

Synthesis of projects “3.1 Allocating public and/or private responsibilities” & “3.2 Implementing climate adaptation: Public policies and private initiatives”

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The two research projects that make up WP3 compliment each other. The research approach for project 3.1 deals with the issue of public and private responsibilities in the governance of adaptation to climate change (particularly related to urban areas). It is based on cross-national comparative case studies in which existing and alternative governance arrangements for the adaptation to climate change are analyzed. These case studies deliver concrete context-dependent knowledge. In other words, the cases are characterized by the analysis of complex social situations where the boundaries between the object of study and the context are blurred. While project 3.1 is defined by the analysis of the context-ridden concreteness of existing governance arrangements, the research in project 3.2 is (mostly) based on context-free analysis of (new) policy instruments that can be added to the existing mix of governance strategies. The experimental, economic modelling and simulation driven analysis on which project 3.2 is based delivers insights on the behavioral fundamentals of private agents that would be very difficult to uncover in real-life cases. The comparative case study approach of 3.1 however explores and finds explanations for the range of different governance arrangements that already exist along the public-private divide, but also arrangements that are close to implementation in the policy cycle. In contrast, the more general results of 3.2 are food-for-thought for future governance arrangements, but are complemented by the ex-post analysis of the case studies' complexities and controversies, and the more in-depth nuanced insights that they offer.

The joint research of projects 3.1, 3.2 and 5.1 resulted in a framework to systematically analyze the case studies of 3.1. The four challenges to the governance of adaptation and the six considerations that are contained in the framework play a crucial role in the issue of responsibility divisions. The four challenges of *uncertainty, spatial diversity, controversy, and social complexity* determine the different weightings of considerations for different adaptation issues and for different timescales (the magnitude of the challenges can vary over time). The six considerations of *securing adaptation action, efficiency, rule of law, fairness, legitimacy, and accountability* are important criteria for the success of the governance arrangements. We find that promising alternative governance arrangements for adaptation to climate change can be derived from an optimal balance of relevant considerations in view of the specific challenges for a specific adaptation issue.

A key conclusion of this research is that the responsibility for local urban climate adaptation is currently primarily taken on and borne by local public authorities. Existing governance arrangements for local urban climate adaptation are dominated by a large extent of public responsibility at all stages of the policy process. Private responsibility mainly becomes apparent in the financing and implementation of adaptation measures; joint public-private responsibility is still rather rare. The two dominant considerations for this public responsibility are: i) effectiveness in terms of securing sufficient adaptation action, and ii) rule of law in terms of the duty of care of local authorities for flood management, and the health and living environment of citizens. The dominant consideration for allocating responsibility with private actors is efficiency. These three dominant considerations, in turn, are less influenced by the four challenges to the governance of adaptation than I hypothesized at the beginning of the research project. It appears that decisions on responsibility divisions are not taken very deliberately; path dependencies from

existing ways of working, and policy routines from the related policy fields of urban planning and water management have been more influential on the dominance of certain considerations, and hence on determining the divisions of responsibilities among local public and private actors.

The dominance of public responsibility is somewhat surprising, in light of the expectation that the emerging policy field of climate adaptation would be more likely to elicit the development of new governance modes, the more so since the case studies were selected for not being the default solution and for bringing public and private benefits together. On the other hand, perhaps it is not so odd after all that a more traditional hierarchical steering with predominant public responsibilities has materialized. There are still many uncertainties and there is a lack of a real sense of urgency, which deters the private sector from taking action. This makes the consideration of securing adaptation action particularly relevant at this point in time, leading to a public responsibility for several key roles such as agenda setting, policy initiation and strategy making. This raises the question of whether this dominance of the public sector is a temporary situation, or whether it is a more permanent requirement for adaptation to climate change. Will a shift towards more public-private or private responsibilities eventually appear as the policy field matures?

Based on another key conclusion of this research, namely that public responsibility in the first stage of the policy process tends to enhance the effectiveness, legitimacy and fairness of governance arrangements for urban adaptation to climate change, one could conclude that a large extent of public responsibility is a good thing and that there is no need to change anything. However, there is every reason not to be complacent, sit back and wait. By falling back on existing routines and by not taking conscious note of the four adaptation challenges and all six considerations, other (perhaps even more) promising alternatives are overlooked. Furthermore, the projected acceleration of climate change will pose serious threats to urban societies in a few decades; it might aggravate the four adaptation challenges, and increase the urgency for adaptation planning and action now (in light of long-term investments in the built environment) and well into the future. In future, when put under strain, existing arrangements might turn out not to be climate-proof in terms of being able to handle more extreme climate impacts.

Based on the three case studies contained in this research, it can be concluded that interactive arrangements with shared public-private responsibilities are quite promising for urban adaptation to climate change because they take note of the following relevant adaptation challenges and considerations: spatial diversity which triggers the consideration of fairness; and social complexity and controversy which trigger the consideration of legitimacy. This could take the form of policy networks in which responsibilities would become a joint obligation between the relevant public and private actors, culminating in covenants or contractual agreements as the key supporting policy instruments. These networks could be case and space specific; depending on the exposure, sensitivity and adaptive capacity of a specific area or neighborhood, different actors could join the network, and they could jointly decide on the adaptation goals to be set and adaptation measures to be taken to reach these goals. Ultimately, this could lead to several co-existing networks for one and the same adaptation issue, each tuned to the vulnerability of a specific part of the city or citizen group. Nevertheless, if climate change further exacerbates uncertainties, thus triggering securing adaptation action as a decisive consideration, a promising alternative would be to develop hierarchical arrangements with predominant public responsibilities, and supported by more coercive legal policy instruments such as requirements, building codes, and performance standards.

Contrary to the literature that argues that climate adaptation is characterized by vague and ambiguous responsibilities, in the 20 studied governance arrangements the responsibilities were allocated quite clearly between the relevant public and private actors. It is also quite obvious that the arrangements have managed to get adaptation planning and action off the ground, albeit to different degrees. Based on these research results it becomes apparent that a clear *and deliberate* allocation of responsibilities, that is well informed by the four challenges and the six considerations, is important for getting adaptation off the ground *and for making cities future climate-proof*. The conceptual framework developed in this research project can help inform deliberate and deliberative processes for decisions on responsibilities and for decisions on the selection of policy instruments for adaptation to climate change.

The multiple, comparative case study strategy proved to be instrumental in the comparison of existing governance arrangements across a range of adaptation issues and across a variety of different economic, cultural and political contexts. The research strategy has substantially increased the external validity of the research. The comparison with other foreign cities was also insightful for the policymakers of Rotterdam. It provided a mirror to the Rotterdam arrangements and several policy-relevant lessons could be drawn from the study of other cities. As stated before, the three cases of adaptation measures were strategically selected in the expectation that they would show a range of different mixtures of public and private responsibility, including joint public-private and private responsibilities. It would have been helpful to include more of the same cities across the three cases of adaptation measures (similar to the city of Rotterdam). This would allow a thorough comparison across the different adaptation measures in similar cultural, political and economic contexts. At the time of the research this was difficult to do because urban adaptation planning and implementation was not yet widely developed (this in sharp contrast with mitigation). This will, however, become possible as and when the adaptation practice expands across urban areas.

The conclusion of 3.1, that public responsibility in the first stage of the policy process tends to enhance the effectiveness, legitimacy and fairness of governance arrangements for urban adaptation to climate change, provides a nuanced view on the proclaimed advantages of new governance modes and the positive effect attributed to increased private responsibilities for environmental governance. In the governance literature the private sector is often claimed to be more effective and efficient, while governments are seen as bureaucratic and unresponsive and have therefore lost their legitimacy. Scholars have also increasingly come to criticize these positive effects of new governance modes. While the dominant stance of governance scholars is that the involvement of private actors in policy networks raises the commitment and therefore increases the effectiveness of policy, others point out that the lack of authoritative power of networks decreases their effectiveness. While the dominant stance of governance scholars is that the involvement of private actors in policy networks raises the legitimacy, others have pointed out that it rather creates a democratic deficit because it tends to enhance the power of vested interests. Project 3.1 thus contributes to the governance debate by demonstrating that more hierarchical arrangements with a large extent of public responsibility can also be effective, legitimate and fair.

In project 3.2 the focus is on the efficiency and effectiveness of policy instruments in the procurement of environmental services. Similarly to 3.1, it introduces a framework to select policy instruments (or mixes) that is based on considerations from three fields of expertise: economics, law and

policy sciences. Under typical public governance, policy instruments such as legal requirements or subsidies can be employed, while private governance of adaptation may for instance entail policy interventions that stimulate the private insurance market for flood damage (*e.g.* insurance premium discounts for those that take prevention measures). Project 3.2 showcases the usefulness of the framework in a case study on natural climate buffers in the Netherlands. The framework offers a broad perspective on instrument selection before the focus is shifted to the more technical (context-free) descriptions of market-based economic instruments. The research discusses the menus of contracts approach, repeated procurement auctions, and wildlife corridor auctions. We also study top-down control (*e.g.* the setting of minimum performance requirements) and discuss the impact of control and information on intrinsic motivation to exert effort in a principal-agent setting.

Let us first discuss the menu of contracts approach. We assume that agents differ only in the rate at which they discount the future. Time preference heterogeneity implies that agents value specific environmental policies differently for two reasons. First, differences in discount rates imply that agents differ in how they value a particular stream of per-period benefits and costs. Second, decisions like how much to invest in abatement technologies or in land quality are influenced by time preferences, and differences in specific abatement technologies or land qualities can make environmental protection more or less costly – and hence the stream of per-period benefits and costs may differ between agents too. Contrary to conventional wisdom, we show that the complete information menu of environmental policy contracts can be incentive compatible in the presence of information asymmetries, and we determine the circumstances under which this is the case when investments are sunk at the time the government initiates the environmental policy program, and also when they can be adjusted.

In our research on repeated procurement auctions, we use an economic experiment to examine whether the market efficiency of discriminatory price auctions increases or decreases with repetition. Procurement auctions are auctions in which one buyer tries to purchase goods or services from multiple sellers, and in discriminatory price procurement auctions the successful sellers receive the price they stated in their bid. Standard game theory predicts that repetition facilitates collusion among sellers in this type of auction. Contrary to that, behavioral economics suggests that repetition may increase market efficiency because it attenuates the endowment effect – the phenomenon that ownership of a good tends to increase one’s valuation of the good, which hinders trade because the median seller tends to ask a higher price than the median buyer is willing to pay. We find that of these two countervailing effects, the latter has the upper hand; average bids in the discriminatory price auction continue to fall over time.

Third, we present a general model of bidding behavior of landowners in wildlife corridor auctions. Given *(i)* some spatial configuration of landowners in a landscape, *(ii)* the landowners’ opportunity costs, and *(iii)* the value of establishing the corridor, our model predicts individual landowners’ offers, overall participation rates in the auction, as well as the expected net benefits to the auctioneer. We find that market efficiency of the auction increases in the number of potential corridors. We use simulations to compare a benchmark auction with two policy scenarios in a hypothetical landscape. In one scenario, members of a winning corridor receive an agglomeration bonus. In the other scenario, we buy out a pivotal landowner (one that is part of many potential corridors) prior to the auction. Given equal budgets for the agglomeration bonus and the buyout, the agglomeration bonus is less efficient than a buyout for low budgets and vice versa. A risk-averse auctioneer is however always better off opting for the buyout option.

Fourth, we analyzed whether giving agents more or less information on the marginal benefits of a productive activity adds another dimension to the hidden costs of control, *e.g.* the crowding-out of intrinsic motivation when a principal requires an agent to exert a minimum level of effort. We find that, for student subjects, information is a substitute for control because their intrinsic motivation is negligible – greed is the main driver for them. Extending information on the marginal benefits has a positive effect on the agent’s productivity the same way setting a minimum performance requirement does. Offering the principal the option to control when the agent already receives information (or vice versa) does not further increase performance for student subjects. However, for similar levels of control, professionals do show crowding-out of intrinsic motivation when control is applied. Principals that refrain from (high levels of) control are rewarded by more productive agents. When asked for their considerations to exert effort in the role of the agent, professionals are also more likely than students to say that receiving information on the marginal benefits has a positive effect on their productivity. For most professionals, such efficiency (but also fairness) considerations are more important than signals of (dis)trust when deciding on their level of productivity.

The risk of low participation rates is a key feature in the market-based instruments that are presented in project 3.2. In our research on procurement auctions, we suggest that the endowment effect is a plausible explanation for why participation rates are typically low. The wildlife corridor auction model shows that restricting spatial auctions to the procurement of corridors is expected to decrease participation rates even more. In our menu of contracts research, we show that the chance of the complete information solution being incentive compatible becomes smaller the larger the number of different types there are. Extending the model from two to multiple levels of (im)patience shrinks the range of parameters for which the complete information solution is incentive compatible. If various types exist, optimal ‘bunching’ and/or exclusion of types needs to be considered. In other words, starting with n types distributed over a specific support, can we construct a menu of $m < n$ contracts that approximates the complete information solution? This is especially important because this research also suggest that the probability of the complete-information solution being incentive compatible is larger the larger the number of different characteristics agents have (think of risk preferences resulting in farmers choosing a specific land quality or a specific type of crop, in addition to their rates of time preferences – assuming that the two types of preferences are not perfectly correlated).

For our menus of contract research, empirical evidence on the relationship between agents’ preferences (elicited for example via incentive-compatible economic experiments) and (truthfully revealed) required compensation levels (think of data generated from a uniform price procurement auction) is needed to see whether the ideas of this research remain theory, or whether the insights can be applied in practice. Furthermore, it remains to be seen whether the results of the endowment experiments hold when a participation decision is added to the treatments. If some bidders opt out, this will most likely increase strategic behavior in the repeated procurement auctions. In particular, in our research on wildlife corridor auctions, we find that landowners can obtain large windfall profits even if a few landowners decide not to participate. Designing an effective agglomeration bonus or determining the characteristics of a successful buyout can thus be important tools in increasing the market performance of the corridor auctions. Finally, the results of our research on trust and control can be seen as a stepping stone in the design of arrangements for environmental regulation that are based on providing (more) information to the agent, *e.g.* on the social benefits of private adaptation to climate change. However, given our small sample size (especially for the subsample of professionals), we believe more data is required to support

our conclusion that information is a substitute for control for professionals. It thus remains to be seen whether Gneezy and Rustichini's (2000) well-known proverb "Pay enough or don't pay at all" can be changed to "Control a little, but whatever you do, inform your agent".