topics was inconsequential. Alternatively, if one is deeply entrenched in the neo-liberal camp, efforts that make this cooperation easier would in turn help the free market to provide positive (and limit negative) externalities. This thesis bases itself on the fact that there is extensive political support for neo-liberal planning in much of the world, and that this type of developer cooperation is thus important. Third, some forms of cooperation increase the power of developers at the expense of other interests. This could be, for instance, cooperation on lobbying municipalities or even illegal collusion to fix prices. Unlike the first type, this is Pareto efficient when only considering the participating developers. Whether developers should be encouraged to engage in this type of cooperation depends on the specific planning systems and on how one weighs different interests against one another.

It is also valuable to rank the barriers to coopetition discussed in this thesis according to the extent to which they imply that development would be more efficient if they were mitigated. At one end of the spectrum, some of the reasons not to cooperate indicate that cooperation is simply not viable. At the other end of the spectrum, some reasons are more institutional or psychological, which indicates that they create efficiency losses. Thus, increasing efficiency in the rate of cooperation should focus on the barriers closer to the latter end of this spectrum. Imperfect trust necessarily makes cooperation less viable, but in a world of limited information, market actors should always demonstrate at least some distrust. Excessive distrust would hinder efficient cooperation schemes, but there is nothing in this research to indicate that this is common among Norwegian redevelopment firms. This could easily pose a barrier elsewhere, such as in Belgium, where the games presented in Article 3 indicate lower trust levels. Differences in timing are the result of the business cycles and portfolio management of different firms, and of the incentive they have to stage development. The timing inflexibility of the investments relates to the high upfront costs and cost of capital for development firms. However, while these factors limit timing flexibility, development firms might always want to run their projects according to strict time

frames. Lack of a tradition for cooperation is likely to cause market failures insofar as it exists. Decision-makers have a sense of ownership of the land uses and marketing efforts created on their own plots, and exhibit an endowment effect. This makes Pareto-efficient cooperation on these goods less likely to happen, as the owner of the externality and the beneficiaries are unable to appraise them similarly. The disinclination to spend direct resources on incalculable benefits illustrates this: the values of these externalities are difficult to quantify and the silent knowledge, biases and heuristics of the decision-makers impact the appraisal. The endowment effect is one such bias, which is likely to shift projects away from cooperative solutions towards developing their marketability in isolation. How this endowment effect influences developer cooperation could be a viable course of behavioural research.

Much of the research in this thesis relates to the provision of externality-generating land uses typically provided by municipalities, such as greenspace and technical and social infrastructure. In Norway these uses are increasingly provided by developers, though at levels mandated by the municipalities and restricted by the Planning and Building Act. This mandate only extends to investments 'necessary' for a project or for offsetting the negative externalities it generates. It is plausible that in some cases the municipalities require fewer externality-generating land uses than the optimal allocation from the point of view of the developers: the net benefit for the group of developers overall from investing more in these goods than required by the municipality can be positive. This is more likely if the positive effects spill over a large area of redevelopment land and if the municipalities stay within their jurisdiction by demanding only 'necessary' improvements. However, more research is needed to determine the value of these investments to development projects.

As discussed in the sections on the Norwegian planning system and how it handles externalities (2.2 and 3.1.3 respectively), the municipality's power to demand investments from developers will only be limited if the developer brings the case to court. If a developer has the opportunity to get its project approved assuming it agrees to furnish externality-generating activities beyond what the municipality may legally require, it may have an incentive not to challenge the deal. Deals are finalised *after* the municipality approves of a plan. After that point, the municipality would have a hard time stopping a project. However, the developer can sign a binding contract stating that it will approve the deal once zoning is completed (Øyasæter 2018). However, it gives the developer an opportunity to signal that it will accept a deal but then challenge it in court afterwards. This situation is thus similar to the gift exchange game described in section 3.4.1, where the municipality can choose to trust the developer for common benefit, but where the developer has the opportunity to betray the municipality assuming it exhibits trust. The firms that engage in these redevelopment projects have long time horizons and are usually intent on developing similar plots later. As there is a large but indeterminate number of interactions, the game theoretical prediction would most likely be that the developer would want to keep its deals with the municipality. On the other hand, the games reported in Articles 2 and 3 reveal that public planners tend to have a quite low opinion of developer reliability in this type of scenario, which would prove a hindrance to this type of investment.

The limitation that developers should only have to afford public investments development that offset the negative externalities from the project is problematic in redevelopment areas. A less obvious problem with this system would be if, due to these limitations, municipalities were hesitant to demand *less* investment when other factors indicate that it is warranted. This would persist even if municipalities are aware of this issue and try to reduce the threshold for starting the early phase of a redevelopment area, which they most likely are. Insofar as municipalities follow this line of thought, the high upfront costs of making these areas marketable for housing and services strengthens the freerider problem: the first developers will not only be in a worse

position when selling their products than later developers; they will also be required to afford more infrastructure and other marketing-strengthening efforts. If the municipality could require more investments from later projects, tax increment financing, or a simple windfall tax, they would have an incentive to let developers carry out cheaper projects in the early phases of a redevelopment. However, one could argue that the City of Oslo gets around the limitations in the Planning and Building Act through non-juridical binding plans and mandate the production of positive externalities beyond what is both 'necessary' and directly tied to each development project, which is important for the development of unmarketable areas.

The Norwegian government is considering several amendments to the way municipalities and developers should finance public infrastructure (Gran, Evjenth et al. 2018). Among other things, it is considering letting municipalities designate a development fee to an area so that anyone developing within the area must pay a fixed sum per added square metre towards the municipality's infrastructure, similar to the infrastructure levies used in England (Lord 2009). This would be similar to what the City of Oslo is attempting through non-juridical "guideline plans", but with a stronger legal basis and a clearer framework for making such plans. This alleviates the incentive to wait until other developers have built the necessary infrastructure, but not the effect of prices rising as the area is redeveloped.

A strength of this thesis is that the experiments are run with professionals who are close to the decisions studied. However, analysing game results can be difficult due to large variances in how different subjects interpret the rules and the setting. Further research in this field should consider combining the interview with the game experimental method in trying to reach the same valuable subject pool, but in small groups so that the experimenter can interact directly with the subjects and talk to them about their strategies. Thus, game experiments can be seen as a supplement to interviews to pick up on some subconscious biases that are not revealed during interviews. This necessarily leads to few observations compared to traditional experiments, but this is hopefully counteracted by the greater expertise of the subjects. Having the people who makes decisions in the real world play games mimicking simplified versions of the same decision situations would enhance the external validity.

8   Summary and conclusions

Redeveloping industrial and logistical land into new, urban functions, such as dense housing and customer-focused commerce and services, is difficult. The areas are complex, and the plots are expensive and tend to be fragmented. There are therefore often many developers in each area, with many common interests. The thesis has particularly focused on how they all want to create a marketable neighbourhood, and on how they confer substantial positive externalities on each other when developing their respective plots. This provides them with an incentive to cooperate on maximising the value of these externalities. They can also have an incentive to cooperate on constructing public spaces and common infrastructure to achieve economies of scale, on exchanging information, lobbying the public sector or on 'some contrivance to raise prices'. Nonetheless, they remain competitors selling to the same market.

Situations where developers generate positive externalities for one another, as is common in urban redevelopment areas with multiple developers, tend to create efficiency gaps. Traditional planning tools may be able to prevent over-production of negative externalities. This will typically be by disallowing projects that create congestion or noise or that remove public spaces and so on, requiring developers to compensate for these externalities or by providing neighbours with rights to stop such externalities. Although these tools are less able to ensure efficient levels of positive externalities, they can in theory be achieved through cooperation.

While there is substantial room for cooperation between competing firms in urban redevelopment areas, and Norwegian development firms are fundamentally cooperatively minded, cooperation is limited. It is difficult for development firms to cooperate in praxis because they are disinclined to alter their own time frames and budgets to accommodate coopetition. This makes cooperation on creating efficient levels of positive externalities difficult. What cooperation they do engage in does not require them to change the timeliness of their projects or alter their budgets. Within these very strict boundaries, a cooperative mindset is the norm. Thus, while developers may be able to provide efficient levels of positive externalities, there is a role for the public sector in coordinating them and setting the pace for redevelopment within each area. This might be through, for instance, direct interventionist tools such as public land assembly, or more indirectly by subsidising early redevelopment stages and capturing the windfall of subsequent stages.

There is much more than cold calculations and financial realities that explain cooperation in general and between developers in particular. Both urban redevelopment and cooperation schemes are complex, and the parties must make decisions based on limited information. Many of the benefits from cooperation are hard to appraise, such as the value of good relations with other developers and increased marketability of a neighbourhood. Factors such as the parties' trust, reciprocity, risk preferences and general cooperative attitudes are important for their willingness to cooperate. This thesis employs game experiments to study these factors. Substantially more research is needed to draw firmer conclusions, but the method can provide empirical data on some trends that might be assumed but that are hard to prove: that risk and heterogeneity of power are disadvantageous for cooperation; that people have different ideas about fair distribution of the payoff from a cooperation scheme but will strive to reach agreement if it is Pareto efficient to do so. More surprising is the fact that that professionals from the private development sector are no more likely to cooperate with others from the private development sector than with public planners, while other professionals often display a preference for cooperating with parties from their own group.

These game experiments also reveal some differences between Norway and other countries. Compared to the Dutch and particularly the Belgian cases, Norwegian developers are more inclined towards cooperation. Again, this reflects what one might assume, given studies by others showing that, for instance, Norway is a high-trust society. On the other hand, Belgian developers have a substantially weaker preference for cooperating with their own group: in fact, Belgian property developers are about as cooperatively minded as Norwegians as long as they do *not* cooperate with developers alone. While there are weaknesses in the experiments employed in this thesis, this cultural difference strongly indicates that this type of bias is important when studying coopetition in different countries or transferring experiences or policies between countries. It also indicates the viability of economic experiments to learn about these differences.

Anywhere the market is a driving force behind developing and shaping urban space, the tension between cooperation and competition among developers is relevant and deserves some attention from policymakers and scholars.

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Appendix A: Developer coopetition interview protocol

I initially interview project leaders for developers in Oslo case areas where multiple developers are active. This is a male-dominated group, with an intricate social network within and across organizations. I might expand the selection to include others, if the interviews reveal that the developers make important decision in other instances of their organizations. I will ask the subjects about their attitudes towards cooperation with other developers active in the same area, particularly regarding marketing of the case areas. I will primarily focus on their experiences from four areas, but I expect to be offered information on other, relevant projects with which I will supplement my data. The areas are: Ensjø, Vollebekk, Løren, and Ulven. I want to answer the following research questions:

"How does Norwegian developers working in the same areas cooperate with one another to benefit from positive externalities and economies of scale and scope?"

"Why does not Norwegian developers cooperate more?"

I have generated three general hypotheses for the second question:

H1: Tradition within the firms does not open for coopetition.

As times have been good for redevelopers in Oslo, they have arguably not had to innovate much in their business practices. In other industries, coopetition have been gaining traction mostly in the past two decades, a period that has been marked by nearly continuous rising housing prices in Oslo, and little new competition. Arguably, this could make developers keep less efficient practices, such as refraining from coopetition where it would be beneficial, without being out-competed by firms that are more adaptable, as traditional business theory would indicate.

H2: Formal structures within or outside the firm makes coopetition difficult.

There could be that the ways firms organize their development projects and decision making structures, or the way society organizes and regulates development, hinders coopetition. The firms in the case areas have for the most part several decision-making levels, a specialized division of labor, and frequent use of external agents. The specifics of how these are assembled and fit into one another could cause unintended effects that impact the propensity for coopetition. An in-depth study of the organizational structures could be necessary for an exhaustive study of this hypothesis, but this is somewhat beyond the scope of this article, which limits itself to the points of view of subjects.

H3: Developers perceive costs of coopetition as too high compared to the benefits.

This hypothesis will be strengthened not only if there are actual high costs and low returns to coopetition, but also if the subjects merely perceive it as such. In fact, high costs compared to benefits of coopetition would not in itself reduce firms' propensity for cooperation, as decision makers can only make decision based on what they can perceive. The interview method employed makes it difficult to pick up on actual costs and benefits where they diverge from the perceived ones. This makes the method good for testing this hypothesis and answering the research question. An analysis of actual costs and benefits independent of how the decision makers perceive them would be valuable both for motivating coopetition research and for identifying possible efficiency gaps, but it is again outside the scope of this study.

These three hypotheses can be subdivided into more specific hypotheses:

Hypothesis	Branch
H1: Developers simply do not consider working alongside other developers as a possible strategy.	Tradition
H2: Developers in Oslo are not particularly innovative, as the market has been strong.	Tradition
H3: Developers are prone to professional or personal disagreements	Tradition
H4: Developers does not have a dedicated person making the marketing strategy, relying on external firms with limited powers.	Formal structures
H5: Developers want to stay away from anything that can resemble illegal collusion.	Formal structures
H6: Developers are reluctant to cooperate because the monetary benefits are low.	Costs/benefits
H7: Developers are reluctant to cooperate because the startup costs are too big, and would have to be repeated on each project.	Costs/benefits
H8: Developers are worried that association with partners with worse products and reputation can impair their own reputation.	Costs/benefits
H9: Developers do not want to show their strategies and technologies to competitors.	Costs/benefits
H10: Developers are worried about losing market shares by improving competitors' products.	Costs/benefits
H11: Developers are worried about their power compared to their prospective partners, either being dictated by a stronger actor or being taken advantage of by a weaker one.	Costs/benefits
H12: Keeping as much as possible of the development process within the firm reduces risk.	Costs/benefits
H13: Developers are reluctant to cooperate because the benefits are not clear for them.	Costs/benefits

When initially contacted and again at the start of the interviews, the subjects are told the research questions. I do not give the actual questions that I will ask during the interview beforehand. The subjects are also asked if they can be recorded, and will be allowed to check the transcripts and retract or amend as they want. They are also told that everything is treated confidentially between my advisors and me, and that no specific people will be identified in the published material.

Appendix B: Interview questions:

Om forholdet mellom eiendomsutviklere som holder på med separate prosjekter i samme område

- Hva slags kontakt har dere med andre utviklere i området? (H1)
  - Møter? Telefonsamtaler? Arrangert av kommunen eller annet?
- Vurderer dere å samarbeide med dem om for eksempel programmering eller utforming av området? (H1)
- Er det noen temaer der det kunne vært hensiktsmessig å snakke med andre utviklere i området? (H1, 5, 6, 12)
- Er det noen tradisjon for å snakke om dette mellom eiendomsutviklere i forskjellige firmaer?
  - Med folk man kjenner fra før? Med folk man ikke kjenner, men som er i samme område? (H1)
- Bruker dere mye energi på å se på om dere kan gjøre prosjektene og rutinene deres mer effektive, f eks ved nye løsninger knytta til håndtering av rekkefølgekrav? (H2)
  - Har dette forandret seg etter at boligmarkedet i Oslo fikk en knekk i 2017?

Om markedsføring

- Har du noen eksempler på at dere bruker ressurser på å markedsføre et område, utover bare å avertere leilighetene deres? For eksempel å reklamere for området som helhet, midlertidig bruk av området, eller arrangere eventer? (H3)
  - Eventuelt hvorfor ikke?
- Hender det at dere samarbeider med andre aktører om dette? (H1, 5, 6, 10, 12)
- Hender det at andre utviklere spør dere om å samarbeide om dette? (H1, 5, 6, 10, 12)
  - Hvem ville de henvendt seg til? (H3)
  - Hva svarte dere?
- Har det hendt at andre utviklere har markedsført et område på en måte som har begunstiget dere? (H5, 6)
  - Eller omvendt?

Om barrierer

- Er dere bekymret for at andre eiendomsutviklere kan få bedre produkter dersom dere jobber sammen, og ta markedsandeler fra dere? (H9, 10)
- Vurderte dere ryktet eller produktet til naboen da dere (ikke) inngikk partnerskap med dem? (H8)
- Forhindrer tidskostnaden dere i å snakke mer med andre utviklere om felles prosjekter for eksempel for markedsføring? (H7)
- Kan samarbeid fortelle konkurrenter for mye om strategiene deres knytta til salg eller annet? (H9)
- Ville dere foretrekke å samarbeide med markedsaktører som er mindre, omtrent like store, eller *større* enn dere? (H11)
  - Er nivåforskjell på kompetanse, ressurser og markedsandel til hinder for at dere søker samarbeid?
- Er dere bekymret for hvordan konkurransetilsynet ville oppfatte mer utstrakt samarbeid med andre utviklere? (H4)
- Ser dere på samarbeid med andre utviklere som et risikomoment? (H12)

Bakgrunnsspørsmål

- Hvor har du jobbet tidligere?

Appendix C: Cooperation experiments

This appendix contains the three different voluntary contribution games that were used to test the subjects' general cooperativeness, and provides the data for article 2. Common goods I is the description of the basic game as it was given to the subjects translated to English. Common goods II and III are variants of the same game, with minor variations. All subjects played game I first, then some played game II and some played game III. Game I was also played in Belgium and the Netherlands and used in article 3.

Common goods I

Imagine that you are playing a game with two (*public planners/private developers/one of each)[3]*. The objective of the game is to score as many points as possible (independently of what the others score).

In this game, you play one of three developers, each of whom is planning to build an apartment block bordering each other, as illustrated below.

All three developers have an interest in improving the quality of the area (for instance by installing street furniture, planting trees, decorations, and so on). All developers can decide to contribute in these improvements before finalizing their project budgets. The benefits from the improvements, in the form of higher sales prices, will benefit all developers equally, independently of how much they invested.

Each developer start with 100 points, and you can invest any share of these in the common project. The other players will not be told how much you invest, only the sum of all investments in the group. Your total payoff will be as follows: The investments of all the developers are pooled, and the sum is multiplied by two. This is the value added to the entire area following the investments. This is shared equally between all developers, independently of how much they contributed. Your payoff is one third of this added value from the investments (the sum of the investments multiplied by two), plus whatever you did not invest in the common pool.

For example, if all give 50 points to the pool, the common pool will be (50*3)=150 points. This is doubled to 300, which is divided evenly between the participants. Each participant is then give 100 points, plus the 50 points they did not invest in the pool.

The contributions are anonymous: the players can see how much was contributed in total, but not what each player contributed.
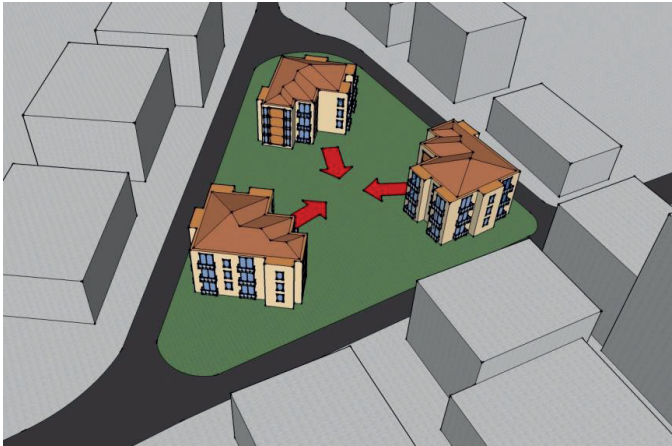
Please fill inn how much you want to contribute out of your 100 point

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[3] *Players get one randomly selected*

Common goods II a: Risk and uncertainty[4]

This game is similar to the previous one. You and two others play as developers, each constructing adjoining buildings. Imagine that you are playing a game with two (*public planners/private developers/one of each*). Now, however, there is a risk element: when the buildings are completed, the housing market will be either strong or weak.

You can invest your points in a common project with the other players, that each benefits from equally. The payoff is still one third of the payoff from the common pool, plus whatever you did not invest. If the market is strong, the pool will be *triple* the value of all contributions. If the market turns weak, the pool remains the sum of all contributions. In other words, if the market turns weak, all players just gets back the average of all three contributions.

When everyone have decided how much to pay to the pool, we will draw a ball that is either white or black. A white ball represents a strong market, a black ball a weak market. (*you do not know the distribution of white and black balls/there are the same number of white and black balls*).

The contributions are anonymous: the players can see how much was contributed in total, but not what each player contributed.

Please fill inn how much you want to contribute out of your 100 point [   ]

## Common goods II b: Heterogeneous endowments[5]

This game is similar to the previous one. You and two others play as developers, each constructing adjoining buildings. Imagine that you are playing a game with two (*public*

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[4] After playing Common goods I participants play either Common goods II a or Common goods II b.
[5] After playing Common goods I participants play either Common goods II a or Common goods II b.

planners/private developers/one of each). Now, however, there is a risk element: when the buildings are completed, the housing market will be either strong or weak.

You can invest your points in a common project with the other players, that each benefits from equally. The payoff is still one third of the payoff from the common pool, plus whatever you did not invest. The value of the common pool is still the double of the sum of all contributions. Now, however, (*you have 50 points. One other player has also 50 points, while one has 200. / you have 200 points. The two other players have 50 points each*).
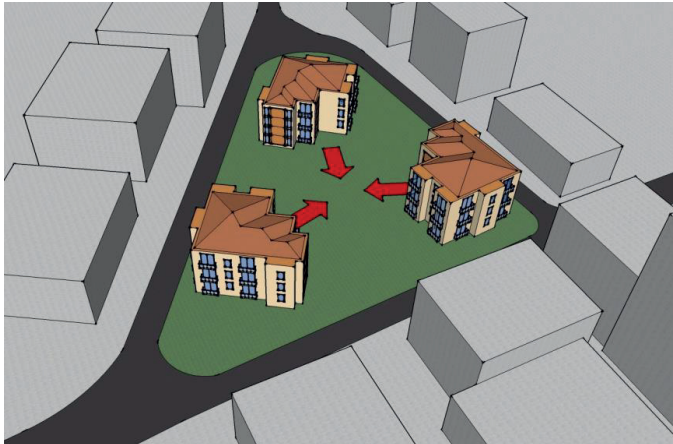
The contributions are anonymous: the players can see how much was contributed in total, but not what each player contributed.

Please fill inn how much you want to contribute out of your (50/200) poin

Appendix D: Trust game

This appendix contains the text as given to the subjects of the trust game used in article 3. It was translated to Dutch, French, and Norwegian.

Imagine you are playing against a (*property developer/public planner*).

In this game, each start with 100 points. You can send any share of these to the other player. This person receives three times as much as you send. For instance, if you send 10 points, the other receives 30. If you send 90, the other receive 270.

After this other player have received the triple amount, he or she can send back any share of this to you.

If you send 50 points and the other sends 100 back, the end result for you will be the50 you did not send, plus the 100 you receive from the other player. The end result for the other player will be the 100 points this person started with, plus the 150 you sent, minus the 100 points sent back to you.

In this game, how much will you send?

Appendix E: Risk game

This appendix contains the text as given to the subjects of the risk game used in article 3. It was translated to Dutch, French, and Norwegian.

This game is about a grid of 25 plots, as shown below. You have the opportunity to buy and develop these plots, and sell them as a whole. For each plot you develop you can expect to earn net 20 points. However, one of the plots is seriously contaminated, while the remaining 24 are clean. Due to the agreement with the land owner, the buyer of the polluted plot must assume the entire clean-up cost.

You do not know where the pollution is. You only know that each plot have 1/25 chance to be the polluted one. If you buy the polluted plot, the clean-up costs will be so large that it removes your entire net gain from the development project.

Your task is to choose how many plots to buy. You can chose any number from 1 to 25. If you for instance write 3, you buy plot 1, 2, 3. We then draw a random number from 1 to 15, which indicates where the pollution is. If the pollution is on a plot you did not buy, you receive 20 points for each plot you bought. If the random number is random or the same as the number you chose, you buy the polluted plot and loose the entire pay-off.

When the session is finished we will draw which plot contains the pollution.

Please fill inn how many plots you want to buy

Appendix F: Game survey

This appendix contains the survey were given to all subjects after playing the games presented above. Relevant modifications were made for Belgium and the Netherlands.

Please mark the option that fits best.

Gender:

☐ Male ☐ Female

What type of organization do you primarily work for?

☐ Municipality ☐ Public office ☐ Property development ☐ Consultancy

☐ University ☐ Other, please specify: _____

In which area do you work primarily?

☐ Bergensområdet ☐ Stavanger-Området ☐ Stor-Trondheim

☐ Stor-Oslo ☐ Nord-Norge ☐ Midt-Norge

☐ Vestlandet ☐ Sørlandet ☐ Østlandet

How many years have you been working with planning, development and related fields?

☐ 0 ☐ 0-1 ☐ 1-5 ☐ 6-10 ☐ 10-20 ☐ Mer enn 20

What is your current job?

☐ Developer consultant ☐ Finance ☐ Planning/ property

☐ Research ☐ Spatial planning ☐ Construction

☐ Policymaker ☐ Administration ☐ real estate economics

☐ Investment advisor ☐ Other, please specify: _____

To what extend do you agree with these statements?

Lack of cooperation between private developers is a problem for urban redevelopment

☐ Agree completely ☐ Agree ☐ Agree partially ☐ Disagree ☐ No opinion

Lack of cooperation between private developers and municipalities is a problem for redevelopment

☐ Agree completely ☐ Agree ☐ Agree partially ☐ Disagree ☐ No opinion

Do you have any comments to the games or the survey?

[   ]

Appendix G: Coalition game

This appendix presents the coalition/negotiation game used in article 4, and the survey given the subjects. Unlike the games above this game was played with students in the UK in addition to Belgium, the Netherlands and Norway, and the subjects were sitting together in groups of three and interacting. In addition to these instructions the experimenter presented the game.

A municipality would like to develop an area by inviting developers to plan and carry out the development process. Three private land developers, A, B, and C, are interested in the project. The municipality will only give a development permit if the development is carried out through a coalition or a joint-venture initiative of at least two developers because by doing this, they can make a better project and create more value for the area. Therefore, if no coalition is formed (by at least 2 developers), no value will be created and everybody will get nothing. Due to differences in the capacity of the developers, the value created from the joint venture will differ according to the members of the coalition. The expected values from the development are:

- **nothing** if developer **A, B, or C** develops the area alone

- **300** million kroner if developer **A and B** develop the area together

- **350** million kroner if developer **A and C** develop the area together

- **400** million kroner if developer **B and C** develop the area together

- **900** million kroner if developer **A, B, and C** develop the area together

Note:

- If 2 developers agree to make a coalition/joint venture, the value they create will only be divided between them, while the third player will get nothing.

Your Task:

You are developer (A/B/C), sitting together with (A/B/C) and (A/B/C). Please negotiate with each other, what coalition are you going to form, and how are you going to divide the value created by the coalition among the coalition members?

When you have decided on a coalition and a distribution, please turn over the page.

Answer sheet (all three players fill in the same):

- Circle the coalition you formed
  - **(A, B)**
  - **(A, C)**
  - **(B, C)**
  - **(A, B, C)**
  - **None**

- Distribution of created values:
  - A: _____ kroner
  - B: _____ kroner
  - C: _____ kroner

Questionnaire (fill in individually):

1. Please explain the motivation of your decision (in forming or not forming a coalition)

2. Do you think that you have distributed the created value in a fair way among the members of the joint venture, and why do you think so? Please also explain what, in your opinion, is the fair distribution if you think you have not distributed the value in a fair way.

3. Years of completed university/college education

4. Gender:

5. Age:

6. Do you work outside of the university?

    a. No

    b. Yes, but not related to planning or development

    c. Yes, with development or urban planning in the private sector

    d. Yes, with development or urban planning in the public sector

7. Income:

    a. Less than 200,000 kroner a year

    b. 200,000 – 500,000 kroner a year

    c. More than 500,000 kroner a year

8. Type of education

    a. Urban and regional development

    b. Property development

    c. Property sciences

    d. Other (please specify):

Article 1: Developer Coopetition: Cooperating Competitors in Market-Led Urban Redevelopment

Developer coopetition: Cooperating competitors in market-led urban redevelopment

Purpose: Developers operating in the same redevelopment area have strong common interests, but eventually sell their units in the same market. This article investigates mutually beneficial interactions between competing housebuilding firms.

Methods: The article relies on semi-structured interviews with 13 project managers. The managers are drawn from redevelopment areas in Oslo, Norway, and represent 10 firms with experience of interacting with one another. It employs a thematic narrative analysis.

Findings: The article finds that competing developers often identify mutual interests in infrastructure development and branding, share positive relationships, and tend to help one another. However, their cooperation is limited by: narrow and misaligned time frames both for devising strategies and investment timing; difficulties in justifying monetary costs for incalculable benefits; and the easier option of leaving coordination to the municipality.

Practical implications: The article concludes that there is significant potential for further coopetition, which could be exploited for more efficient redevelopment projects and increased production of positive externalities from, for instance, public spaces and marketing activities. The importance of timing for cooperation in development projects is an argument for municipalities to use tools to set the pace in urban redevelopment.

Originality/value: The article introduces the concept of 'coopetition' (voluntary cooperation between competitors) to private sector-led redevelopment. It may be the first paper to focus on voluntary cooperation between development firms in direct competition.

Keywords: redevelopment, cooperation, coopetition, externalities, area branding

Introduction

This article investigates voluntary cooperation between neighbouring housing developers in urban redevelopment areas. In organisational theory, such cooperation between competitors is called *coopetition* (Giovanni and Giovanna, 2002). In coopetition, competition enforces efficiency, while

cooperation allows firms to achieve economies of scale and scope that would be unattainable alone. Developers can gain important advantages by cooperating to achieve these economies (Song and Lind, 2009). However, there are unique mechanisms when cooperating with competitors, as they have symmetric interests but also disincentives to help each other create competitive products (Dagnino, 2009). When building housing in unattractive parts of the city, developers have a common interest in creating a marketable neighbourhood. Simultaneously, they face stiff competition for customers, a tension which previously has been studied only cursorily by real estate scholars. Previous studies of mandatory cooperation and vertical cooperation with other actors in the value chain, in public-private partnerships and in joint ventures, all lack this tension.

The coopetition literature identifies benefits competitors can achieve through cooperation which are relevant in private-led redevelopment. Foremost of these are increased benefits from positive externalities (i.e. secondary effects that benefit others in the area) (Osarenkhoe, 2010). Through coopetition, firms that provide positive externalities can be compensated by beneficiaries either directly or by receiving similar benefits in return, internalising part of the benefit (Coase, 1960). This article investigates whether competing developers cooperate with each other to internalise externalities and how they strategise to achieve other scalar economies together, and identifies factors that promote and hinder coopetition. It explains how the Norwegian redevelopment process makes coopetition difficult, despite there being a fundamentally cooperative atmosphere among developers.

The article employs interviews with 13 project managers in Oslo, Norway. The City of Oslo has a redevelopment-focused, market-led development policy whereby developers prepare their own detailed zoning plans for their projects and provide substantial parts of the infrastructure and public areas in return for building rights, thereby providing ample opportunity for coopetition.

Coopetition

Inter-firm relationship theory before the turn of the millennium focused either on competition between firms to achieve advantages over one another or on cooperation for collaborative advantages, and these were seen as diametrically opposite (M'Chirgui, 2005). While the term *coopetition* had been used before (Bouncken et al., 2015), Bradenburger and Nalebuff introduced it to the wider academic and

professional world in their book *Co-opetition* (1996), wherein they analyse situations where actors try both to increase the size of the pie and to get as big a slice as possible. Here, both cooperation and competition pay off depending on the specifics.

There are several reasons why coopetition is relevant in private-led development, and particularly in redevelopment. There tends to be several developers working alongside one another in each area; urban redevelopment projects are expensive, with uncertainty regarding both income and expenses (Weiler, 2000). Even big actors might be unwilling or unable to buy all available plots in an area, preferring to split their available capital on multiple projects with different time horizons (Wernstedt et al., 2003). On the other hand, once there is some interest to redevelop one plot, the neighbouring plots becomes more lucrative for redevelopment which draws more developers to the area (Nordahl and Eika, 2017). Particularly where the public sector lacks the legal and financial tools to assemble land and spark redevelopment, this can lead to a freerider problem where all developers have an incentive to wait for the others to develop (DiPasquale and Wheaton, 1996).

There are many positive externalities developers can cooperate on internalising. For instance, planning for cleaner air (McCord et al., 2018), aesthetic constructions (Nase et al., 2016), greenspace (Mei et al., 2018) or kindergartens (Theisen and Emblem, 2018) generates externalities for neighbouring plots in the form of higher housing prices. However, the fact that the public enforces a certain provision of these goods and divides the costs among the developers may stifle motivation to cooperate on maximising the value added through such externalities, causing a crowding-out effect (Ford, 2007). The areas which municipalities single out for redevelopment typically have a low standing in the housing market (Teaford, 2000). Low marketability of redevelopment areas is a significant barrier to redevelopment (Hutchison and Disberry, 2015), prompting developers to spend resources on branding not only their individual projects but also entire neighbourhoods. This creates a positive externality for any plot with redevelopment potential in that neighbourhood.

Any activity that provides positive externalities is prone to under-provision (Alfano and Marwell, 1980). A developer does not receive the entire benefit of area branding or infrastructure. Standard economic theory suggests they will invest in these goods until their marginal costs meets marginal benefits. This

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individual equilibrium point is lower than the social equilibrium, where marginal costs for all developers in total meet marginal benefits for all developers in total. In the same way, a firm developing an entire redevelopment area would want to invest more in these goods than the sum of individually optimal investments if the area were fragmented between multiple firms. If possible, developers try to internalise these externalities by constructing large projects on cheaper greenfield sites outside the city (Fujita et al., 2001). Through coopetition, neighbouring developers in the existing city would be able to internalise some of these positive externalities, either by sharing their costs with other developers who benefit or by ensuring that the beneficiaries provide proportional externalities. This in turn provides an incentive to increase investments in externality-generating activities which benefit the general public, as with increased investments in public spaces (Brainard and Dolbear Jr, 1967). Such positive externalities might be maximised more efficiently through bilateral agreements, where beneficiaries compensate the providers, than through public intervention (Webster, 1998).

Despite this, the literature on how competing developers might cooperate is scant. Henderson (2010) reports on cooperation between developers in Paddington, London, following a municipal initiative to spark synergetic development in the fragmented site. He finds that it is difficult for the local government to spark such collaboration, but once it is under way the participating firms benefit from joint marketing and greater physical connectivity between the projects. Coiacetto (2006) writes about how dominant developers can gain competitive advantages, and some of these can also be gained through cooperation between developers. Particularly, cooperating or oligopolistic firms can influence public policy and the planning process. Similarly, Carter and Darlow (1997) find that small firms are unlikely to participate in a public development consultancy scheme because they cannot provide the manpower for projects with intangible, delayed benefits: Mosselson (2019) provides an example of this from Johannesburg, where developers join together in negotiations with the city council and in policy debates because they tend to have common interests in the inner city.

On the 'dark side' of coopetition, Coiacetto (2006) also writes that areas with few, strong developers have an incentive to collude with their competitors to stifle the release of new projects on the market. The heterogeneity of the products and the intricate mechanisms for deciding the optimal non-collusive

rate of sale make any illegality difficult to prove. Nelen (2008) supports this, adding that at least the Dutch real estate brokerage, management and development industries are dominated by 'old-boy networks' which make collusion plausible. Particularly in the US, coopetition research and praxis were hindered by in ideology that did not distinguish it from collusion until the 1980s (Dagnino and Rocco, 2009).

Drivers of coopetition

Ritala (2012) looked at what environmental factors affect the suitability of a market for coopetition. Firms can share risks through cooperation, making market uncertainty a motivator for coopetition. Markets with high network externalities, where users derive greater value from products when others consume similar products, are also viable for coopetition. Finally, coopetition is often easier in markets with fewer players because it is easier to focus on one or a few partners.

Adams, Leishman and Watkins (2012) find that interactions between UK development firms tend to be based on trust. Developers network to build trust to continually trade land at reasonable prices, even when demand would open for bullish bidding wars. The studied developers depend on their reputations, and have strong incentives to act according to their peers' expectations. The employees tend to move quickly from firm to firm, building social ties and trust between the firms. On the other hand, these firms often merge or are taken over, so expending too much energy on building relations will sometimes not pay off if the recipient vanishes. Cultures differ in the value they attach to trust (Buchan et al., 2000), which implies significant cultural differences in the motivation for coopetition. The Norwegian development market is generally characterised by high levels of trust and willingness to cooperate (Li et al., 2019).

Barriers to coopetition

Although cooperation theoretically carries substantial benefits for developers, there are several reasons why they could be reluctant. Developers, particularly those working in the same geographical area, are competitors (Park and Russo, 1996). When developers build apartments in a neighbourhood, they can be seen as competing only with each other, or with all first- and second-hand homes available in the

entire city or conurbation. If they consider each other as the only relevant competitor, much of the benefit from cooperation, in the sense of higher-value units at a lower cost, will go to end users and landowners because both developers will want to out-compete each other when selling units or buying land (Ginevičius and Krivka, 2008).

Any coopetition scheme carries tensions, because the parties simultaneously want to create common value and capture private benefits (Tidström, 2014). Disagreements are likely to arise regarding tasks, values, personal relationships and roles, both at organisational and individual level (Bengtsson and Kock, 2015). Although knowledge exchange is a motivator for cooperation, appropriation of knowledge and technologies can be a source of tension (Loebbecke et al., 1998). In some cases the faster learner can gain a position to later out-compete its partner (Khanna et al., 1998). In many types of cooperation, the monetary value of benefits can be difficult or impossible to calculate, which would make both compensation from beneficiaries and reciprocation schemes difficult to be seen as fair by both parties (Rossi-Hansberg et al., 2010). Coopetition will often be between parties of unequal power. One party's market position, size, available resources or technology may enable it to force the alliance to act in a way that works against the weaker party's interests (Osarenkhoe, 2010). This shifts the weaker party's interests away from those of the alliance and towards increasing its own power and decreasing its dependency on its partner (Luo, 2005).

Developers are a heterogeneous group when it comes to strategies and motivations (Adams et al., 2012a), and it is plausible that different types of developers react differently to drivers of and barriers to coopetition. To varying degrees, developers incorporate into their strategies future payoffs from procuring a reputation of gift-giving and reciprocity (Hyde, 2018), which in turn influences their value as prospective partners. Firms differ in their sources of funding, typically a mix of bank loans, investment funds, private equity and their own accumulated profits. This impacts their preference for speed and risk (Coiacetto and Bryant, 2014). Some firms also stay engaged with their products and are dependent on their long-term performance, while other firms have a high preference for quick payoffs (Adams, 2008). This incentivises non-cooperative behaviour, particularly in markets where the actors are less likely to interact again later {Ball, 2002 #592}.

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Context

This article seeks to answer the questions: How do neighbouring housebuilding firms cooperate to internalise externalities from area branding and other sources? Do they cooperate to achieve other scalar economies? What promotes and hinders this type of coopetition? To answer these questions, the article employs interviews with redevelopment project managers in Oslo, Norway, where private firms have a dominant role in development and wider scope for coopetition. Municipalities have legal tools to make the assembly of redevelopment land easier. However, in the past 30 years or so the public sector has largely stepped back from this role, leaving it to development firms to acquire land on the free market. The City of Oslo draws up master plans for development, supplemented by more thematic plans, such as for public areas in and between projects. The developers submit detailed zoning plans for their projects, which the municipality approves if they align with its own vision for the area and comply with the statutory plans (Falleth and Nordahl, 2017). While developers prepare zoning plans, they liaison with the City of Oslo's Agency for Planning and Building Services, which indicates what they must do to have their proposals approved. Because development land in Oslo is hard to come by and housing demand is high, developers are willing to go a long way towards meeting the municipality's requirements (Nordahl, 2006). They usually negotiate over how much of the developer's land and resources must be allocated for roads, walkways, greenspace and other uses that enhance the marketability of the entire area. Developers have an incentive to internalise the benefits from these investments as much as possible by making them formally or informally exclusive to the end users, while the municipality wants them to benefit the public as a whole (Webster, 1998).

Although demand for housing in Oslo was high during the period of this study and throughout the preceding three decades, development is seen as a risky business. The aforementioned planning system can result in permits that allow significantly less cost-bearing housing and more expenses than planned, and downturns in the housing market pose an ever-present threat. These factors, in combination with a lack of local market knowledge among national and international financial institutions, make it difficult to raise capital for housebuilding in Oslo. Developers are dependent on pre-sales of apartments and on

staging the projects, often over many years, to spread the risk and raise capital (Barlindhaug and Nordahl, 2018).

Methods

The 13 interviewees were drawn from four areas in Oslo where multiple firms are redeveloping industrial and logistical land on adjoining plots, as shown in Figures 1–4. These areas range from 18 to 33 hectares, with between three and 30 different landowners and developers present, which is typical for Norwegian redevelopment areas. The four areas are located in districts whose marketability warrants neighbourhood branding. Because the demand for housing in Oslo is high, this latter condition excluded much of the city. The interviewees were selected by stratified purposive sampling. A project manager from the largest developer of each area was contacted, as well as project managers from two additional firms. This provided an opportunity to ask about the same coopetition projects from multiple angles. As described in the discussion on development externalities, we can expect the rationale behind coopetition to differ depending on the absolute and relative size of the projects. These additional firms were selected because they have central projects in the redevelopment areas, given that the relationship between coopetition and positive externalities is most relevant for developers of adjoining plots. The interviewees have ongoing projects, ranging from early in the zoning phase to mostly completed constructions. In total, these firms constructed 60 per cent of all new housing in Oslo between 2016 and 2018. This percentage is substantially higher within redevelopment areas, but no statistics are available for this segment alone. The managers have deep knowledge of most or all of their employers' projects, so between them the interviewees have first- or second-hand experience of a substantial majority of coopetition projects in redevelopment areas. Table 1 lists the interviewees and gives a brief overview of their projects. Figures 1–4 show the layout of the areas.
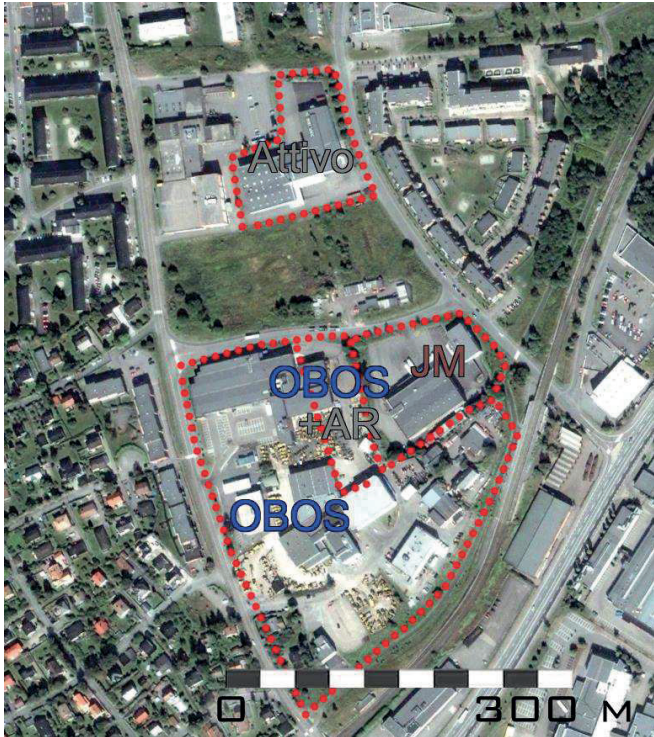
Figure 1: Developers positioned in 2019 in site A, over a satellite image showing the area in 2006 before redevelopment.
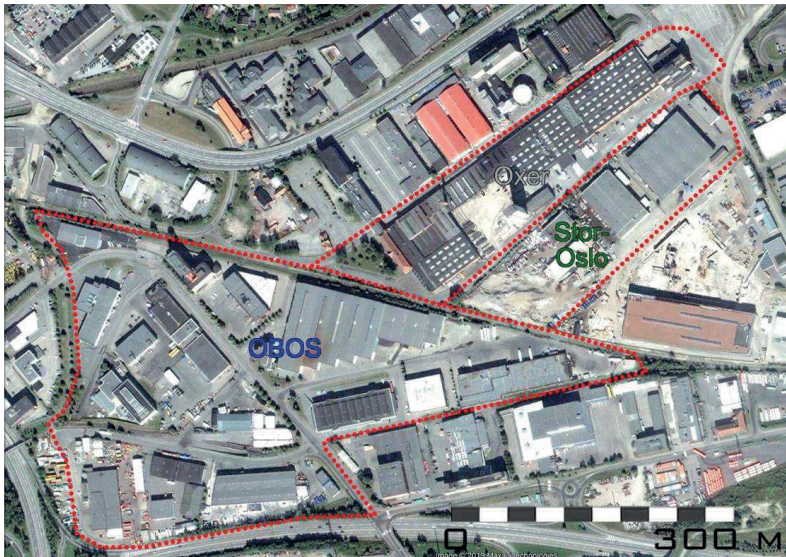

Figure 2: Developers positioned in 2019 in site B, over a satellite image showing the area in 2006, before redevelopment

Figure 3: Developers positioned in 2019 in site C, over a satellite image showing the area in 2006 before redevelopment.
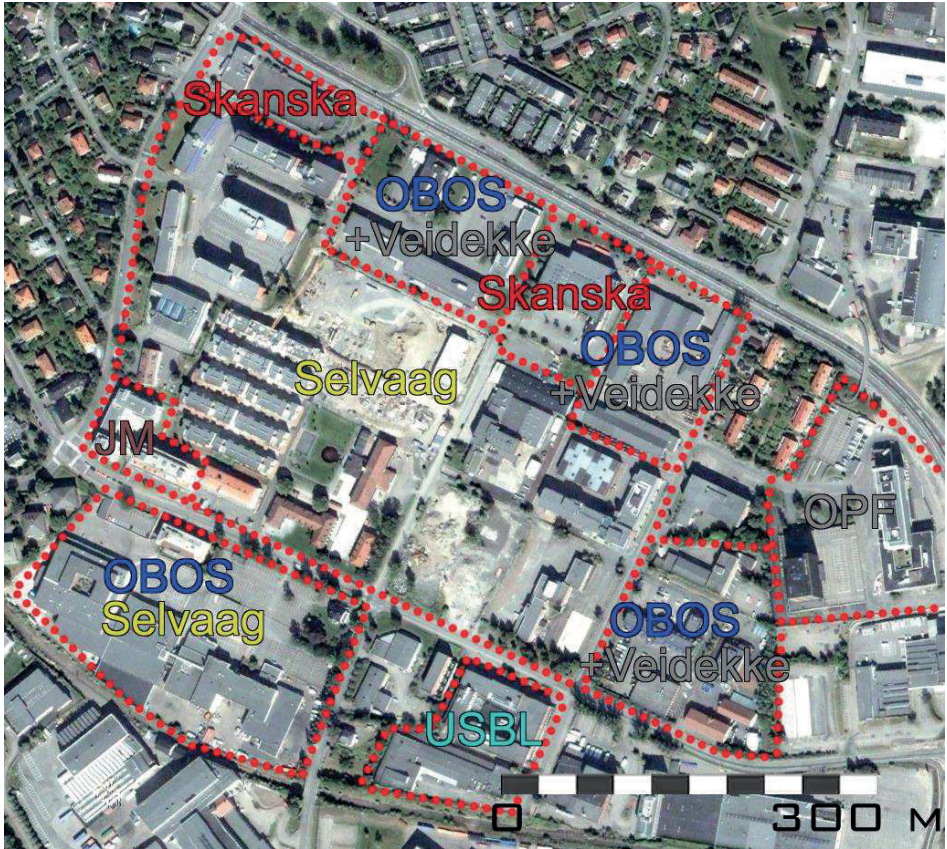
Figure 4: Developers positioned in 2019 in site D, over a satellite image showing the area in 2006 before redevelopment.

Table 1 here. Informant number	Project size (1,000 m² planning area)	Project size (1,000 m² floor space)	Project start	Phase	Area	Ownership type
1	12	17	Plot bought 2010	Construction started, completion expected in one year.	A	Private firm
2	50	100	Plot bought 1997	Construction started, project completion expected in eight years	A	Housing Cooperative
3 & 4	13	21	Plot bought 2016	Regulation in progress, completion expected in more than five years.	A	Public firm
5	54	130	Plot bought 1997	Still working on ideas, construction not expected to start for another decade.	B	Private firm
6	140	330	Plot bought 2016	Construction started and expected to continue for several decades.	B	Housing cooperative
7	47	110	Plot bought 2016	Still working on ideas, construction not expected to start for another decade.	B	Private firm
8	103	162	Planning start 2006	Several stages completed, last stages expected to finish within a decade.	C	Private firm
9	8	21	Regulation from 2008	Regulation in progress, expected completion in 15-20 years.	C	Private firm
10	36	90	Land banking from 2006	Construction started and expected to continue for at least five years.	C	Public firm
11	32	65	Planning start 2007	One segment completed, one expected to be completed in 2020.	D	Private firm
12	12	23	Planning start 2016	Zoning in progress, completion expected in five years.	D	Housing cooperative
13	100	163	Planning start 1999	First stages finished a decade ago, and expected to continue for another decade.	D	Private firm

Table 1: List of informants and the projects they represent. The table employs different methods to denote project startup based on what is most representative for the project in question. Many of the projects have faced significant delays due to planning and market factors not detailed here. Private companies are usually family-owned or employee-owned entities.

All interviewees contacted were positive about participating. The interviewees represented six large and four medium-sized firms in terms of units produced annually. Two firms were represented by two

different interviewees for two different projects. The interviews lasted from one to three hours and were conducted, recorded, and transcribed by the researcher. The interviews were carried out in the winter of 2018/19 in the interviewees' offices.

The interviews were semi-structured around the interviewees' strategies regarding coopetition. The interviewees were prompted to recount specific instances where interaction with competitors could be viable and to explain the reasons why they did or did not resort to cooperation. They were then asked about second-hand experiences, and about the viability of hypothetic coopetition on branding and other externality-generating activities such as allocation of price-driving land uses. Finally, they were asked about the pervasiveness of the potential barriers to coopetition derived from the literature mentioned above insofar as it had not surfaced earlier in the interview:

- Disinclination to aid competitors
- Protecting technology, strategies, and valuable employees from foreign acquisition
- Lack of innovation following strong housing markets
- Professional and personal disagreements
- Power asymmetry
- Distrust
- Antitrust regulations
- Resource constraints, particularly time
- Indirect benefits

In the first interview, two additional barriers became important and were added to the interview guide:

- The timing of when different developers must make their investments
- The crowding-out effect of municipal control over externality-generating efforts

The interviews are analysed according to these themes, along with the ownership type of the respondent's firms. The topic is complex, spanning economic sociology, behavioural science, organisational theory and microeconomics. Each of the projects and the areas in which they are located are complex and unique along multiple parameters. The article therefore employs a thematic narrative analysis

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(Riessman, 2005),to pick up on layers of meanings and connections between them. The findings are illustrated by representative quotes, translated by the researcher. To ensure anonymity, they are not attributed to specific interviewees in Table 1.

Findings

The interviewees did not report being affected by the barriers derived from the literature, except for the indirectness of payoffs from cooperation. Moreover, few differences emerged between the entities based on their status as public or private firms or a housing cooperatives. All the interviewees are fundamentally positive to cooperation with their competitors within redevelopment areas. Despite this, substantial cooperation projects to incentivise each other for generating positive externalities as described by Webster (1998) are not common. The interviewees agree on this premise, i.e., that cooperation means developers can maximise positive externalities and economies of scale: '*It's always important to talk to those around, to hear if you can find some common solutions.*' There are a few examples of such cooperation: one group of developers got together to construct a road bordering their projects although it would be possible for them to do it disjointly. One firm plans to scale a pneumatic waste collection system to take care of the neighbouring projects' waste needs in return for compensation, obviating the need for waste collection trucks in the area. However, this is uncommon, particularly for substantial infrastructure investments.

All interviewees express the need for branding transformation areas for market-led transformation of industrial and logistical areas. Some marketing projects for entire neighbourhoods range in the hundreds of thousands of euros. One interviewee describes the initial phase of the redevelopment process as follows: '*Very few people had any relations to [this area]. It was hard to reach, with no public transportation, and most buildings were fenced off with barbed wire. […] So it was important to spend a lot of energy on getting the word out to the market that there's something coming here.*' In the four areas the interviewees were drawn from, only one had a significant joint branding venture. Here, landowners who were not primarily developers but who had long-term redevelopment plans formed an organisation for promoting and coordinating the development. As traditional developers positioned themselves in the area, they joined. Two of the other areas had minor joint projects, while the fourth

area had none. Most of the interviewees could name other projects in which they were engaged in joint branding, but they rarely do so, even though they all are positive to the concept.

The most substantial amount of coopetition happens on a smaller scale. For instance, one developer hired a consultancy firm to perform a socio-cultural analysis of the redevelopment area, and then shared it with its competitors. Another developer who had aerial photos taken of its plot shared them freely with a neighbour whose plot also appeared in the photos. Most interviewees will divulge information when prompted on sales volumes, designs, building heights or particularly good praxis and ideas. The developers keep each other updated in formal or informal meetings on changes in the municipality's demands and preferred methods for securing infrastructure. All interviewees share similar opinions to this one: '*There is a lot of openness, we are invited to look at others' projects.*' This also alleviates some of the risk associated with redevelopment, which is an important spin-off from contact with competitors: '*By learning about other people's projects, we can clarify some of our risks.*' One developer mentions the benefit of knowing if neighbouring developers are planning to build particularly high: '*Our project will look very low and have a greater chance of getting approval from the municipality's departments and politicians.*' Developers will occasionally band together to influence the municipality to alter or soften demands for infrastructure. In one area, the municipality tasked a group of developers with constructing a foot and bike path through their plots. However, it informed the developers too late to make sufficient space for it: '*Then we are strengthened when we sit together and argue the same case. We [the developers and the municipality] had a big general meeting about that foot and bike path.*'

Developers see competition more as an issue of one development area competing with similar neighbouring areas and the second-hand market than as an issue between the different projects within one area: they want other projects in the area to succeed because it will establish it as a sellable neighbourhood, a type of network externality which is helpful for the viability of coopetition (Ritala, 2012). As one manager put it: '*When your competitors succeed, you succeed too, in the long run.*' The added activity speeds up the transformation process, since multiple developers with multiple abutments with the market and higher total risk willingness will be able to sell more apartments in any one area than one monopolist developer would be capable of. The area reaches the threshold where the general

public see it as a residential area faster: 'Something *starts to happen, and then it suddenly happens very fast.*'

Trust between the firms in redevelopment areas is high. The same five to 10 firms meet each other in most of the redevelopment areas, and each firm is represented by only a few different project managers in the different projects. Thus, the same individuals continuously interact, and both the firms and the individuals expect to interact with one another for the foreseeable future. '*We know each other, we meet in different settings such as conferences. There's about five large developers in the greater Oslo area, and we meet each other constantly. There are only a few people in each firm with the same role as I have.*' When prompted, the interviewees cite distrust as a potential barrier to cooperation with small, recently established firms with short-term perspectives: '*There could be some small [developers] who are too greedy and only think about the bottom line.*' However, none of the interviewees can give examples of this type of firm in the redevelopment areas in which they are operating, as these gravitate towards simpler infill and greenfield projects where the entry thresholds are lower.

These interactions between the developers are characterised by reciprocity: for instance, when asked how they obtain information on each other's projects, one interviewee answers: '*It's just a matter of making a phone call. […] You tell me now, I'll tell you some other time.*' Similarly, the interviewees will usually not 'play hardball' in their dealings; even if a competing firm shows high willingness to pay for a benefit, they will provide it at cost. They worry that taking a strong position in one case to derive a benefit others might see as unfair will easily come back to bite them: '*If you're difficult or unreasonable, the word will get around. […] We're constantly cooperating with others.*' Some interviewees also claim to be motivated by a 'warm glow' effect: '*If [other developers] do well because of something we have done, I will sleep even better at night. There's also the idea that we can get goodwill in return.*' Another more pragmatic interviewee planned to accommodate a neighbouring developer's waste on an industry plot it rents out so as to make the neighbour's branding projects more efficient. This was potentially against the wishes of their tenant, but: '*We will deal with [neighbouring developer] for 10–12 years, while the tenant will probably be gone in two years, so we prioritise [the developer] if we have to.*'

Barriers to coopetition

The time line of development projects can make extensive forms of cooperation unfeasible. When first redeveloping an area, firms must make substantial marketing investments. In the three areas with little joint branding, the developers with early projects initiated area branding projects early in the process, which were ongoing as later developers position themselves. Even if the effort is not completed, they have already displayed a willingness to pay for it without external contributions. To quote one developer: '*If you're the one who sees the need for it, you're the one who will have to pay for it.*' The later developers sometimes still run their own area branding efforts, but are not inclined to assist the first developers' efforts: '*Since we bought our plots in the eastern parts [of the redevelopment area] we have been free-riding when it comes to branding. In many ways, that's been a conscious strategy.*' The private firms more often have the luxury of waiting, while housing cooperatives or firms in construction conglomerates are more inclined to do the initial heavy lifting.

Similarly, developers must usually build or pay for infrastructure within narrow time windows. The municipality usually demands that infrastructure investments be made before construction starts on the cost-bearing parts of the project, but in lieu of other demands, developers have a strong incentive to wait with these investments for as long as possible. When asked about the potential for jointly investing in infrastructure beyond what the municipality demands to increase the value of surrounding projects, one developer points out: '*You would have to be […] in the same part of the process and with the same time line. You will not get a contribution from someone who will not start construction within a few years.*'

Tangible expenses, intangible benefits

Coopetition on things like common improvements and marketing provide developers with three categories of benefits: financial benefits, in the form of higher prices and quicker sales; relational benefits, in the form of stronger bonds with their partners; and brand benefits, in making their firm better known by the general public for making pleasant areas. Note that these benefits are all indirect: many interviewees point out that even the financial benefits would be difficult to accurately predict, or even measure after the project is sold. It is therefore difficult for managers to justify for owners to invest in

joint marketing or externality-generating land uses, even if the project manager believes it to be worthwhile: '*You need to be pretty sure you're getting back more than you put in, and there are never two lines under the answer.*' Therefore, most of the observed coopetition is either free, with the parties only forgoing income, or for investments that would be made individually if the firms did not cooperate, such as marketing activities or the occasional joint infrastructure project. As one subject puts it: '*It becomes problematic as soon as you transfer money from one firm to another.*'

Both the actors behind the externality-generating projects and the beneficiary neighbours consider it natural that the actor with the physical structure should foot the bill. One developer was in the process of buying art to beautify a wall on the border of the area. When asked about the possibility of asking the neighbour on the other side of the border for a contribution, he replies: '*The wall is most visible from their plot, so I do it just as much for them. [...] But I had not considered it before you asked. We have our things, and they have theirs, and some of them we cooperate on. They would be wondering what I had been smoking if I told them that they should pay when we decorate a wall.*'

Crowding out

Division of infrastructure costs and land allocations lie firmly in the domain of the City of Oslo. While the interviewees agree that for instance, high-quality parks create positive externalities for neighbouring developers, they will not try to influence other developers to build more or higher-quality parks, as conditional development permits enforce a decent level of greenspace in the area. None of the interviewees had ever discussed investing more than what the municipality demanded in common externality-generating infrastructure. When asked about the possibility of coopetively deciding how to fund externality-generating land uses, the interviewees point to the municipality, one saying: '*If there is a suggestion to make the area more attractive or more sellable, and eventually put more shiny coins in our chest, we would think about it right away. We could for instance furnish a playground outside of our plot. [...] However, in Oslo this is all handled through [municipal plans], and that is actually a good system.*' They see municipal planning as a more predictable and fairer system than planning such goods coopetively.

Discussion

Despite several barriers to cooperation, there is a cooperative attitude among developers. The main drivers of and barriers to coopetition are summarised in Table 2. These correspond with the few previous studies on the topic. Barker (2004) argues that among UK housing developers competition is most severe for land acquisition rather than for the products themselves. The shortage of land for development in the Oslo area is comparable to those studied by Barker. Similar to the interviewees in Adams, Leishman and Watkins (2012), the interviewees in the present study tend to trust one another, but while the interviewees in their study claim that strong relationships are less important due to the transient nature of firms, the interviewees in Norway point out that their relationships are expected to continue for decades. In game theoretical terms, expectations of more interactions give Norwegian developers a stronger incentive to 'play nice' with one another in situations where defection would give a short-term benefit.

Drivers	Barriers
Necessity	Timing
Reciprocity	Incalculable benefits

Table 2: A summary of drivers and barriers to coopetition between developers in redevelopment areas.

The municipality's role in organising externality-generating land uses such as public areas makes developer coopetition to internalise these externalities implausible. In other words, in some scenarios there would be an efficiency gap as developers refrain from seeking coopetition to internalise benefits from such expenses as described by, for instance, Webster (1998), which leads to an under-provision of externality-generating activities. This would be compounded by the difficulties in calculating the benefits from these externalities and thus in agreeing on a fair distribution of tangible costs.

Area branding circumvents the issue of municipal crowding-out because it is not mandated. Also, while the benefits from branding are incalculable and the costs direct, the projects already have budgets for it: when project managers are able to internalise the positive externalities from branding through

coopetition, and thus increase the marginal benefit, they can increase the joint branding expenditure by shifting resources from their individual marketing activities. They therefore do not have to defend using real money for incalculable benefits, as the money was already budgeted for efforts that create incalculable benefits. For these reasons, area branding represents a particularly interesting arena for coopetition. It does, however, still require the developers to be in approximately the same phase of the process, which in praxis entails that the first developer(s) in an area must carry a disproportionately large burden. Those with flexible schedules, usually those with income from industries on the redevelopment land, are happy to let those developing before them take a disproportionate share of the burden, while those who have to develop quickly will not jeopardise their progress for the sake of efficiency gains through coopetition.

None of the interviewees sees illegal collusion as an issue in housebuilding, but there could be a potential for limiting competition. Several of the interviewees argue that the heterogeneity of the products makes price fixing or limiting supply infeasible: Coiacetto (2006) argues that this makes the development industry *more* prone to such collusion, as it would be difficult to uncover, particularly in markets with a few strong actors such as the housebuilding market in Oslo. The interviewees report discussing the rates of releasing housing units in the market, and the reciprocal system would give an incentive to maintain any collusion.

A number of things should be kept in mind when applying this research outside Norway. Fragmentation in redevelopment land is dependent on local conditions, but it is well known outside of Norway. Dutch (Van der Krabben and Jacobs, 2013) and English (Adams et al., 2001) literature indicates that this will happen where redevelopment is prevalent but where local government does not possess strong legal and/or financial tools to assemble land and spark holistic development. Correspondingly, this creates difficulties in redeveloping urban areas with low marketability, particularly due to the incentive for landowners to delay development until their neighbours have developed. The relatively few dominant actors and the longevity of Norwegian development firms contribute to the incentive of maintaining good relationships with competitors, unlike, for instance, the UK, where mergers and takeovers are common (Adams et al., 2012b). Also, depending on market

conditions, developers can limit the need for coopetition by designing large projects and thus achieving sufficient economies of scale and internalising the externalities discussed here. Finally, local culture and planning institutions will likely alter the dynamics of coopetition. Economic experiments with planning professionals reveal substantial differences in cooperative attitudes between culture, with Norwegians tending towards more cooperative attitudes than other Europeans (Li et al., 2019).

Conclusions

While previous research on developer cooperation usually focuses on mandated cooperation, cooperation between public and private actors, or between actors in different parts in the value chain, this article outlines voluntary cooperation between actors in direct competition. There tends to be multiple firms operating in the same redevelopment areas. These developers have substantial common interests, particularly in run-down areas where significant branding and infrastructure investments must be made for redevelopment projects to be economically viable. However, the firms will eventually compete in the same market. This tension is much studied in other industries, but the dynamics that promote and hinder coopetition in Norwegian redevelopment differ significantly from those found in the general coopetition literature.

Coopetition in Norwegian development is characterised by good relations and reciprocity. Despite this, the number of actual instances of coopetition is limited. Developers refrain from coopetition if it means altering expense and revenue timelines or committing funds beyond what is necessary for the project from an individual cost-benefit point of view or for meeting municipal demands. Firms use coopetition on marketing and externality-generating land uses to expend more efficiently the resources they were going to expend anyway. However, they will still under-supply positive externalities; all the firms in an area could be better off if they all had a more flexible coopetitive strategy. It is unlikely that the market will be able to coordinate this without public intervention. In particular, the importance of timing for the viability of coopetition is an argument for municipalities having tools to set the pace and framework for redevelopment. It should thus be seen together with the wider debate on public schemes such as using eminent domain, control through municipal landownership, and windfall capture mechanisms in redevelopment areas in an age where many nations are turning towards more

market-based approaches (Kalbro and Mattsson, 2018, Van der Krabben and Jacobs, 2013, Miceli, 2011).

The peculiarities of the Norwegian planning system and culture should be kept in mind when applying this research to other contexts. Development firms assemble land in the free market and draw up the detailed zoning plans for redevelopment, contributing to the fragmentation of redevelopment areas and the interdependence of the various projects. Norwegian society is characterised by high degrees of trust and willingness to cooperate. The development industry is small, with few actors who continuously interact with one another on various projects. Both the rationale for coopetition strategies and its importance are dependent on the local context.

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Article 2: Urban development and cooperation games

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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.

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,

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 one		Game two (uncertainty)				Game three (Endowments)			
				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				
	PPM	55	25	55	12	40	9	84	17	28	21
Consultants	Consultants average	63	57	53	19	47	13				
	PPP	67	40	52	10	38	8				
	PPM	54	17	64	9	63	5	105	15	45	10
Other private	Other private average	59	26	53	10	53	11				
	PPP	60	19	82	6	58	6				
	PPM	57	7		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

Anders Eika graduated with a Master of Urban Planning from the Norwegian University of Life Sciences in 2014, and is currently pursuing a PhD from the same institution. His main field of research is cooperation between developers in urban transformation areas.

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Article 3: Measuring and comparing planning cultures: risk, trust and co-operative attitudes in experimental games

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Measuring and comparing planning cultures: risk, trust and co-operative attitudes in experimental games

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ABSTRACT

Cultural impacts in planning increasingly receive attention from both academics and practitioners around Europe. However, comparative planning cultures studies face the challenges of lacking systematic comparison and empirical evidence, especially at the micro level of planning actors' behaviour in interaction. This article aims to fill these gaps by (1) operationalizing the concept of planning culture; and (2) measuring and comparing it. We base our operationalization on the culturized planning model (Knieling, J., & Othengrafen, F. (Eds.). (2009). *Planning cultures in Europe: Decoding cultural phenomena in urban and regional planning*. Farnham: Ashgate). We complement its explanatory power by building a link between planning culture and planning outcome through attitudes of planning actors. This article focuses on three attitudes: risk, trust and co-operation. To measure and compare these attitudes, we adopt three experimental economic games and conduct an experiment with public and private planning practitioners in three European countries: Belgium, the Netherlands and Norway. Both cross-country and public-private differences in these attitudes are tested in the experiment. Our experimental findings suggest that Dutch planning actors value risk aversion and trust; Norwegian planning actors value cooperation; while (French-speaking) Belgian planning actors do not value these variables that much.

1. Introduction

Urban development can be considered as the result of the interplay between spatial planning and land and property markets. One might argue that spatial planning defines to a large extent the institutional conditions (or restrictions) for investments in land and property development. Within this institutional context and influenced by market conditions (demand for real estate; investment climate), both public and private actors operate. They decide whether to invest in urban extensions, urban transformations or renovations or

perhaps to delay intended investment projects, to make use of certain policies, instruments and governance modes, to co-operate with other stakeholders, and to buy or sell land and properties, etc. In different countries and at different times, the institutional contexts and market conditions explain differences in outcomes of urban development processes to a large extent. However, though regulatory planning frameworks and market conditions have a substantial impact on stakeholder decisions, they cannot explain all differences in outcomes. Planning systems usually leave quite some *room to manoeuvre* for both public and private stakeholders to decide how to act, while market conditions can be interpreted in different ways. Therefore roles and positions of public and private stakeholders differ between planning systems. In this paper we argue that how roles are fulfilled and discretion is exercised is shaped not only by the individual actor, but also by (differences in) planning culture.

Planning scholars and practitioners have increasingly recognized that culture matters. Cultural influences in planning and urban development processes mainly manifest in two aspects. First, the concept of planning culture is found useful in explaining the differences in planning practice between countries (Knieling & Othengrafen, 2009; Sanyal, 2005; Stead, De Vries, & Tasan-Kok, 2015). Second, when we consider possibilities of policy transfer, we must pay attention to the cultural embeddedness of the transferred policies (Stead, 2012). Several scholars have argued that formal institutional change does not necessarily lead to the expected change in planning actors' behaviour as cultural factors (for instance norms, intentions, traditions, etc.) are resistant to change (Buitelaar, Galle, & Sorel, 2011; Evers, 2015; Root, Van Der Krabben, & Spit, 2015).

Planning culture is a relatively new subject in planning literature (De Olde, 2015). Several scholars reflect on the current debate on planning culture and comparative planning by stating that this debate is still characterized by conceptual fuzziness (Booth, 2011; De Vries, 2015). Although several studies have broadened our understandings of planning culture's richness as well as complexity (see e.g. CULTPLAN, 2007; Keller, Koch, & Selle, 1996), the analytical power of planning culture comparison has been lacking. For Taylor (2013), the definition of planning culture is unsettled and left to interpretations by each researcher. This leads to a lack of conceptual precision, and makes systematic comparative research difficult (Buitelaar & Bregman, 2016). Fürst (2009) points out the methodological deficiency in comparative planning culture research, these being: the analysis of expert discourses; participating observations and expert experiences; and, dominantly, case studies. Although case studies provide rich materials for discussion, the operationalization and focus are still lacking (Buitelaar & Bregman, 2016). In addition, in terms of operationalization and focus, several authors have stressed the importance of studying planning actors and their interaction in planning decisions at the micro level (Ernste, 2012; Getimis, 2012; Othengrafen, 2014; Reimer & Blotevogel, 2012).

In this study, we aim at making planning cultures measurable and comparable. More specifically, we investigate how the concept of planning culture can be operationalized in order to develop a methodology to measure and compare planning cultures.[1] This attempt is inspired by Hofstede's work on comparative culture studies (1980, 2001) in which he operationalizes culture as a set of values and then compares values across different organizations and countries. In addition, economists have empirically studied the relationship between culture and economic outcomes through values and attitudes (Alesina & Giuliano, 2015; Guiso, Sapienza, & Zingales, 2006) and developed experiments

to capture cultural influences (Chuah, Hoffmann, Jones, & Williams, 2009; Henrich et al., 2001). Therefore, we adopt an operational definition of planning culture as *a set of values and attitudes shared by planning actors that is learned and sustained through the planning process*. As argued by Stead et al. (2015), some of the attitudes underlying the planning systems and the attitudes of the actors involved (e.g. preferences for individualism or collectivism) differ substantially. By planning actors, we mean planners working for public authorities as well as professionals active in property development.[2] Building on existing theoretical models – in particular, the culturized planning model (Knieling & Othengrafen, 2009, 2015) – we conduct game experiments derived from behavioural economics to observe values and attitudes of planning actors as operational indicators of planning culture. Compared to traditional comparative studies on values and attitudes using surveys, experiments are good at avoiding self-reporting biases. To test this approach, we chose three attitudes that are critical to decision-making in planning implementation: risk preferences, trust and propensity for co-operation. For comparative purposes, the three attitudes were measured in three European countries: Belgium (more precisely French-speaking Belgium), the Netherlands and Norway.[3] Many comparative and country-specific studies of land and property development in these three countries have stressed the importance of attitudes towards risks (e.g. Halleux, Marcinczak, & Van der Krabben, 2012; Valtonen, Falkenbach, & van der Krabben, 2017), trust (e.g. CULTPLAN, 2007; Höppner, 2009; Kadefors, 2004; Swain & Tait, 2007) and co-operation (e.g. Boxmeer & Beckhoven, 2005; Dethier & Halleux, 2014; Falleth & Nordahl, 2017; Halleux et al., 2012; Mäntysalo & Saglie, 2010; Nordahl, 2006; Van der Krabben & Jacobs, 2013; Verhage, 2002; Woestenburg, Van der Krabben, & Spit, 2018) in explaining outcomes of land and property development. Furthermore, decision-making in urban (re)development has become increasingly complex, which makes co-operation among stakeholders more or less the rule. Given that risk and trust attitudes have been found influential in co-operative behaviour in economics, understanding public and private planning professionals' risk, trust and co-operative attitudes thus becomes more relevant.

The remaining of the article consists of five sections. Section 2 presents the conceptual framework as a basis for the operationalization of the concept of planning culture, followed by a description of our experimental methods (section 3). The Results and Discussion sections present our empirical findings and deliberate the validity of our methodology, as well as the successes and limitations in operationalization (section 4 and 5, respectively). Section 6 concludes and points out future research questions.

2. A conceptual framework for planning culture operationalization

2.1 The culturized planning model (CPM) as a basis

In an attempt to address the challenges to theorize the concept of planning culture, Knieling and Othengrafen (2009) propose the culturized planning model (CPM) that offers a systematic conceptual framework in comparative planning culture studies. Their model analyzes planning culture at three levels according to 'the degree to which the cultural phenomenon is visible to the observer' (Schein, 2004): planning artefacts, planning environment and societal environment (Table 1). The three levels interact. On the one hand, visible planning artefacts (e.g. urban development patterns) are a result of the

Table 1. The culturized planning model (CPM) with its origins and elaborations.

The levels of culture	Organizational Culture (Schein, 2004)	Planning Culture (Knieling & Othengrafen, 2009)	Explanations (Stead et al., 2015)
Manifest	Artefacts	Planning artefacts	Physical urban developments; The organization of the planning process; The scope of planning
Manifest and non-manifest	Exposed beliefs and values	Planning environment	The core values, principles and conception of planning; The type of actors who have access to the planning process
Non-manifest	Underlying values and assumptions	Societal environment	More general, underlying norms, beliefs and perceptions of a particular society

decisions made by value-holding actors in the planning environment, whose values are constantly influenced by more general values shared in the societal environment (Othengrafen, 2014). On the other hand, physical changes in the planning artefacts can also mould the perceptions of planning actors, which may affect general social norms (e.g. the deterioration of urban areas may lead to greater appreciation for change in planning policies among planning community and the society).

This model helps to fill in the analytical deficiency in comparative planning culture studies as it provides a systematic way to decompose cultural manifestations in planning at three interrelated levels. However, it is not immune to criticism and it is by no means the end of the story on the operationalization of the concept of planning culture. Getimis (2012) and De Olde (2015) argue for instance that CPM might be intellectually attractive but lacks explanatory power due to its abstract presentation. Moreover, important issues remain unaddressed with the model. For instance, in what way and to what extent do factors in societal environment influence elements in planning environment? And, to what extent are changes in planning artefacts attributable to changes in planning environment? Answers to these questions will help disentangle the complex relationship between culture and planning. However, the merit of this model as an analytical tool is also obvious: it simplifies the research work around the encompassing and complex concept of planning culture by separating the demanding effort for operationalization to different levels. It provides us with a good basis on which to position our focus of measurement.

Among the three levels of analysis of planning culture's manifestitations, the planning environment in the middle can be considered as the key and the connecting layer. At this level, actors involved in planning absorb the underlying societal beliefs (input) and make the choices of policy responses and instruments (output, as well as planning outcome). However, the transformation from its input to output remains as a 'black box'. Given the central role of planning actors in the planning environment, we believe it is justifiable to focus our measurement of planning culture at this level of cultural manifestation.

2.2 Inside planning environment: values, attitudes and behaviours

In order to operationalize planning culture within the planning environment, we propose to build a link between its input and output through values-attitudes-behaviours relations (Figure 1), taken from relevant studies in economics and psychology. According to
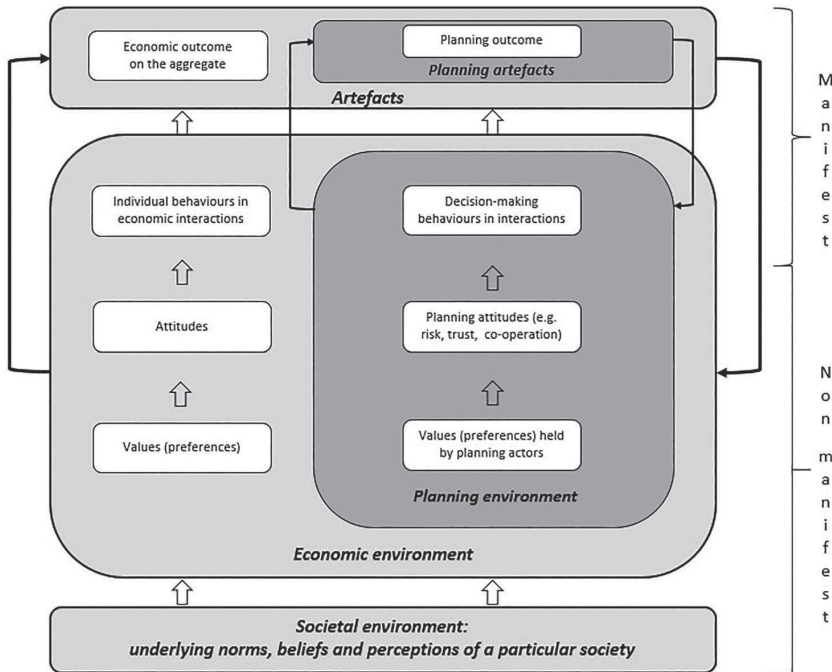
Figure 1. The CPM-based framework that adds values, attitudes and behaviours within the planning environment.

Rokeach (1973, p. 5), values can be defined as 'an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence'. Values, on the one hand, 'are a result of all the cultural, institutional, and personal forces that act upon a person throughout his lifetime' (ibid, p. 23); on the other hand, values are determinants and predictors of attitudes as well as behaviour (ibid, p. 18; Schultz & Zelezny, 1999). Note that values should not be confused with attitudes. Compared to values, attitudes are used to describe individuals' evaluations of more specific entity (Rohan, 2000). Meanwhile actual values are invisible until they become evident in behaviour (Hofstede, 2001, p. 10).

Economists have argued that culture (using for instance religion and ethnicity as instrumental variables) impacts economic outcomes (for instance national savings rates) through values of individuals (such as preferences for thriftiness) (Alesina & Giuliano, 2015; De Jong, 2013; Guiso et al., 2006). It draws our interests in exploring whether there could be a similar connection between planning culture (defined as a set of values and attitudes of planning actors) and planning outcome (defined as choices of policy responses and instruments made by planning actors) through the values of planning actors.

This connection consists of two parts. First of all, cultural differences manifest in the different values of planning actors. As argued by Healey (1998), different stakeholders who come from different worlds hold different values and stakeholders' interactions are

sensitive to cultural differences. Evidence is given by Read and Leland (2011) who show that American planners employed in the public and private sectors have different values towards competing interests in the planning process. Besides, cross-nationally, public planners are also found to have significantly different values relevant to planners' roles (Rodriguez & Brown, 2014). Though comparative evidence is limited, previous studies tend to emphasize both the value differences of planning actors between countries as well as between public and private sectors. Therefore in this study we explore both cross-country and public-private differences in planning culture.

Second, the relationship between values of planning actors and planning outcome is complicated. Although Reimer and Blotevogel (2012) perceive planning culture as a specific context in which 'the values and perceptive patterns of actors come together to influence actions', there is a lack of empirical evidence in planning literature to support this statement at both the macro and micro level. With respect to empirical evidence, psychologists pioneer in studying the complicated relationship between values and behaviour (see for instance Sagiv, Roccas, Cieciuch, & Schwartz, 2017). Behavioural economists build on insights from psychology to study actual behaviour of individuals and its determinants within the context of single- and multi-player games in controlled experiments. Values and attitudes are found to be explanatory variables of behaviour in experimental games (Camerer, Loewenstein, & Rabin, 2011).

Therefore, in our conceptual framework, the input and output of planning environment are connected: Planning actors absorb the underlying societal beliefs (input) and form their core values accordingly. These core values affect their attitudes and decision-making behaviours in interactions. Eventually, actors' interactions in different places, at different regulatory levels and even in different periods jointly determine the choices of policy responses and instruments (output and planning outcome) that shape the urban patterns and the planning process at the observable level. As a tunnel connecting the invisible societal environment to the visible planning artefacts, the planning environment can be both manifest (in terms of actors' decision-making behaviour) and non-manifest (in terms of actors' values).

Since we operationalize planning culture as shared values and attitudes among actors, we aim to measure the values and attitudes of planning actors. Particularly, we choose risk, trust and co-operative attitudes as variables in the measurement of the concept of planning culture. First, the three attitudes are of great importance to (interactive) planning decisions. Planning actors from different cultures may (in a more general way) value risk, trust and co-operation differently. The value differences, in turn, lead to different attitudes in some specific situations: for instance, whether to invest in high-risk but high-reward development projects, how much to invest in monitoring business partners and agents, and whether to co-operate or act alone when the relative benefits are uncertain. Second, these variables have been extensively studied in economics experiments (see, for instance, Holt and Laury (2002) for risk; Ostrom and Walker (2003) for trust; and Fischbacher and Gächter (2010) for co-operation). The established experimental methods, which are explained in detail in section 3, provide good tools to measure those variables. Last but not least, the three attitudes have also been compared in different countries and in different subject groups (Chuah et al., 2009). Existing comparative data may provide a good basis for validating our results. We acknowledge that there are other important cultural values manifesting in actor interaction, for instance

consensus-oriented vs outcome-oriented, person-oriented vs task-oriented, etc (Fürst, 2009, p. 26; Othengrafen, 2014). While these are also important and interesting indicators, they are hard to measure and thus lacking comparable evidence.

3. Methodology

In order to elicit planning and urban development professionals' attitudes towards risk, trust and co-operation, we have designed an experiment based on experimental practices in economics and earlier applications of these practices in planning research (Glumac, Han, Schaefer, & Van der Krabben, 2015; Samsura, 2013; Samsura, Van der Krabben, Van Deemen, & Van der Heijden, 2015). We also selected professionals working for either municipalities or commercial development and consultancy companies as the stakeholders in planning and property development processes. The experiment is therefore contextualized based on common planning and land development issues faced by municipalities and commercial developers in the three countries. This contributes to the external validity of the experiment.

The experiment consists of three games associated to the three variables, namely *risk, trust,* and *co-operative attitudes*. After each game, participants were asked to fill in a short survey related to the topic and their socio-demographic characteristics. The experimental instructions were first formulated in English and then translated to the subjects' national languages: French,[4] Dutch and Norwegian.

All games are one-shot games,[5] which means that participants make the same decision only once. Although most experimental economic games are financially incentivized, we didn't follow this principle. Since our goal is to elicit only the *professional* preferences of practitioners, we decided not to provide monetary incentives, which may induce *personal* monetary preference. Besides we assured double-blind anonymity so neither experimenters nor peer participants would track answers from any participants to their identity.

3.1 Design of the experiment

First, to elicit risk attitudes, we built a game based on the one-player Bomb Risk Elicitation Task (BRET) (Crosetto & Filippin, 2013). BRET is an established risk elicitation tool in experimental economics. We use it to elicit risk attitudes under a type of primary uncertainties in development: uncertainty in location conditions.

In our version of BRET, each participant chooses how many plots of land to buy and develop from a grid of 25 plots. They earn a profit of 20 points per plot. However, one unknown plot out of the 25 is contaminated. We assume that the clean-up fee of the contaminated plot is big enough to nullify all the potential earnings from development. If the contaminated plot is one of those chosen by the participant, (s)he will get zero; otherwise, her/his earnings equal the number of the plots (s)he buys multiplied by 20 points. Participants thus face the trade-off between a number of points they can earn and the likelihood of obtaining them. Since the expected utility maximizing amount is in the middle of the choice range (12.5), a risk-neutral subject should choose 12 or 13 plots to buy. The more plots they buy, the more risk-loving they are and vice versa. Figure 2 illustrates the game.
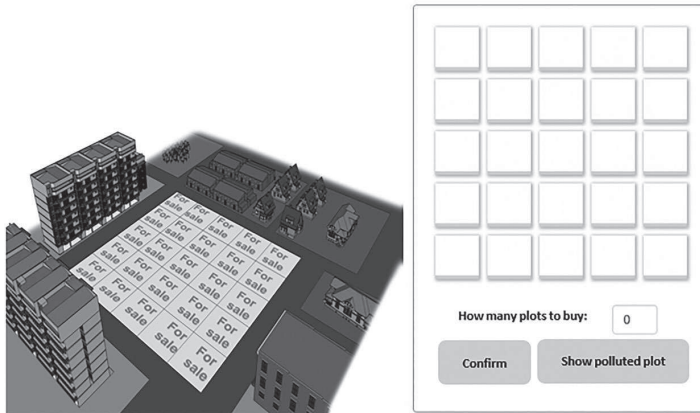
Figure 2. An illustration of BRET.

Second, to elicit trust attitudes, we follow the traditional design by Berg, Dickhaut, and McCabe (1995): a two-player sequential game to measure trust and reciprocity. Both players get 100 points at the start of the game. The first player (the sender) can decide to give some of the 100 points to the receiver. The sent amount (S) is multiplied by 3. The receiver then decides from the tripled amount (s)he gets ($3S$), how much (s)he would like to return (R) to the sender. At the end of the game, the sender gets $100-S+R$ and the receiver gets $100+3S-R$ as illustrated in Figure 3. Given fully rational players who are driven by utility maximization, the theoretical prediction of this game is that R will be zero as the receiver has no incentive to return anything to the sender. If the sender predicts this, S is also zero. The sent amount S indicates how much trust the sender places in the receiver and the return amount R indicates how much reciprocity the receiver repays to the sender for her/his trust. Reciprocity is a key facilitator of trust
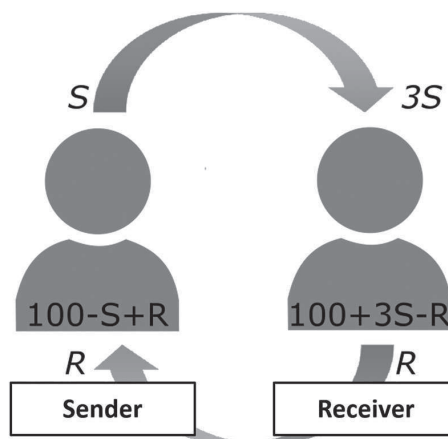

Figure 3. An illustration of trust game.

but not in itself important for us. We, therefore, let all players be in the sending position and told them they are playing against a hypothetical private developer or public planner. In order to measure whether the trust attitudes towards different partners vary between public and private actors, we designed four treatment groups: Public vs Private (MP), Public vs Public (MM), Private vs Private (PP), and Private vs Public (PM). The treatment groups MP and MM were played with pubic participants who are representing municipal planners (M), while PP and PM were played with private participants who represent private developers (P).

Last, to elicit co-operative attitudes, we use Ledyard's (1995) public goods game in a development context. Three players play as independent developers in a neighbourhood. Each developer gets an endowment of 100 points. They choose how much to invest in a neighbourhood improvement project independently (S_1, S_2, S_3). The total investment is doubled and then shared evenly by the developers. For each player, the earnings equal to a third of the doubled total investment plus whatever (s)he kept. Because the marginal per capita return from the public goods is lower than 1, no matter what the other players do, the best strategy for any fully rational player is to contribute nothing. The group as a whole would, however, be best off if all invest 100 points. The investment amount of players indicates their propensity for co-operation. This game is illustrated in Figure 4.

Like in the trust game, in order to measure whether the co-operative attitudes of municipal planners (M) and private developers (P) are different towards different partners, we designed four treatment groups: MPP, MMM, PPP and PPM. The participants were told that they are playing with two other hypothetical private and/or public participants.

3.2 Participants and procedure

The experiments were conducted in the three countries from June 2016 to June 2017. We used two venues of gathering subjects. First, we contacted approximately 8,500 persons by
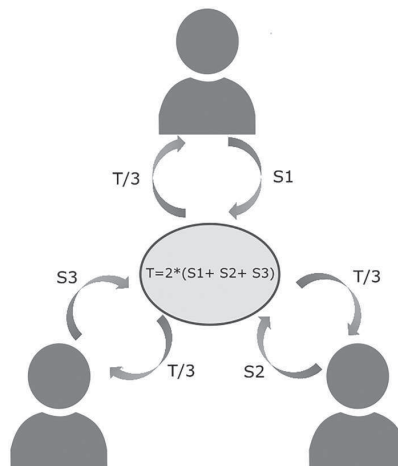

Figure 4. An illustration of public goods game.

emails through professional networks, in which 298 (3.5%) responded and 244 (2.9%) completed the session. We also followed up about 100 emails with phone calls to members of the less populated cohorts (the municipal planners or the private developers depending on the countries). Second, we invited the participants of four planning and development conferences to participate as part of the events, which yielded 195 respondents out of 277 attendees (70%). The participants who were reached through emails played the games on Qualtrics, Google Forms or GXP,[6] while the conference participants played online on SurveyMonkey or used physical handouts. The participants were instructed not to communicate with each other during the experiment.

4. Results

4.1 Risk game – Bomb risk elicitation task (BRET)

This game elicits the risk attitudes of players by providing them with a trade-off between maximizing profits and minimizing risks, with the risk-seeking players taking more than 13 plots. Table 2 shows the results of our BRET game.

Nonparametric tests results[7] (not presented here, but available from the authors upon request) show that Dutch, Belgian and Norwegian participants can all be categorized as risk-averse on average. Dutch participants are most risk-averse, followed by Belgians and lastly Norwegians. Cross-country difference is significant. In terms of pairwise comparisons, Norwegian participants are significantly different from Belgian and Dutch participants, while differences between Belgian and Dutch participants are not significant.

Previous cultural studies have shown that Belgians have a much stronger preference for uncertainty avoidance than Dutch and Norwegians (Hofstede, 2001, p. 151). Our results partially verify this for private actors, while only the high risk aversion of Dutch public professionals contradicts it. Since Dutch municipalities have invested heavily in the land market for decades but suffered great losses in the 2008 financial and economic crisis, Dutch municipal planners' present risk aversion can, therefore, be interpreted as a 'response' to these losses (Van der Krabben & Jacobs, 2013).

Regarding public-private differences, public and private participants in both Norway and Belgium show no difference in risk attitudes, while public participants in the Netherlands are significantly more risk-averse than their private counterparts. Therefore only our Dutch data demonstrate Klijn and Teisman (2003)'s arguments that public professionals

Table 2. Levels of risk attitudes in Belgium, the Netherlands and Norway.

Country	N	Mean	Type classification (%)		
			Averse	Neutral	Loving
Belgium	**79**	**10.14**	**61**	**19**	**20**
Public	25	10.20	60	16	24
Private	54	10.11	61	20	19
The Netherlands	**74**	**8.91**	**73**	**14**	**14**
Public	43	7.84	84	2	14
Private	31	10.39	58	29	13
Norway	**90**	**11.99**	**41**	**24**	**34**
Public	50	12.30	38	28	34
Private	40	11.60	45	20	35
TOTAL	243	10.45			

value risk avoidance more than private professionals. As mentioned, this difference might be intensified by the impact of the 2008 financial crisis on the budgets of the Dutch municipalities.

4.2 Trust game

Table 3 presents trust levels among our subjects. It shows that Dutch and Norwegian participants exhibit more trust than Belgian participants. Overall, it demonstrates that trust among planning actors is not high.[8]

Our cross-country data is consistent with the findings from several large, influential value surveys among the general population. For instance, the European Values Study 2008[9] shows that 62% of Dutch and 75% of Norwegian participants think most people can be trusted, while only 27% of French-speaking Belgian think the same. For the whole of Belgium, the percentage is 35%. It is also consistent with the European Social Survey 2014,[10] which uses the same question but has numeric value: general trust in Norway (6.62) and Netherlands (5.97) is above an European average (5.21), while trust level in Belgium (5.02) is below average.

The Dutch and Norwegian MP results are also consistent with Sager (2009): Norwegian planners are less in favour of private developers than Dutch planners. However, the Dutch and Belgian PM results do not support the observations that there is a fundamental distrust to planning in Belgium and a general trust to planning in the Netherlands (De Vries, 2015; Faludi, 2005).

When we take a closer look at public-private differences, we find that Dutch public participants trust more than Dutch private participants. In contrast, Norwegian public participants trust less than Norwegian private participants, while Belgian participants show no difference in trust levels. The Dutch results confirm the findings from Public-Private Partnerships in Dutch urban development projects in which both public and private actors hold bias and distrust towards one another (Heurkens, 2012, p. 32). This corresponds to the common finding that people tend to be more trusting towards people from their own group (Tanis & Postmes, 2005).

In clear contrast, the Belgian results show the opposite: both public-public and private-private trust are lower than trust in the mixed group, of which private-private trust scored the lowest of all treatment groups. This may be the result of the group composition.

Table 3. Levels of trust attitudes in Belgium, the Netherlands and Norway.

Country	N	Mean	Treatment groups (M = Municipality; P = Property developer)			
			MM	MP	PP	PM
Belgium	**71**	**42**				
Public	27 (14, 13)	43	40	46	–	–
Private	44 (23, 21)	42	–	–	37	48
The Netherlands	**47**	**52**				
Public	30 (15, 15)	54	61	47	–	–
Private	17 (9, 8)	49	–	–	51	46
Norway	**140**	**51**				
Public	42 (22, 20)	46	49	43	–	–
Private	98 (53, 45)	53	–	–	51	55

Note: Detailed treatment group size is shown in parentheses.

Indeed, in the survey that we made after the trust game, we have noticed that the partici- pants in the PP group are found more trusting in other people. We, therefore, attribute the unexpected low PP trust to a statistical anomaly due to our small sample size. Besides, trends in Norwegian results reveal private actors' trust towards public actors. This reflects the findings of the European Social Survey (2014) regarding trust in the general population and towards the bureaucracy.

When we compare the treatment group of MM in three countries, we can see that public participants in the Netherlands trust their partners from the same sector much more than those in Belgium and Norway. In all three countries public participants show low trust towards partners from the private sector. When we compare PP numbers, private participants in Belgium show the least trust. Lastly, private participants' trust in Norway towards a public partner is higher than the same group for the Nether- lands and Belgium.

4.3 Public goods game

Based on the results of our public good game as shown in Table 4, we find that participants in all three countries are more co-operative than the average found in economic exper- iments, where roughly 50% of endowments are contributed in one-shot games (Levitt & List, 2007). Norwegian participants are even more co-operative than the Dutch and Belgian participants.

Taking a closer look at public-private differences, we find that Dutch public participants contribute more than Dutch private participants, whereas the Norwegian and Belgian public and private participants show no difference in average contributions. When we compare treatment groups of MMM in three countries, we can see that public participants in all countries show similarly high levels of co-operation with other public partners. This may serve as supporting evidence to a widespread inter-municipal co-operation phenom- enon throughout Europe (including the Netherlands and Belgium), as discussed in Hulst and Van Montfort (2012).

In the case of MPP, the level of co-operation slightly declines: Belgian and Norwegian public participants show lower co-operative attitudes towards private partners, but Dutch public participants co-operate the same when we tell them they play with private partners. This corresponds to the statement by Halleux et al. (2012) who argue that Belgian

Table 4. Levels of co-operative attitudes in Belgium, the Netherlands and Norway.

Country	N	Mean	Treatment groups (M = Municipality; P = Property developer)			
			MMM	MPP	PPP	PPM
Belgium	**41**	**54**				
Public	16 (8, 8)	55	59	51	–	–
Private	35 (15, 20)	54	–	–	48	62
The Netherlands	**39**	**57**				
Public	25 (13, 12)	61	61	61	–	–
Private	14 (8, 6)	50	–	–	55	43
Norway	**236**	**61**				
Public	93 (81, 12)	61	62	55	–	–
Private	143 (98, 45)	61	–	–	62	60

Note: Detailed treatment group size is shown in parentheses.

municipalities are much more reluctant than their Dutch peers to co-operate with private developers. Meanwhile, since Norwegian planners are more in disfavour of private developers than Dutch planners (Sager, 2009), it also makes sense that their co-operative attitudes towards developers are lower than those of their Dutch peers.

When we compare PPP groups, private participants in Norway show the highest level of co-operation with private partners, and Belgians the lowest. In PPM groups, Dutch private participants tend to co-operate less when they interact with public partners (lowest overall). Belgian private participants tend to co-operate more in this treatment group than any other.

Lastly, as trust and cooperation are two focal and mutually reinforcing elements in planning (Kumar & Paddison, 2000) as well as in general social science (Gächter, Herrmann, & Thöni, 2004; Ostrom & Walker, 2003), we also tested the correlation between trust and cooperation in the Dutch and Norwegian data.[11] The results show that they are positively correlated ($p < 0.01$). This indicates the importance of trust in planning as 'trust functions as an assumption and as a developer of co-operation (the more trustful behaviour is, the more intensive co-operation is possible)' (CULTPLAN, 2007).

In summary, our experimental results reveal the attitudinal differences in decision-making in planning between the three countries as well as between public and private actors in each country. The highlights of our findings are summarized in Table 5.

5. Discussion

The main contribution of this paper is to offer experimental games as a measurement tool (as a complement to CPM as an analytical tool) of planning culture. We have operationalized and measured planning culture through three attitudes. In this section, we will look critically at the internal and external validity of our experimental results and discuss the appropriateness of the operationalization.

5.1 Measurement: internal and external validity of the experiment

Experimental studies are commonly evaluated by two criteria: internal and external validity. First, internal validity refers to the reliability of the causal relationship established in the experiment between independent and dependent variables. In our experiment, the independent variables are country and sector, while the dependent variables are risk, trust and co-operative attitudes. The internal validity issue relates to the confounding threat which suggests that a third variable may explain the relationship between an independent and dependent variable. In the context of our experiment, the potential impact of socio-demographic variables such as income, age, gender, working experience, or size of employment organization may raise concerns. Due to the limited size of our three national samples, the data were not rich enough to run robust statistical analysis to test the potential impact of socio-demographic variables. However, Van der Wal, De Graaf, and Lasthuizen (2008) find that value preferences are primarily attached to the sector (public vs private) rather than other socio-demographic characteristics, based on a related survey with a larger number of professionals from public and private sector organizations.

In terms of internal validity, another methodological issue relates to the professional implication of some of the respondents. This problem was put forward by the fact that,

Table 5. Highlights of risk, trust and co-operative attitudes in Belgium, the Netherlands and Norway.

Country	Differences	Risk attitudes	Trust attitudes	Co-operative attitudes
Belgium (BE)	Cross-country	• Medium risk-averse • Difference between BE and NL is not significant • BE public is medium risk-averse, but not significantly different from NO public • BE private is most risk-averse, but not significantly	• Least trust • MM: lowest • MP: similar to NL and higher than NO • PP: lowest of overall • PM: medium	• Least co-operative • MMM: similarly high level of co-operation • MPP: lowest • PPP: lowest • PPM: highest of overall and similar to NO
	Public-private	• Public is less risk-averse than private, but not significantly • Very similar in risk categories	• No public-private difference • MM < MP • PP < PM	• No public-private difference • MMM > MPP • PPP < PPM
The Netherlands (NL)	Cross-country	• Most risk-averse • Difference between NL and BE is not significant • NL public is significantly more risk-averse than BE and NO public • NL private is medium risk-averse, but not significantly	• More trusting than BE and similar to NO • MM: highest of overall • MP: similar to BE and higher than NO • PP: highest and similar to NO • PM: lowest	• Medium co-operative • MMM: similarly high level of co-operation • MPP: highest • PPP: medium • PPM: lowest of overall
	Public-private	• Public is significantly more risk-averse than private	• Public show higher trust than private • MM > MP • PP > PM • MP = PM	• Public co-operate more than private • MMM = MPP • PPP > PPM
Norway (NO)	Cross-country	• Least risk-averse • Significantly different from BE and NL • NO public is least risk-averse, but not significantly different from BE public • NO private is least risk-averse, but not significantly	• More trusting than BE and similar to NL • MM: medium • MP: lowest • PP: highest and similar to NL • PM: highest	• Most co-operative • MMM: similarly high level of co-operation, highest of overall • MPP: medium • PPP: highest of overall • PPM: highest and similar to BE
	Public-private	• Public is less risk-averse than private, but not significantly	• Public show lower trust than private • MM > MP • PP < PM	• No public-private difference • MMM > MPP • PPP > PPM

in the risk game, some participants chose 0 or 25 plots to buy, which results in an automatic payoff of zero! Thanks to the short survey the participants had to fill in after the game, we realized that this type of answer was not caused by a misunderstanding of the game but, instead, by a professional judgement. Indeed, some of the public participants who chose 25 justified their choices with the arguments that the municipality does not aim for financial profits and that addressing soil contamination is a public task. In parallel, some of the private participants who chose 0 explained their motivations by the fact that they consider the transfer of risk from seller to buyer as unreasonable. In relation to this point, it must be noted that the answers of 0 and 25 plots were not considered in the quantitative analyses.

Second, a common critique of an experimental approach is its limited generalizability (external validity). In this respect, we shall discuss whether our sample is representative of

the three considered planning environments. To do so, we discuss below the issue of the sampling bias and the issue of the abstract versus planning-relevant context.

Unlike most experimental economic games which recruit student subjects, this experiment was conducted with planning and development practitioners. We do this to ensure the generalizability of our results to planning actors. Though our sample size is relatively low, we have tried to reach participants through many channels. Based on the available demographic data, we regard the representativeness of our three national samples as acceptable. However, the ultimate test of an experiment's external validity is replication.

The most significant alteration we made compared to the typical economics experiments is that we frame the context with common planning-relevant issues in the three countries. Deviating from the often abstract framing in economics, our experiment intentionally provides a familiar context for our participants, as endorsed by Loewenstein (1999). We asked the participants to reflect upon their professional roles as much as possible. On the one hand, since we frame hypothetical settings without explicit wordings like risk, trust and co-operation, it reduces some self-reporting bias found in common survey research. We are confident that participants reveal their *honest* inclinations. On the other hand, to ensure coherence and comparability, we keep the game instructions as close as possible to the original, abstract games. It is possible that some subjects misunderstood our instructions. However, a richer context may hamper the control of experiment as subjects may make decisions as a response to factors that are not intended by experimenters (Levitt & List, 2007). The balance between rich and abstract context is a challenge to any planning experiments.

5.2 Operationalization of planning culture

Our measurement of planning culture is based on how we operationalize the concept. The CPM-based conceptual framework provides the basis for measuring planning cultures. The framework attempts to complement the CPM's explanatory power at the micro level by arguing that planning actors' behaviour in interactions can be explained by their values and attitudes. This is in line with the arguments in Reimer and Blotevogel (2012) that planning cultures are established through concrete forms of planning action, which are the consequence of the specific values and orientations of the actors involved. Here we discuss risk, trust and co-operative attitudes of actors involved in planning and development as operational variables of planning culture.

Firstly, we have used attitudes to infer values. It can be summarized from Table 5 that Dutch planning actors value risk aversion and trust; Norwegian planning actors value co-operation; while Belgian planning actors have a lower score of these values when compared to the other countries. This empirical evidence is largely in line with observations and discourses of national cultures in the three countries. We could, therefore, state that as 'culture manifests itself in values' (Hofstede, 2001, p. 10) and 'values are among the building blocks of culture' (Hofstede, 1980, p. 25), there is also a similar relationship between planning culture and values of risk, trust and co-operation.

Nevertheless, it seems rather speculative to confirm this statement. One reason is that 'both the formal rules and the informal constraints are embodied in attitudes and values' (North, 1990, p. 136). It would be arbitrary to attribute attitudinal differences to simply cultural differences, without taking into account formal institutional influences.

Although we have controlled that all participants read the same instructions and therefore all differences are due to intrinsic differences in their mind-sets, it is beyond this research to investigate *why* and *how* actors in three countries have formed different attitudes. The planning systems in Belgium, the Netherlands and Norway vary in what prominence market actors have in planning implementation and in implementing power held by the public. These differences most likely influence actors' experiences and attitudes in the public – market interaction. It is however not our task to explain the differences. We have, however, successfully measured planning culture as it is narrowly defined here, and provided numerical data for actors' different attitudes in planning interactions.

Secondly and by acknowledging the previous limitation, based on the empirical evidence, we move a small step forward towards the understanding of the planning environment identified in the culturized planning model. The approach taken has shown a direct impact of culture on values and attitudes of planning actors across countries and between sectors. With our experiment, we capture the attitudinal part of planning culture to some extent. However, we also admit that the whole spectrum of planning culture is too rich to be fully captured. To maintain the focus of measurement, other elements within planning environment as well as factors in societal environments and planning artefacts have been omitted. Therefore we reiterate that improving the explanatory power of the concept is not what we aim for. With the help of the conceptual framework, future studies on planning actions and planning practices can build on our attitudinal results to find explanations for planning behaviours. This is also a response to call for more studies on behavioural aspects of actors in planning (Othengrafen, 2014; Reimer & Blotevogel, 2012; Samsura, Van der Krabben, & Van Deemen, 2010).

6. Conclusion

This research started from a curiosity to understand how culture impacts planning. As a response to a bunch of literature criticizing the vague comparisons of planning cultures, we borrowed economic experimental games to measure planning culture. Our study demonstrates how planning culture can be measured and compared systematically through risk, trust and co-operative attitudes. With the help of the comparability and replicability advantages entailed in experimental games (Camerer & Fehr, 2004), this paper contributes to the debate with introducing this systematic measurement tool (Croson & Gächter, 2010), verified by empirical evidence from three European countries.

We are aware that our results involve limitations, mainly focused on experimental practicalities. The samples were small and uneven. Moreover, it should be noted that in this research we mainly focus on measuring planning actors' attitudes towards risk, trust and co-operation as a bridge between planning culture and planning outcome by using experiment as a tool. We have not discussed other important elements of culture, for instance norms and traditions. However, based on the empirical evidence collected in Belgium, the Netherlands and Norway, we have demonstrated that planning culture can be measured and compared by testing carefully selected variables in an experiment. The experiment can be replicated in more countries and statistical analyses can be carried out with larger sample sizes. It is also meaningful to repeat the experiment in a later

period to track changes in planning culture over time or after a critical event. We hope that these results can trigger more debates on the relationship between planning culture and planning outcome.

As a final point, two main reflections can be drawn from our study to prepare a future research agenda. Firstly, it will be interesting to see whether the measured preferences of Dutch municipal planners for the avoidance of uncertainty will persist even when the land and property markets remain stable for a long period of time (as is more or less the situation since 2014). Secondly, the breakdown of results between French-speaking Belgium, on the one hand, and the Netherlands and Norway, on the other hand, may invite complementary investigations in other countries. Those investigations should be designed to evaluate whether collaborative planning practices are feasible within a low-trust society. It would also be interesting to explore the relations between these cultural factors and the legal and administrative planning families identified in (Newman & Thornley, 1996), as a complement to discussions about formal and informal logics of planning action (Reimer & Blotevogel, 2012).

Notes

1. Please note that our meaning of operationalization is in line with the traditional understanding of operationalization which is the process of strictly defining variables into measurable factors. This process is driven by our aim to make planning cultures *measurable*. In contrast, this approach differs from other operational studies in comparative planning cultures (e.g. Getimis, 2012) which focus on *comparability* of planning cultures.
2. We admit that there are other kinds of planning actors for instance landowners, investors, politicians, etc. For the sake of testing the experimental approach, we focus on the most representative subject groups in public and private sectors.
3. The selection of the three countries is in fact based on practical reason in which the authors are all involved in a research project due to their shared research interests. Nevertheless, the fact that these countries actually also have different planning systems (see e.g. Dubois, Gabriel, Halleux, & Michel, 2002 for BE, Needham, 2016 for NL, and Falleth & Nordahl, 2017 for NO) and that they are somewhat moderately close with each other in terms of culture (as European countries), has made the comparison interesting and more reasonable.
4. The games were played by French-speaking subjects from Brussels and Wallonia. Our results therefore do not speak of the reality for the Dutch-speaking population of Belgium.
5. Compared to repeated games that test learning effects, one-shot games are used to elicit subjects' intrinsic motivations in making decisions. This is a common approach in social preference experiments to exclude strategic motivations like reputation building in repeated games (Levitt & List, 2007).
6. GXP (https://gxpfoundation.wordpress.com/) is an online experimental platform that supports research in human behaviour. Experimental sessions on GXP are programmed in Otree (Chen, Schonger, & Wickens, 2016; Holzmeister & Pfurtscheller, 2016).
7. We specifically used the Mann-Whitney U Test. We used the non-parametric test to compare differences between independent groups because we do not make any assumption about the distribution of the data.
8. Based on the average sent amount found in economics experiments which is roughly 50% of the endowment (Levitt & List, 2007).
9. https://www.gesis.org/en/services/data-analysis/international-survey-programs/european-values-study/.
10. http://www.europeansocialsurvey.org/downloadwizard/.
11. This test could not be done for Belgium as the two games were played by different subjects.

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Disclosure statement

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Article 4: Fair shares? Advancing land economics through trust and cooperative game theory

Fair shares? Advancing land economics through trust and cooperative game theory

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Abstract

Site consolidation is a perennial issue in the study of land economics. The emergence in many contexts of policies that follow variations on 'land readjustment' represent a common way for policy makers to overcome the barriers to wholesale redevelopment. In several important respects the nature of the problems that land readjustment seeks to confront are best thought of as questions in cooperative game theory. In this contribution we seek to explore the underpinning logic of land-readjustment using a core concept in cooperative game theory: the Shapley Value. This approach sheds light on a range of important practical issues for the policy ranging from the conditions under which development might be self-initiated, coalition stability and the value of an animating agency such as urban planning. We use game experiments with 276 planning, development and architecture students from the Belgium, the Netherlands, Norway, and the United Kingdom to show that the solution concept is intuitive for many British and Norwegian students, but not for the Dutch.

Introduction

Site consolidation is a perennial issue in the study of land economics. In many contexts around the globe wholesale urban transformation is hindered by multiple ownership of often small, contiguous parcels of land that would ideally be considered together as a coherent whole for redevelopment purposes. The corresponding power accorded to one unwilling seller to 'hold out', either for pecuniary or sentimental reasons, has resulted in delay and sometimes prevention of development becoming a hallmark of urban planning in some contexts, such as the UK (Cheshire and Sheppard, 2005; Nathan and Overman, 2011; White, 2014, Adams, Disberry and Hutchison 2017). The challenges of property led urban redevelopment is well known also in Norway (Falleth and Nordahl 2017, Falleth, Sandkjaer and Saglie 2011). Nordahl and Eika (2017) for instance found

that planning agencies allow for plot-wise planning and in other ways tries to minimize plan-led dependency on diverse landowners. As responses to the challenges of cooperation between diverse landowners, some nations have begun to experiment with new policy responses designed to overcome what is in effect a collective action problem and catalyse the development process. In many parts of the world the first choice for policy makers has been variations on land readjustment where the promise of a corresponding uplift in land values associated with site consolidation and subsequent planning consent, it is hoped, should provide an incentive for cooperative behaviour between landowners (Adams et al., 2001; Turk, 2008; van der Krabben and Jacobs, 2013; van der Krabben and Heurkens, 2015, Nordahl and Falleth 2011). At root this approach turns on some important economic concepts/assumptions. Firstly, for land readjustment to work it would be essential that individual land owners are able to decode what cooperative action – the willingness to pool their asset with those of their neighbours – would mean for them as individuals. Secondly, we would ideally need to know if the viability of the approach is in any way dependent upon the various potential roles for the state, for example, as a holding agency to guarantee a fair pooling and subsequent distribution of assets. On this second point it would be desirable to know under what conditions individual land owners might be able to reach a solution themselves without the requirement for the state to referee the process. Any evidence on this would speak directly to the wider question of the degree to which self-organisation can be prompted by policy design and, by extension, if self-organisation is a realistic and viable vision of an achievable urban policy yet to come (Boonstra and Boelens, 2011; de Roo, 2016; Moroni, 2015; Portugali, 2000, 2011; Swyngedouw and Moulaert, 2010; Zhang and de Roo, 2016).

On these important questions we have only clues. The degree to which such cooperative outcomes, particularly those that imply some form of self-organisation, are likely to result from variations on the land readjustment formula is an open question upon which there is a paucity of research. For example, the fundamental issue of the degree to which the apportionment of land holdings to be returned to landowners accords with a shared or broadly consensual interpretation of what would constitute 'fair shares' is a centrally important issue. Moreover the degree to which cooperative action depends upon the existence of a mutually binding trust between stakeholders is also under-researched.

In this paper we aim to use cooperative game theory to explore these question of how collective agreement over the pooling and reallocation of an asset, in this case land holdings, might proceed. To explore these questions, we first use a thought experiment in which, rather than the state assigning values for compensation payments on a case by case basis, landowning developers do

this collectively based upon their own expectations of what the surplus subsequently to be shared might be. Using Shapley values to illustrate how the process might work in theory we hope to show that under very specific conditions a self-determined solution would be theoretically possible.

In taking this approach we hope to illustrate in theoretical terms what some of the implied differences might be between urban planning systems that allow for some degree of selforganisation compared to those where a state or para-state agency plays an active economic role either as regulator or broker. Secondly we present empirical evidence from a recent JPI-funded project, *SIMS City: Testing new tools for value capture*, which seeks to explore the degree of trust present amongst actors at the core of the redevelopment process across varying national contexts (Li et al 2019).

Land readjustment policy: history, context and mechanics

Land readjustment has been used in a wide variety of international contexts across the globe, although it has been particularly popular in Europe and South East Asia. If a specific geographic origin can be found the principal candidate is Japan where an early version of the approach was employed following the Tokyo earthquake of 1923 and in the reconstruction of Japanese cities following the Second World War (Larsson, 1997). More recently land readjustment has been used in varying contexts within mainland China (Li and Li, 2007), and Hong Kong (Yau, 2012) as well as Australia, where it is known as 'land pooling', Israel, and South Korea. In Europe, the idea has gained most currency in the north of the continent where it can be witnessed in urban planning policies enacted in Germany, France, the Netherlands, Sweden (Turk, 2008). Land readjustment is also well established in Norway, but only for agricultural purposes and rural settings. An attempt of widening the scope of land readjustment on urban through a law amendment in 2006, is only partly successful (Hasseldokk Ramsjord 2014) as Norway see no use of urban land readjustment that include pooling resources and sharing the value increase after development (Nordahl 2019). Never-the-less, the potential for land readjustment to act as a vehicle for urban transformation in extreme settings – such as post-conflict Japan – has moved the World Bank to advocate the policy as a measure that might have some traction in developing countries (Doebele, 2007).

The core principle of land readjustment is that it enables the consolidation of separately held, adjacent plots into a new configuration more amenable to wholesale development. In a typical model of urban land readjustment, private property rights are temporarily transferred to a public development agency that proceeds to assemble and re-parcel the site – often into a greater number of smaller units – before installing infrastructure and thus raising the value of each individual plot.

Property rights are subsequently returned to the original landowners. The upfront costs incurred by the state (through the public development agency) are designed to be recovered by the sale of new additional plots created by the process.   Compensation to the original land owners, whose cooperation is essential to the process as a whole, comes through the enhancements to their (typically reduced) land holdings resulting from the creation of fully serviced sites complete with planning consent (van der Krabben and Needham, 2008).

Variations on the model include scenarios in which no new plots are created, land owners cover the costs of the redevelopment themselves from the subsequent anticipated increase in the value of their holdings and where a public use (e.g. a municipal building, green space) may also be incorporated with private holdings in the allocation and re-allocation of holdings (Needham, 2007; van der Krabben and Needham, 2008). In the UK, Adams et al (2001) draw inspiration from urban land readjustment in proposing the 'urban partnership zone' as a way of tackling the barrier sometimes posed to redevelopment by one or more land owners obstructing development. In such circumstances, urban land readjustment has been valued for its potential to build the recovery of infrastructure costs into the development process thus providing an automatic way of capturing the uplift in land values associated with the granting of planning consent and obviating the need for any form of *ex post* development levy (such as that discussed in Lord, 2009). From this perspective, land readjustment is a policy tool that may be used to address situations where, "the boundaries of the rights to land ownership or land use may impede the desired use of the area as a whole" (Needham, 2007: 115).

To date the effectiveness (or otherwise) of urban land readjustment has largely been judged inductively on the basis of experience. As a result conclusions are in many instances predicated on conjecture and circumstantial evidence regarding what might or might not work in various contexts, thus making context potentially the most salient variable. However, the underlying principles upon which urban land readjustment are based – the division of an asset between a small number of self- and collectively-interested agents speaks very closely to a common theoretical question in game theory – an increasingly popular way of thinking about such questions (Lord, 2009,2012; Samsura et al., 2010, 2015) . In this contribution we seek to explore one of the most fundamental questions relating to how coalitions might decide on what constitutes 'fair shares' within the process by which individual assets are collectivised and then returned, subdivided, to their original owners.

Cooperative game theory

When considered in the abstract the questions with which land readjustment deals in practice can be understood as analogous to those that are routinely explored in cooperative game theory. This branch of game theory explicitly sets out to understand group decision making and is therefore distinct from the best known examples – such as the prisoners' dilemma and the ultimatum game – that seek to explore the microeconomics of decision making under non-cooperative conditions (for a thorough discussion of the differences between cooperative and non-cooperative game theory see Binmore, 1992; Rasmusen, 2006). For cooperative game theory the aim is to investigate the conditions under which some form of cooperative action might be necessary and the outcomes that might follow. There is, therefore, a clear point of tangency between the goals of cooperative game theory and the specifics of a policy such as pooling of resources in land in order to increase value above independent use of the resource.

In relation to the specific question of site consolidation and subsequent reallocation we have a set of issues that can very neatly be codified as a problem in cooperative game theory. Our asset, the full potential site, is pooled, subdivided and then returned to the original landowners in modified form. The anticipated spur to the initial cooperative act is the prospective incentive that the holding that will be returned from the land (remediated, consolidated with its neighbouring plots, possibly serviced by infrastructure and with planning consent provided) will be of enhanced value compared to the asset that the individual land owner had initially submitted to the pool.

The predictions of cooperative game theory would suggest that each individual land owner will evaluate the degree to which their outcome is acceptable not on the basis of the uplift in value that pertains to their land holding *per se* but as a function of the relative redistribution of the asset *as a whole* between the group *as a whole* (Young, 1988). This concept, called the Shapley value after its founder Lloyd Shapley, allows us to theorise and predict the behaviour of individual economic agents when confronted with a collective asset that must be divided amongst them relative to their marginal contribution to its creation (Roth, 1988; Shapley, 1953; Winter, 2002). Applied to a public policy question such as a land-readjustment exercise we can use this theoretical framework to explore the degree to which cooperation might be sustained over the full duration of the pooling/reallocation process and the conditions under which a self-organised solutions might be possible and those where a state/regulatory referee might be required.

To explore this range of questions we propose a thought experiment. This method of thinking about a problem in the abstract is the most common method of analysis in much of Western philosophy, particularly the analytic tradition, and those disciplines, such as game theory, which

follow this lead. Thought experiments allow us to conceive of a problem in terms of its first principles. Common examples include *Schrödinger's Cat* (Schrödinger, 1935) where we are invited to think about the conditions under which we might claim certainty of knowledge and Hardin's (1968) *Tragedy of the Commons* which posits varying outcomes as a result of individual and collective actions. Many thought experiments have had enduring appeal as devices to extrapolate from the abstract to the material world (e.g. Cole, Epstein and McGinnis, 2014; Feeny et al., 1990; Ostrom, 1990).

The following thought experiment allows us to explore the foundational issues in land readjustment by formulating a simple game that mirrors the interactions that land readjustment creates. Although in simplified form – we have just three developers, each owning land in a neighbourhood – the results provide insights into fundamental mechanics of this approach to redevelopment and point to important lessons for policy design. Moreover although our experiment is restricted to just three players the experiment can be extrapolated for any number of participants.

Rethinking land readjustment using Shapley Values

Consider a situation where owners of three small, separate but adjacent pieces of land can be redeveloped as a whole.

In keeping with the terminology of game theory let the three owners be labelled players A, B and C. . Suppose each player on their own possesses too little land for financially viable redevelopment and thus cannot start any project alone. Hence, the "worth" of coalitions of a single player can be normalized to 0. That is, the characteristic function v has the value:

$$v(\{A\}) = v(\{B\}) = v(\{C\}) = 0.$$

On the other hand, when two developers forms a coalition, a small redevelopment project becomes possible. However, when all three players work together, they can realize the full potential of the total site that comprises the three adjacent pieces of land. To specify this range of possibilities more completely, let the value of all potential coalitions be defined as:

$$v(\{A,B\}) = 3, v(\{A,C\}) = 3,5, v(\{B,C\}) = 4, \text{ and }, v(\{A,B,C\}) = 9.$$

We note that to reflect the possibility that the three pieces of land may differ in attributes, we have allowed $v(\{A,B\})$, $v(\{A,C\})$, and $v(\{B,C\})$ to be different. Note also that the union of any two sets of players is always worth no less than the sum of the two individual sets or, in game theoretical terms, our land adjustment game is superadditive.

We now first apply the concept of the Shapley value to this cooperative game which determines each player's fair payoff in the efficient grand coalition, {A,B,C}. The Shapley value is defined by players' average marginal contribution over possible coalition formations. In the table below we find for each player their marginal contribution in each permutation of the grand coalition. In the first column we list the 6 possible orderings of the grand coalition. In the second column we record player A's marginal contribution in each ordering - player A's added worth to the coalition formed by all players *preceding* her. For example, in the permutation (B,C,A), player A contributes to the coalition {B,C} by increasing the worth of the coalition from $v(\{B,C\})$ *to* $v(\{B,C,A\})$, i.e., 9-4= 5. In the ordering (C,A,B), player A's marginal contribution is v({C,A}) - v({c}) = 2 - 0 = 2. Similarly, in columns 3 and 4 we record marginal contributions of players 2 and 3, respectively.

TABLE ONE ABOUT HERE

Marginal contributions

Ordering	A	B	C
(A,B,C)	0	3	6
(A,C,B)	0	5,5	3,5
(B,A,C)	3	0	6
(B,C,A)	5	0	4
(C,A,B)	3,5	5,5	0
(C,B,A)	5	4	0
Average	2,75	3	3,25

The Shapley value - defined as a player's *average* marginal contribution over the permutations - are thus 2,75, 3, and 3,25 for players A, B, and C respectively. Let Sh_i denote player i's Shapley value payoff in this land adjustment game. We have $Sh_1 = 2,75$, $Sh_2 = 3$, and $Sh_3 = 3,25$. In this solution, the three players efficiently and, one can argue, fairly divide the total value from the land adjustment project.

The Shapley value represents one bid on what is fair division of the grand coalition's worth. Intuitively, each player is rewarded by his/her average marginal contributions to other coalitions. The Shapley value is the only value that satisfies a set of simple and intuitive axioms. For instance,

Young (1985, 1988) demonstrates that the Shapley value is the only solution that satisfies axioms of efficiency, symmetry and the "marginality principle". The efficiency axiom means that the worth is fully divided and symmetry requires that the payoffs to any two players should also be the same whenever they make exactly the same marginal contributions. A value satisfies the marginality principle if a player receives the same payoffs in two different games of the same set of players whenever the player makes the same marginal contributions in the two games. These three axioms characterize the Shapley value.

A more intuitively compelling argument in favour of a Shapley value to solve distribution of payoff from lands is perhaps the balanced contributions property. Suppose ψ is an arbitrary value. Imagine that player B is able to say to player A: "give me more of the proceeds of the development or I will leave the coalition, causing you to obtain only ψ_1 ({A,C}) rather than the larger payoff of ψ_1 ({A,B,C, }). This will mean that you lose the positive amount ψ_1 ({A,B,C}) - ψ_1 ({A,C})." We call this an *Objection* of player B against player A. If, on the other hand, player A can say to player B that "it is true that if you leave then I will lose, but if I leave then you will lose at least as much: ψ_2 ({A,B,C}) $- \psi_2$ ({B,C}) $\geq \psi_1$ ({A,B,C}) - ψ_1 ({A,B})", then we say player A has a *counter-objection* to player B's objection. Note that in our example the Shapley value, $Sh_1(\{A,B,C\}) - Sh_1(\{A,C\}) = 2,75 - 1,25 = 1,5$ while $Sh_2(\{A,B,C,\}) - Sh_2(\{B,C\}) = 3-2=1$. Thus player 2 does have an objection against player 1 but player 1 also has a counter-objection to player 2's objection against player 1. The presence of an objection and counter-objection mean that neither player has any incentive to withdraw from the coalition.

In a real life situation where the cooperation leads to a payoff that are "greater than the sum of the parts" as in the example given above, it is not obvious that the players will give the balance contribution property much purchase. In the example above the reward of a 3 player cooperation yields more than twice the payoff of any two player cooperation. Moreover, in this game an even split (3 to each player) gives a higher payoff for all players compared to any 2 player cooperation. Phrased differently, going from a 2 player cooperation to the 3 player cooperation with equal shares yields a pareto improvement[1]. This implies that player A, the player most disadvantaged by the Shapley value division of the payoff may offer an ultimatum: the 3 player cooperation with equal shares or nothing. In this case the other two players need to decide whether or not they prefer to

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[1] Pareto improvement is a change in allocation, here going from a 2 player cooperation to a 3 player cooperation with equal shares, that benefits one player without hurting the other players. If the players are forced to consider the 2 player cooperations and the three player with equal shares, the 2 player cooperation strategies become dominated strategies, and every player will choose the 3 player cooperation strategy.

split 4 (by a Shapley value or an even split) or to split 6 which is their share after paying A an even split in a 3 player cooperation.

At a higher level, any division of the 3 player cooperation payoff that gives higher payoff than the alternative yields a possible Nash equilibrium. In the situation above, where we considered the situation where the most disadvantaged player proposed the 3 player even split ultimatum, the two other players should accept the offer if they are rational economic agents and believe the threat. In practice, the two other players may tempt to propose counter offers, which the disadvantage player may turn down. The disadvantaged player's risk in practice, which has no place in a one shot rational agent economic game, is the prospect of punishment. The two other players can forego profit in order to punish the disadvantaged player's hard ball ultimatum. In a game in the lab or in a real life scenario, the players have an incentive to explore how much of the payoff they can achieve without being punished by the fellow players. In this sense the ultimatum strategy resembles the the much studied dictator game (Bolton, Katok & Zwick 1998). The take away here is that there *is no theoretic fair share* nor *any division principle* that is likely to be recognized by all players. In practice we will expect that players will have some knowledge of each other's preferences and limits to their own negotiation power as real life players tend to punish unfairness and overt greed.

Summing up: The Shapley value is the only division rule that satisfies the balanced contributions property which requires that for every objection of any player *i* against any other player *j* there is a counter-objection of player *j*. If the worth of the grand coalition is allocated *in any other way* than in strict accordance with the principles of the Shapley value, then there can exist objections to which there is no counter-objection. This in turn implies that the cooperative agreement may be *destabilised for any arrangement that deviates from that which accords with the Shapley value*. On the other side, may the division of the 3 player yield more possible Nash equilibrium as any three party cooperation gives higher payoff than the alternative.

The next section present results of an experiment on coalition and value distribution in four European countries. The experiments examines the tendency of forming a grand coalition and agreeing on value distribution.

Empirical Material

We constructed a game experiment to provide the empirical underpinnings for the theories presented here. Groups of three subjects play developers A, B, and C and they were told a municipality invites them to develop a plot. To ensure a good project, the municipality demands

that a coalition of at least two developers undertake the project. Due to different capacities, the possible coalitions will have different nett payoffs:

- **300** million (national currency) if developer **A and B** develop the area together
- **350** million (national currency) if developer **A and C** develop the area together ☐ **400** million (national currency) if developer **B and C** develop the area together
- **900** million (national currency) if developer **A, B, and C** develop the area together

The coalition parties will then divide the payoff as they see fit. The subjects had 15-25 minutes to make a coalition and a distribution of the payoff. After an experimenter introduced the game to

the subjects and gave them a handout with the assignment text, an answer sheet, and a short survey, that also assigned the A, B, or C roles to each subject. The text indicated a single shot game. Students from property development, planning, and architecture programs at Belgian, Dutch, Norwegian and UK universities participated in the experiments as a part of regular lessons[2]. The students come from fields related to the themes of this paper, but had not been educated in cooperative game theory.

We expect most groups to be able to reach the grand coalition, as the payoff is high enough to make everyone better off than they could hope to be with any dyad. So is also the case: out of 92 groups only three groups did not form a grand coalition. As table 2 shows, *Shapley value distribution* meets strong competition from *evenly value distribution*. 66 groups chose to distribute the values evenly between the A, B and C whereas 26 divided the 900 million payoff evenly.

*Table 1: Number of groups electing distribution strategies.*
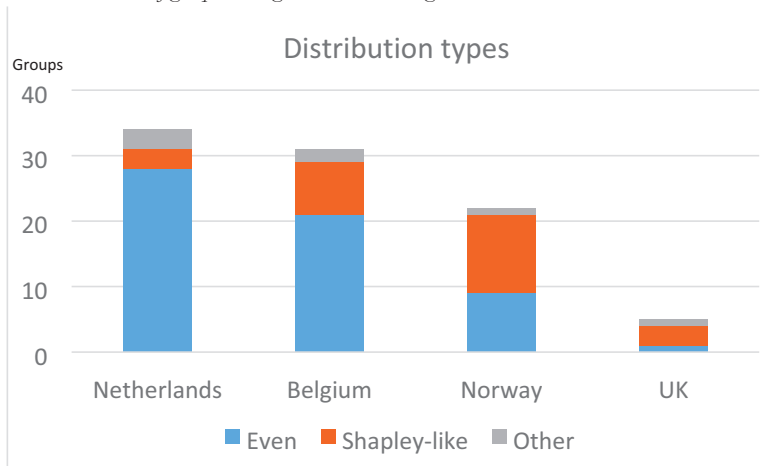
In the game, the Shapley value is 275, 300 and 325 million to A, B and C respectively. None of the groups chose the exact predicted distribution. However, 26 of the 92 groups (28 %) reached distributions similar to the Shapley prediction, with the player in position A receiving less than the player in position C, and B somewhere in between. Of the seven groups that reached other

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results, three formed dyads, three failed to reach any agreement in the allotted time, and one group formed a grand coalition with a distribution of 400, 100, and 400.

Table 2: Distribution of payments in the 27 games where the players formed the grand coalition, but did not distribute the payoff evenly.
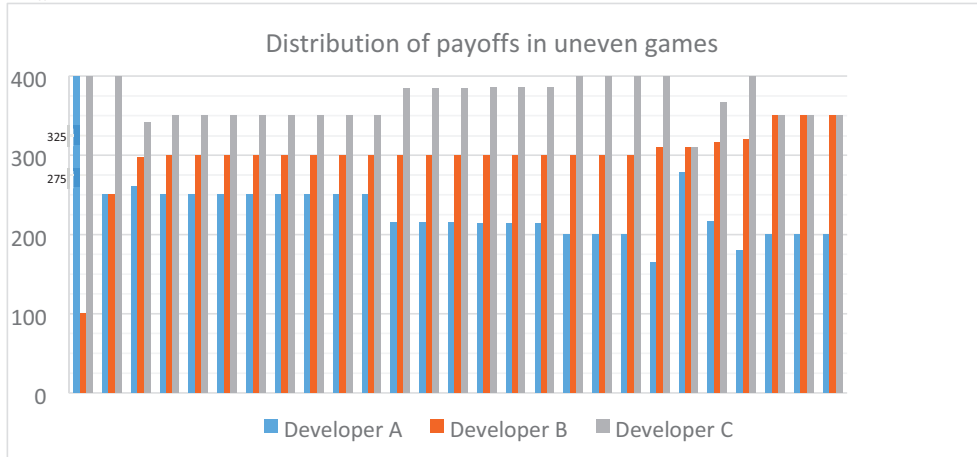
In the subsequent questionnaire all but five of the players that achieved the grand coalition thought that the distribution was fair: The three players who distributed 400, 100, 400 all agreed it was unfair, plus two of "A developers" who received a smaller share. Most of the other A developers who received less than 300 saw it as reasonable for the others to earn more, as their participation contributed more to the project.

Analysis

The game set out above illustrates the conditions under which a (small) collection of interests, which otherwise may not work together, might assemble into a functioning coalition. The alignment of individual payoffs with the corresponding contribution made by each member of the coalition to that coalition points to ways of both initiating development and ensuring stability across the group of interested parties through the full duration of the development process.

We anticipated that if we could establish a reallocation to all interested parties that implies payoffs that accord with the principles of the Shapley value we would have created a settlement that is stable and mutually incentivises cooperative action such as would be necessary to realise wholesale redevelopment. However, the experiments indicated that another distribution of value would be the preferred one: The experiments indicated, firstly, that all participants saw the value of a grand coalition and, secondly, that even distribution would be the better solutions even if the parties contributed unevenly in the first place. Thus, the experiment indicate an understanding of

interdependencies and willingness to reward this by sharing payoffs evenly. The experiments clearly show little support of Shapley value being the preferred distribution, or bring "fairer" than other distributions.

It might be argued that the choice of even distribution may lead to unstable coalitions and even and collapse after a while. However, it might also lead to a sense of interdependency, a warm glow among the C's and a gratefulness among the A's that might be perceived as useful in later joint ventures.

Shapley value represents an arrangement that has the potential for coalition instability inscribed into it. What remains is the question of whether we would arrive at the arrangement consistent with the Shapley value independently through self-organisation or whether an informed broker would be required to 'nudge' the players towards this, as opposed to one of the other, potential outcomes. In the example set out above just three players are included – we did not include a role for any state or quasi-state agency which might be able to broker a deal between landowners and developer. What remains without such a coordinating agency is a set of circumstances that should theoretically resolve to a mutually binding agreement that tends towards the solution offered by the Shapley value. That is, *ceteris paribus,* even without a state agency to act as a referee the development process could self-initiate and the coalition of interest could self-organise.

Closing words

In recent years a huge amount of academic attention has been devoted to 'mechanism design' – using the principles of game theory and behavioural economics to develop new insights into a whole range of public policy questions (Börgers, 2015; Chetty, 2015; Hu et al., 2016). In our example, a properly designed planning 'mechanism' could be instituted to be played noncooperatively which could implement the grand coalition and the division of surplus defined by the Shapely value. To illustrate how such an observation might be translated into mechanism design, Pérez-Castrillo and Wettstein (2001) offer a bidding mechanism in which players first bid to become the "proposer" and then the proposer makes a proposal to each of the other players. If the proposal is accepted by all the other players, the proposer forms the grand coalition, collects the value generated and makes the proposed payments to the rest of the players. If the proposal is rejected, the proposer will be on their own and the rest of the players play the bidding mechanism again. The authors show that in the subgame perfect equilibria of this bidding mechanism the net payoff of every player is his/her own Shapley value. Much greater research on mechanism design in relation to planning questions is required. In particular more work is required that speaks to the

central importance of planning institutions in animating markets – especially those that relate to/depend upon the natural environment (Bromley, 2014, 2016; North, 1990, 1995; Ostrom, 2005). In the case of our specific thought experiment the behavioural complexities of real estate markets are well-noted (Brzezicka and Wisniewski, 2014; Evans, 1991; Jackson and Watkins, 2008; Pavlidis et al., 2016; Roberts and Henneberry, 2007). Although we could expand the game to encompass a greater number of players across a larger coalition with similar theoretical results, the degree to which the behavioural economics of strategy might affect outcomes remains a very salient question. For example, signalling strategies or the emergence of shifting, or nested, coalitions of actors (partition games) might make a different outcome more likely in practice. Within this real world context there would almost certainly be a need for an agency, such as a development corporation or urban planning, as a formal statutory function that might make the 'state of the world' (Rasmusen, 2006) described by the Shapley value a reality. This type of activity would correspond to the idea of urban planning as a 'market maker' (Lord et al., 2015) – the type of economic agency that can, if suitably well-informed, encourage outcomes, such as coordinated self-organisation. Defining and applying Shapley values to guide the design of land readjustment policies might be one such role a market making planning agency could explore although we are sorely in need of further applied research on how such approaches might work out in practice.

Acknowledgements:

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