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LOCAL SOCIETAL CONTEXTS AND URBAN ENVIRONMENTAL SUSTAINABILITY:

A Qualitative Comparative Analysis of 26 European Capital Cities

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Abstract

Based on a sample of 26 European capital cities, this thesis performs a multi-value Qualitative Comparative Analysis to identify what combinations of local conditions facilitate or prevent the transition towards high urban environmental sustainability (UES). More specifically, it examines the conjunctural effect of cities' relative wealth, the strength of local industrial interests, social trust levels, local climate vulnerability, and the ambitiousness of the national environmental policy context on their performance in the 2009 European Green City Index. These local societal characteristics are expected to affect city residents' willingness and capacity to alter their (collective) behaviour, which is a prerequisite for pro-environmental change. The results indicate that no characteristic is necessary or by itself sufficient for achieving high UES. Except for local climate vulnerability, all examined factors have explanatory value in certain combinations. Generally speaking, a combination of weak industrial interests, high social trust, and a moderately to highly ambitious national environmental policy context facilitates cities' ecological transformation. Interestingly, in cities with a favourable national context and weak industrial interests, high social trust can compensate low levels of wealth and vice versa. In contrast, a combination of low levels of wealth and/or strong industrial interests, low social trust, and an unambitious to average national environmental policy context prevents cities' transition towards high UES. Notably, none of the cities that struggle to become green feature high social trust. Together, these findings therefore suggest that (poor) cities could benefit from putting more effort into enhancing local trust levels.

Keywords: urban environmental sustainability; green cities; Qualitative Comparative Analysis; social trust; European cities

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TABLE OF CONTENTS

1. Introduction

Cities only cover 3% of the Earth's surface, but they produce 80% of the global gross domestic product (GDP). The flipside of their role as "growth machines" (Vasi, 2006: 445) is that they are responsible for half of the world's solid waste, 75% of worldwide natural resource consumption, and 60% to 80% of global greenhouse gas (GHG) emissions (Chávez et al., 2018: 68). The share of the global population living in urban areas has risen substantially over the past few decades. In 2006, this number passed the 50% threshold, and it continues to rise (World Bank, 2022). In the European Union (EU), as much as 75% of the population is already urbanised, and this percentage is expected to reach 80% by 2050 (EEA, 2021). This development is worrying and reassuring at the same time since advancing urbanisation could be both curse and cure for today's global problems — most notably climate change and environmental degradation. On average, city residents' carbon footprint is much larger than that of rural dwellers because urban areas attract more affluent people with lavish lifestyles (Lee and Koski, 2012: 606) and host many industrial activities (Bai, 2008: 16). At the same time, cities' size and population density provide the economies of scale required for "cost-effective and practical" solutions to sustainability issues (Cohen and Dong, 2021: 130; Aufochs Johnston et al., 2013: 4). In recognition of the key role cities play in the fight against climate change, urban sustainability is explicitly addressed by Number 11 of the United Nations (UN) Sustainable Development Goals (UN, 2022), and it features prominently in the Urban Agenda for the EU (European Commission, 2022a).

Thus, it is little surprising that the amount of literature on urban environmental sustainability (hereafter UES) is considerable already. Relevant publications provide *reasons* for why cities must become more sustainable (e.g.: Ojeda Martínez, 2020; Bloomberg and de Lille, 2016), elaborate on the *concept* of urban sustainability (e.g.: Sodiq et al., 2019; Egger, 2006), present sustainability *indicators* (e.g.: EU, 2018; Shields et al., 2009), and make policy recommendations based on concrete *examples* of what cities have already done to advance UES (e.g.: Aufochs et al., 2013; Beatley, 2000). Twenty years ago, Portney's (2002, 2003) influential analysis of 24 American cities that were "taking sustainability seriously" opened up an additional avenue of research based on systematic *comparisons* between cities with the aim of identifying the underlying contextual characteristics associated with UES. Societal and infrastructural local factors are expected to affect cities' cost-benefit calculations and thereby, their sustainability-related actions

(Zahran et al., 2008a: 545). As Table 1 highlights, this smaller strand of the UES literature is heavily focused on the United States.

Table 1: Categorisation of Relevant Publications[1]

Outcome \ Scope	Europe	United States	Global
Intention	Eisenack and Roggero, 2022 Lee, 2018 Reckien et al., 2015 Pablo-Romero et al., 2015*	Krause et al. 2016 Krause, 2013 Wang, 2012 Krause, 2011a Zahran et al., 2008a*** Zahran et al., 2008b Vasi, 2006	Lee, 2013
Policy Output	Salvia et al., 2021 Palermo et al., 2020 Kemmerzell and Hofmeister, 2019**	Hughes et al., 2018 Kalafatis, 2018 Hultquist et al., 2017 Cruz, 2016 Simon Rosenthal et al., 2015**** Homsy and Warner, 2015**** Pierce et al., 2014 Bae and Feiock, 2013 Opp and Saunders, 2012**** Wang et al., 2012**** Krause, 2011b Sharp et al., 2011 Pitt, 2010 Lubell et al., 2009 Portney, 2003 Portney, 2002	Rashidi and Patt, 2018 Lee and Koski, 2014
Actual Performance	*This Master's Thesis*	Lee and Koski, 2012	n/a

* *Spanish municipalities*
** *German municipalities*
*** *County level*
**** *Unspecific elements of actual performance, e.g., whether municipal governments are generating their own renewable energy but not the share of the total energy mix*

Since few publications deal with the broad concept of UES, the relevant literature also includes papers focusing narrowly on local climate governance. Importantly, there is a striking lack of research on the determinants of cities' actual environmental *performance*. While some analyses rely on a dependent variable that only signals their *intention* to become more sustainable (membership in transnational municipal climate networks or the

[1] The literature review only covers UES in Western cities; some studies examine other regions (cf. Yi et al., 2020 on China), but differing levels of democracy and development reduce their comparability with Western samples

existence of an environmental/climate plan), the majority of publications operationalise UES with the number of local environmental/climate *policies*. This is problematic as neither the former (Palermo et al., 2020: 5; Van der Heijden, 2018) nor the latter (De Matteis et al., 2021: 10f.) necessarily result in the desired environmental (policy) outcomes. Lee and Koski's (2012) paper is a notable exception, but their exclusive focus on the number of LEED[2]-certified buildings is narrow.

Another issue in the literature concerns the emergence of a consensus on potential enabling factors (Van der Heijden, 2019: 4f.), which implies that most researchers draw upon this pool of variables in their analyses. Unfortunately, this practice has impeded the inclusion of other possibly relevant factors. For example, interpersonal trust only features in one of the many reviewed publications on UES (Pierce et al., 2014) despite its established positive relationship with pro-environmental attitudes and behaviour (e.g.: Smith and Mayer, 2018; Sønderskov, 2009).

Finally, the literature provides a range of contradictory findings on the effect of local societal characteristics on UES, such as wealth (Reckien et al., 2015; Wang, 2012 versus Bae and Feiock, 2013; Pitt, 2010), local industrial interests (Sharp et al., 2011; Portney, 2002 versus Krause, 2013; Krause, 2011b), climate vulnerability (Hultquist et al., 2017; Lee, 2013 versus Simon Rosenthal et al., 2015; Zahran et al. 2008a) or the state-level policy context (Eisenack and Roggero, 2022; Opp and Saunders, 2012 versus Lee and Koski, 2012; Krause, 2011a). These contradictions may simply stem from varying research designs, but it is equally plausible that the effect of these variables differs depending on the local context. Indeed, Ryan (2015: 519f.) has long criticised the "everything matters" trap which many analysts of urban sustainability fall into. He laments that conventional statistical methods neither indicate whether specific factors are necessary or sufficient to achieve UES nor provide an accurate picture of reality if they have unequal causal effects depending on the local context. Therefore, he suggests that researchers should adopt a *configurational* approach instead. In this approach, individual cases are conceptualised as "configurations of conditions" or, put differently, as cases characterised by a certain combination of properties. For instance, Country A can be described with the configuration "high GDP, no corruption, democratic" and Country B with the configuration "high GDP, corruption, undemocratic". Categorising cases this way is valuable because it can render

[2] Green building certification scheme called "Leadership in Energy and Environmental Design"

complex causal relationships visible. Thus, inferential statistics might not find a significant relationship between high GDP and satisfactory public goods provision when controlling for the level of corruption and democracy since statistical methods test the *isolated* effect of each variable. Configurational methods, in contrast, are interested in the *conjunctural* effect of variables and might therefore find that high GDP does boost public goods provision — albeit only in democratic contexts with low levels of corruption. This combinatorial logic reminds of interaction terms in statistics, but it goes beyond this as configurations usually comprise more than two conditions[3] and the meaning of these new "packages" differs from the mere sum of the individual components (Goertz and Mahoney, 2012: 58).

In line with Ryan's (2015) suggestion, Van der Heijden (2019: 6f.) highlights that UES research could benefit from Qualitative Comparative Analysis (QCA), an approach developed by Ragin (1987) to identify what configurations of conditions are necessary and/or sufficient for achieving a certain outcome of interest. Albeit not specifically referring to QCA, other scholars similarly stress the existence of multiple, *context-dependent* paths towards successful urban transformation (e.g.: Ferrão and Fernández, 2013: 143; Aksoy et al., 2016: 200). Despite this promising opportunity, it seems that to date, merely two scholars[4] have performed QCAs to study the determinants of UES, and their outcome variables only measure cities' intention (Eisenack and Roggero, 2022) or policy output (Kemmerzell and Hofmeister, 2019). The present thesis therefore aims to fill an apparent gap in the literature by answering the following research question:

"What configurations of local societal factors facilitate or prevent high UES?"

In addition to city-level social trust which has been largely neglected in UES research, the focus lies on four local societal factors that yield contradictory results in the literature as highlighted above: wealth, industrial interests (i.e. the size of the local manufacturing sector), climate vulnerability, and the national environmental policy context. More specifically, this thesis analyses their conjunctural effect on the environmental performance of 26 European capital cities as measured in the 2009 European Green City Index.

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[3] Third-order and fourth-order statistical interaction effects are technically possible but very rare since they demand much from the data (Schneider and Wagemann, 2012: 297)

[4] A few additional QCAs deal with narrow aspects of UES, e.g. public transport (Brito et al., 2017) or electric vehicle uptake (Held and Gerrits, 2019), but since these studies focus on technical or economic aspects, they are irrelevant for this thesis

It thus contributes to the extant literature by:

1) Adding to the few >small-N studies with a broad, performance-based conceptualisation of UES,
2) Complementing the limited number of analyses focusing on UES in European cities,
3) Applying the QCA method to the study of UES in order to cast a more nuanced light on contradictory findings in the literature,
4) Introducing generalised social trust as a possible enabling factor of high UES

The rest of the thesis proceeds as follows: Section 2 lays the theoretical foundations of the analysis by firstly, corroborating the appropriateness of analysing cities as opposed to larger entities; secondly, presenting the theoretical framework which regards local urban society as the unit of analysis; and thirdly, motivating the choice of explanatory variables. Section 3 then delves into the methodological specificities by firstly, delimiting the scope; secondly, introducing the QCA method; and thirdly, describing the operationalisations of the outcome variable and the five explanatory variables. The results of the QCA and various robustness checks are presented in Section 4. Possible implications of these findings for research and policy-making are subsequently discussed in Section 5. This also comprises an overview of the main limitations of the analysis before Section 6 concludes the thesis.

The analysis reveals that no local societal factor is necessary or by itself sufficient for achieving high UES. Rather, cities' ability to improve their environmental performance depends on the interplay between various local characteristics. More specifically, a combination of weak industrial interests, high social trust, and a moderately to highly ambitious national environmental policy context facilitates cities' ecological transformation. Furthermore, the results suggest that in cities with a favourable national context and weak industrial interests, high social trust can compensate low levels of wealth and vice versa. The identified causal paths towards low UES similarly reject the idea that a single local characteristic is sufficient for the outcome. Thus, a combination of low levels of wealth, low social trust, and an unambitious to average national environmental policy context impedes cities' transition towards high UES. Even when cities with this combination are wealthy instead, they struggle to improve their environmental performance if they are additionally faced with strong industrial interests. Moreover, the results indicate that the *absence* of high levels of social trust (>70%) is a necessary condition for cities' inability to become green. Overall, the findings corroborate previous studies which highlight the significant effect of wealth, industrial interests, social trust, and the state-level context on UES. In contrast, the results suggest that the degree of local climate vulnerability is irrelevant for cities' environmental performance.

2. Theoretical Framework

2.1. Why Focus on Cities?

Climate change and global environmental degradation are best described as large-scale collective action problems (Jagers et al., 2020: 1282). Pro-environmental action is costly, and the fact that a healthy climate and environment are non-excludable, non-rival global public goods strongly encourages free riding (Krause, 2011b: 46). For smaller units, the costs of action are disproportionately large compared with the share of benefits associated with providing (global) public goods (Olson, 1965: 34f.) and hence, conventional collective action theory predicts that only large countries will be frontrunners (Urpelainen, 2009: 84f.) and that no effective cooperation will materialise in the absence of an enforceable global treaty (Ostrom, 2010: 550). Bai's (2008: 17-21) three "scale arguments" provide another explanation for why ambitious local climate action seems unlikely: Many cities regard the problem as beyond their jurisdictional concern *(spatial)*; the long-term phenomenon of climate change is at odds with the short-term thinking of local officials (*temporal*); and local administrations lack power vis-à-vis higher levels of government and the private sector (*institutional*).

Nevertheless, there are numerous examples of cities adopting ambitious policies that go well beyond national-level strategies: In 2009, San Francisco made refuse separation obligatory; in 2010, Tokyo created the first cap-and-trade system of its kind in Asia; and in 2014, Beijing introduced tight local emissions standards for passenger vehicles (EIU, 2012: 21-26). Even towns with fewer than 100,000 inhabitants can be frontrunners. For instance, Tübingen (Germany) has just introduced a local tax on single-use plastic products for takeaway food (Demuth, 2022). Cities also enhance global collective action through their participation in transnational municipal networks, such as the Global Covenant of Mayors for Climate & Energy (2022), the ICLEI — Local Governments for Sustainability (2021) network or the C40 (2022) Cities Climate Leadership Group. The member cities of these networks represent one-eighth and one-fifth of the global population and one-fourth of global GDP respectively. Against this backdrop, it is little surprising that academic interest in these “rising actors in international relations” (Lee, 2013: 125) has exploded over the past few decades (Bai et al., 2018: 462f.).

Urpelainen’s (2009: 86f.) game-theoretic model of climate policy-making explains this paradoxical frontrunner phenomenon by pointing towards the information asymmetry between local and national policy-makers. Local politicians have superior knowledge of the political benefits of climate action, i.e., they know the electoral sentiments, demands and relative strength of local interest groups and can therefore choose an optimal level of ambition. In contrast, national legislators face uncertainty and adopt weak legislation so as not to impose unexpectedly high costs on local actors. Indeed, as the “front-line service of public administration” (Aall et al., 2007: 99), city governments are closest to their citizens, and municipal leaders personally experience the local impacts of environmental crises. This makes it harder to ignore problems, while at the same time, the smaller scale of urban areas facilitates quicker, more entrepreneurial responses to challenges (Aufochs Johnston et al., 2013: 43). Nonetheless, Urpelainen’s (2009: 83f.) model predicts that this phenomenon is merely transitory. Since local initiatives inevitably provide the national government with more accurate information on the costs and benefits of specific actions, they eventually enable national legislators to adopt more stringent regulations.

For the time being, however, many local governments advance UES by engaging in four “modes of governing”: *governing by authority* (regulations, incentives, etc.), *self-governing* (improving the environmental performance of the municipal administration), *governing by provision* (offering sustainable utilities), and *governing through enabling* (empowering local actors) (Bulkeley and Kern, 2006: 2242). In addition, they significantly contribute to the implementation of higher-level policies.

Importantly, local pro-environmental action does not necessarily imply sacrifices. City governments can foster UES by making data or municipal assets (e.g. vacant areas) available to organisations and businesses interested in implementing green ideas (Aufochs Johnston et al., 2013: 86). Moreover, investments in energy efficiency (social housing, street lights, etc.) and reductions in the amount of waste (water) substantially reduce municipal utility costs, while local renewable energy production and certification schemes help revitalise the urban economy (Sustainable Cleveland Center, 2019). Collectively, cities also have tremendous purchasing power (vehicles, infrastructure, cleaning products, etc.) which they can use to stimulate the production of affordable, environmentally friendly goods (Lee, 2013: 113).

Even costly, potentially contentious policies have co-benefits. Car abatement policies, for instance, improve public safety and reduce congestion, noise levels, and air pollution. In 2006, a trial for the introduction of congestion charges in Stockholm met substantial opposition. When the city residents experienced the benefits of 20% less traffic, however, they approved the tax in a referendum (Högström et al., 2013: 161-163). Similarly, a trial for a traffic-calmed zone in Berlin is currently turned into a permanent policy (Süddeutsche Zeitung, 2021). Other tangible co-benefits of UES include runoff control, micro-climate regulation, and more recreational space (De Luca et al., 2021: 2). Finally, "green branding" serves to attract tourists, investment (Metzger and Rader Olsson, 2013: 5), and highly educated, innovative workers (Simon Rosenthal et al., 2015: 553).

The examples above highlight one strategic advantage of local action: On this level, citizens are more likely to perceive the benefits of (costly) policies and the negative implications of inaction. Arguably, people are much better at assessing the seriousness of environmental issues on the local level — where they are more visible and experienceable — than the severity of global or geographically distant environmental problems. Indeed, surprisingly many people substantially overestimate the proportion of global land and sea areas currently under protection (Waite, 2019). Human exposure to environmental pressures is particularly pronounced in compact, densely populated cities, which explains why (American) urban residents have a higher environmental threat perception than their rural counterparts (Marquart-Pyatt, 2012: 1093).

2.2. What Is a "Green" City?

Throughout most of human sedentary history, which started around 4,000 BC (Cohen and Dong, 2021: 12), urban dwellers lived closely intertwined with their "bio-region," i.e. the natural ecosystem surrounding and supporting the urban area (Ferrão and Fernández, 2013: 97-99). For obvious reasons, humans only settled in bio-regions that were able to renew the energy, basic goods, and materials needed to sustain the settlement. For a long time, agricultural and industrial activities remained included in the city nucleus. When particularly affluent cities started generating surpluses of goods and services, however, the resulting trade and social stratification accelerated growth and gradually crowded out urban industries and agricultural producers. Thereby, urban systems became increasingly decoupled from their bio-region. Most products consumed in contemporary cities are imported from places all over the world, depending on their price on the global market. In this process, users' "sense of physical availability" has got lost and the logic of wealth accumulation has replaced that of human self-preservation (ibid.: 100). According to Ferrão and Fernández (2013: 101), this dissociation "from nature, physics, or basic human principles and values" lies at the heart of today's "artificial" urban life which is a principal cause of environmental and social crises worldwide. Many scholars criticise this depiction of cities and nature as dichotomies, however, arguing that there is much nature "left" in urban areas (Beatley, 2000: 6; Lachmund, 2013: 5) and that cities are better understood as "complex social-ecological-technological systems" (Alberti et al., 2018: 45).

In any case, recognising the need to become more sustainable, many municipalities are already implementing a "triple bottom line approach" which takes into account all dimensions of the three-legged sustainability concept: environmental, economic, and social (Aufochs Johnston, 2013: 37f.). Comprehensive strategies make it easier to forge interdepartmental alliances and justify green policies (ibid.: 152). Moreover, they highlight unintended inequalities associated with sustainability-related activities. For example, access to green and blue spaces is unequally distributed between and within European cities (EEA, 2022). As greening initiatives usually target socio-economically privileged residents and tourists, the resulting increases in real-estate prices crowd out vulnerable populations (Anguelovski et al., 2018: 418). Given the substantial difficulty of properly capturing all three pillars and their interrelations (Lubell et al., 2009: 295; Egger, 2006: 1240-1245), however, this thesis focuses exclusively on *environmental* sustainability so as not to overcomplicate the picture. Although "green" and "sustainable" are often used interchangeably (Metzger and Rader Olsson, 2013: 1), this thesis deliberately uses the term "green city" to underline the environmental focus.

If anything, green cities are those currently transitioning *towards* UES since this qualification describes a process, not the status quo (Altenburg, 2012: 5). So far, cities' collective actions fall short of curbing climate change (Van der Heijden, 2019: 6). Municipal governments understandably pick the "low-hanging fruits" first, i.e. lucrative and uncontentious measures (Aall et al., 2007: 93). Nonetheless, previous research underlines that only those which take action in a wide variety of policy fields (Portney, 2003: 99) and whose sustainability-related activities are not solely driven by the desire to reduce municipal costs (Krause, 2013: 138) eventually achieve high UES. This must be taken into account when defining the term “green city”. More specifically, a holistic definition seems preferable to a more parsimonious one since it better reflects this breadth as well as the complexity and multidimensionality of the concept. It also ameliorates the risk of erroneous classifications. For example, a very parsimonious definition based on few criteria might regard unsustainable cities as green simply because they have a comparative advantage in the examined issue area(s)[5]. The literature already provides a number of definitions which partly overlap and partly complement each other. It therefore makes sense to combine the most frequently mentioned characteristics in a more comprehensive definition. According to it, a green city is one that:

1) Puts sustainability issues unambiguously on the public agenda
   (Portney, 2003: 32)

2) Reduces the ecological footprint per capita to sustainable levels[6]
   (Beatley, 2000: 6-8; Martino, 2009: 239; Pace et al., 2016: 6)

3) Has a “circular metabolism” in which few new resources are extracted and large quantities of material are recycled or reused
   (Beatley, 2000: 6-8; Martino, 2009: 239; Ferrão and Fernández, 2013: xii)

4) Is compact and limits urban sprawl
   (Beatley, 2000: 3f.; Cohen and Dong, 2021: 246)

5) Nurtures urban ecology and emulates nature in its functioning and design
   (Beatley, 2000: 6-8; Martino, 2009: 239)

6) Promotes healthier lifestyles which consider consumption as a means rather than as an end
   (Beatley, 2000: 6-8; Pace et al., 2016: 6; Cohen and Dong, 2021: 51)

7) Resolves environmental problems through political participation and social interaction
   (Martino, 2009: 239; Cohen and Dong, 2021: 125f.)

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[5] For example, poor cities often have a smaller ecological footprint per capita due to their lower levels of consumption (Bradley et al., 2013: 177f.). While this is beneficial for the environment, it seems unfair to place them on the same level with cities that actively promote UES in a variety of issue areas

[6] Some scholars stipulate that green cities should aim for local self-sufficiency (Beatley, 2000: 6-8), whereas others criticise that autarky is an unrealistic, unnecessary goal (Martino, 2009: 238)

Consequently, the term “green city” describes a local urban society that actively, comprehensively, and successfully works towards high UES as an end in itself. This definition will guide the operationalisation of UES in Section 3.3. It is important to note that, in line with the environmental focus of this thesis, it disregards all characteristics related to social or economic sustainability. Furthermore, it ignores features that are better described as beneficial *consequences* of the selected characteristics. For instance, green cities usually have an enhanced resilience to natural disasters, run a lower risk of producing (zoonotic) infectious diseases, and provide an elevated quality of life (Pace et al., 2016: 6).

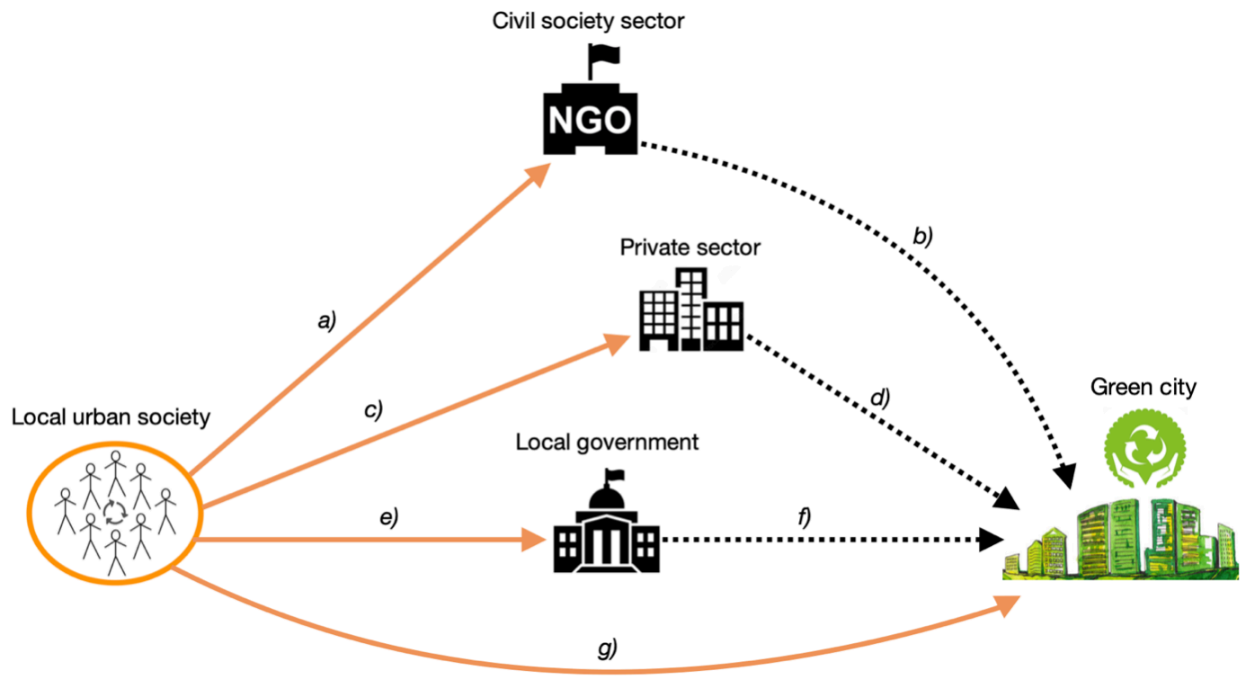
Having identified this set of characteristics, the next question concerns *how* these goals can be achieved. While large parts of the literature focus on the setup and efficiency of local administrations and the adequacy of their policies (e.g. Aufochs Johnston et al., 2013), this thesis argues that this view is too narrow and that research should analyse the wider local society instead. Progress towards UES is impossible as long as people accept the status quo and lack the (political) will to alter their individual and collective behaviour (Portney, 2003: 6). Certainly, many different policy instruments are available to change human behaviour (Connelly et al., 2012: 178-200), but the potential of green policies remains untapped if local citizens (actively) oppose their implementation or do not vote for politicians who intend to adopt them in the first place (Clayton and Manning, 2018: 4). Many examples of cities featuring high UES demonstrate the importance of widespread identification with green initiatives and discourses across the political spectrum (e.g.: Lachmund, 2013: 154; Metzger and Rader Olsson, 2013: 3; Kronsell, 2013: 977f.). Successful governance admittedly arises from the fruitful interplay between local communities and their government (Altenburg, 2012: 12). Nevertheless, creating a green city requires ambitious *concerted action* from a variety of actors (civil society, the private sector, city governments, etc.[7]), and since each of these actors can be regarded as a subgroup[8] of the local population, it seems warranted to use the aggregate of a city’s residents as the unit of analysis. Graph 1 visualises these relationships and highlights the myriad of ways in which each group can contribute to UES. Obviously, this is a very simplified model as there is ample reason to believe that feedback mechanisms render the causal flows

[7] One could add the media, but for the sake of simplicity, this is assumed to fall into the civil society and/or private sector categories

[8] The assumption that all individuals live, work, and politically participate in the same city is unrealistic, but since the following analysis focuses on metropolitan areas, it is expected that the effect of out-of-metropolis commuting remains negligible

indicated below much more dynamic. Thus, local urban society not only influences the civil society sector, the private sector, and the local government, it is also influenced by these actors. City dwellers might elect a green mayor (*active*) and then be inspired by this person and the positive effects of ambitious green policies (*passive*). This experience, in turn, may induce even more city residents to take sustainability issues seriously and vote for green candidates (*reactive*). Furthermore, Graph 1 omits the mutual influence which the civil society sector, the private sector, and the local government have on each other through policy-making, standard setting, lobbying, consultations, and partnerships.

Graph 1: Idealised Model of Causal Flows



a) Members, sponsors, employees, participants, etc.
b) Lobbyism, sustainability projects, awareness campaigns, etc.

c) Consumers, employers, employees, investors, etc.
d) Sustainability-related investments and changes in production processes: energy and water efficiency, renewable energy consumption/production, waste reduction and recycling, emissions reduction, sustainable supply chains, production of sustainable goods and services, etc.

e) Voters, politicians, administrative staff, etc.
f) Sustainability-related investments and changes in public management: energy and water efficiency, renewable energy consumption/production, conscious consumption, waste and emissions reductions, green vehicle fleet, adequate waste management, wastewater treatment, green infrastructure, promotion of green spaces and compactness, environmental protection, eco certification schemes, environmental taxes, information, etc.

g) Sustainability-related investments and changes in behaviour: energy and water efficiency, renewable energy consumption/production, facilitating implementation of green policies, conscious consumption, waste reduction and recycling, public transport, smaller living space, etc.

Sources of pictograms: ReverbNation, 2022; PinClipart, 2018; Freepik, 2022; Adobe, 2022; Noun Project, 2022; Dreamstime, 2022; SmithFoods, 2022

2.3. Theoretical Motivation of the Selected Urban Societal Factors

Unsurprisingly, localities with a higher percentage of environmentally aware residents are more likely to commit to climate action (Zahran et al., 2008a: 559; Zahran et al., 2008b: 469). This raises the question of what type of local community perceives environmental issues as problems that need to be resolved and additionally has the necessary time, capacity, and resources to take action. This thesis analyses five[9] local contextual factors that are expected to influence a community's willingness and ability to be green: wealth, industrial interests (measured as the size of the local manufacturing sector), social trust, climate vulnerability, and the national environmental policy context. Obviously, these contextual factors are not direct *causes* of cities' environmental performance. Nevertheless, they are of crucial importance as they can, to some extent, hinder or facilitate the transition towards UES. Although the selected variables are not exhaustive in their ability to explain differences in local environmental performance, they cover many distinct dimensions deemed important in the literature. The omission of other relevant factors is discussed in Section 5.3.

The QCA performed in this thesis is characterised by a mix of deductive and inductive elements. On the one hand, existing theories and findings of previous research play a key role in the identification of relevant variables. On the other hand, the following analysis is largely exploratory as concerns the exact configurations in which the selected conditions are expected to affect cities' UES. Therefore, no specific hypotheses are formulated.

2.3.1. Wealth

Shields et al. (2009: 13) find a strong positive correlation between cities' GDP/capita and their performance in the European Green City Index. Wealth not only increases their actual performance but also the ambitiousness of their visions for the future. Other studies using GDP/capita or income levels as measures yield similar results (Reckien et al., 2015: 9; Wang, 2012: 1125). There are two main explanations for these findings: financial capacity and value changes.

For one, wealth alleviates the fierce competition for discretionary resources within city governments (Ferrão and Fernández, 2013: 122). When budgets are tight and the admin-

[9] In QCA, the number of explanatory variables should not exceed the square root of all observations (Andreas et al., 2017: 83) — in this case five

istration is simultaneously grappling with other problems, sustainability directors struggle to obtain the necessary funds for the preservation of their position, let alone sustainability projects (ibid.: 124; Aufochs Johnston et al., 2013: 57). Moreover, higher incomes enable citizens to purchase environmentally friendly products (electric vehicles, organic food, solar panels, etc.) which tend to be expensive.

The second explanation posits that wealth changes citizens' values and preferences. Indeed, there is a positive relationship between income and pro-environmental attitudes and behaviour (Smith and Mayer, 2018: 146-148; Marquart-Pyatt, 2012: 1093). Similarly, post-materialist values correlate with heightened awareness of environmental problems and a greater willingness to make personal sacrifices for environmental protection (Haller and Hadler, 2008: 297; Inglehart, 1995: 57). According to Inglehart's (1995: 61f.) influential post-materialism thesis, individuals that enjoy economic security prioritise non-material aspects related to the "quality of life," which includes environmental protection. Martínez-Alier (1995: 4f.) agrees that economic development goes hand in hand with heightened environmental consciousness but contends that the observed change in environmental attitudes is rather a consequence of the increasingly visible "effluents of affluence," i.e. the negative environmental externalities associated with "post-materialist" economic activities.

Although the positive relationship between wealth and environmental sustainability is commonly accepted (Ferrão and Fernández, 2013: 130), there are some null findings in the literature (Bae and Feiock, 2013: 784; Pitt, 2010: 867) as well as noteworthy exceptions at the country (Esty et al., 2008: 9) and city level (EIU, 2012: 40). Indeed, wealth can also be counterproductive because it usually implies more lavish lifestyles (Kennedy et al., 2015: 5987). At the same time, relative poverty positively affects cities' eligibility for international funding aimed at improving the status quo (EIU, 2012: 40).

2.3.2. Industrial Interests

In addition to cities' *level* of wealth, it matters *how* it is created. The industrial sector is responsible for 19% of worldwide freshwater withdrawals (FAO, 2017 (Ritchie and Roser, 2018)) and 29.4% of global GHG emissions (Climate Watch and the World Resources Institute, 2020 (Ritchie and Roser, 2020)). The service sector, in contrast, only accounts for a tiny fraction of global pollution (Levinson, 2010: 96). Therefore, transitioning from a manufacturing-based to a service-based economy helps decouple GDP growth from damaging emissions (Saha and Jaeger, 2020). This implies that cities with a greater share of residents working in the industrial sector have a larger carbon footprint and are more likely to oppose ambitious environmental policies as this could harm local industrial interests (Kemmerzell and Hofmeister, 2019: 98; Krause, 2011b: 56). There are ways to reduce pollution (e.g. by installing air filters), but acquiring cleaner technologies is costly. While most analyses confirm this hypothesis (e.g.: Kalafatis, 2018: 713; Krause, 2011a: 54; Zahran, 2008b: 468), some yield insignificant results (Krause, 2011b: 58).

2.3.3. Social Trust

There are various conceptualisations of environmental problems — “tragedies of the commons” (Hardin, 1968: 1244), “social dilemmas” (Rothstein, 2005: 12), “large-scale collective action problems” (Jagers et al., 2020: 1282) — and all of them point towards the same root cause: a conflict between collective and individual interests which mirrors the “prisoners’ dilemma” in game theory (Ostrom, 1990: 4f.). Solving environmental problems usually requires ambitious concerted action and cooperation. As has been argued, evolutionary adaptations have turned humans into “conditional cooperators” who generally prefer cooperation as long as they do not feel exploited (Sønderskov, 2009: 147). This is often the case, however, as the non-excludable, non-rival nature of global public goods strongly encourages free riding. If the number of defectors surpasses a critical threshold, those still cooperating can no longer resolve the problem. They incur costs for acting in the collective interest without being able to eventually reap the rewards. Defectors, on the other hand, benefit from pursuing their personal interests, albeit not as much as they would if the collective problem were actually resolved. In these situations, “individual rationality” is tantamount to “collective irrationality” (Platt, 1973: 645).

Many scholars contend that generalised social trust plays a key role in fostering co-operation (Smith and Mayer, 2018: 141). Individuals with high interpersonal trust count on reciprocity and believe that others generally have good intentions. This reduces their fears that others might free ride, thereby increasing their willingness to cooperate. In contrast, people with low social trust expect others to take advantage of them and, in order to avoid this, they pursue their self-interests. According to Rothstein (2005: 13), these expectations stemming from individuals’ experiences with fellow citizens become deeply ingrained in a society’s collective memory over time. This can turn social dilemmas into veritable “social traps” that prove difficult to reopen due to the sheer impossibility of deliberately forgetting specific memories.

In the context of UES, it is plausible to believe that cities with higher levels of social trust have a better environmental performance because, assuming that others engage in similar efforts to foster collective action, city residents are more willing to accept sacrifices for environmental protection. Since trust is intimately linked with perceptions of corruption (Rothstein, 2005: 3f.), this variable might also proxy for the (perceived) level of corruption in each city. Previous research indicates that environmentally conscious people are more likely to engage in pro-environmental action in the public sphere if they believe in the impartiality and effectiveness of the government apparatus (Kulin and Johansson Sevä, 2021: 746). Conversely, rampant corruption encourages individuals who oppose pro-environmental measures to free ride because corrupt authorities refrain from properly enforcing environmental laws (Povitkina and Matti, 2021: 406). Finally, it has been argued that the standard trust survey questions tap into respondents’ level of cautiousness rather than their interpersonal trust (Miller and Mitamura, 2003: 69). Even if this is the case, the variable remains relevant since societies with lower levels of cautiousness can be expected to be more open to (risky) sustainability-related changes. Alternatively, one could argue that higher levels of cautiousness increase the perceived threat of climate change and thus result in stronger pro-environmental action. If trust questions are really measuring cautiousness, however, survey results contradict the second assumption.

Empirical research generally confirms that trust influences individuals’ pro-environmental attitudes, behaviour (Smith and Mayer, 2018: 145-147; Sønderskov, 2009: 156; Caferra et al., 2021: 4) and preferences for specific environmental policy instruments (Harring, 2016: 585; Harring and Jagers, 2013: 219). Nevertheless, this relationship may depend on the cultural context: Irwin and Berigan’s (2013: 436f., 441) study of US states indicates that social trust is a good predictor of pro-environmental behaviour in individualist cultures but not in collectivist ones where people’s *institutional* trust seems to play a greater role. Since European countries differ along the cultural dimension — with southern and eastern states trending more towards collectivism (Hofstede, 2022a) — trust may not have a uniform effect in the European context.

2.3.4. Climate Vulnerability

There is some evidence that environmental risk perceptions (Smith and Mayer, 2018: 145, 148; Haller and Hadler, 2008: 292, 297) and personal exposure to environmental problems (Inglehart, 1995: 57) positively affect individuals' pro-environmental attitudes and behaviour. It is possible that only the *direct* experience of natural calamities heightens risk awareness, though, as people usually underestimate temporally and geographically distant risks (Gifford et al., 2018: 166). Indeed, qualitative research suggests that cities which have experienced damaging natural disasters start to take ambitious climate action (Aufochs Johnston et al., 2013: 70) because pro-environmental policies become less controversial once the problems and their implications are too obvious to ignore (Cohen and Dong, 2021: 118). Paradoxically, climate-vulnerable cities not only engage in *adaptation* efforts but also adopt more *mitigation* policies, although the latter only have a negligible effect on local risk exposure (Krause, 2011a: 47). For instance, 22% of 245 surveyed US cities cited weather-related disasters as an "extremely important" motivation for their climate mitigation initiatives (Krause, 2013: 131). With some exceptions (Krause, 2011a: 54; Zahran et al., 2008b: 467), the assumed positive relationship between climate vulnerability and local pro-environmental action reaches statistical significance (Kalafatis, 2018: 712f.; Lee, 2013: 122; Zahran et al., 2008a: 556).

2.3.5. National Context

Many scholars underline cities' "actorness" in global climate policy-making (e.g.: Hoppe et al., 2016: 1; Lee, 2013: 108). Nevertheless, national financial incentives, codes and standards all influence the decisions and leeway of municipal governments (Beatley, 2000: 426f.). Furthermore, municipal-level policies arguably cannot be fully effective if they are at odds with regional, national, and international policies (Cohen and Dong, 2021: 110f.). Although case studies in northern (Kasa et al., 2012: 225f.) and southern Europe (De Gregorio Hurtado et al., 2014: 39) indicate that national-level strategies and support only have a minor influence on local climate mitigation efforts, Aall et al. (2007: 99) believe that they are necessary for fostering UES — at least in those cities that are lagging behind. Similarly, Beatley (2000: 426f.) highlights the fundamental role which national-level development plans — most notably those created under the Agenda 21 framework[10] — have played in making European cities greener. A case in point is Stockholm, the first

[10] Non-binding global action plan created by the UN in 1992 to advance sustainable development

winner of the European Green Capital Award (Metzger and Rader Olsson, 2013: 1). The decisive push for local action towards UES did not come from the city itself. Rather, the ambitious Swedish government urged the global community to hold the UN Conference on the Human Environment in the national capital in 1972, which not only kick-started serious global efforts to address sustainability issues but also set Stockholm on an ambitious path towards UES (ibid.: 3f.).

Homsy and Warner's (2015: 59-63) study of 1,497 US municipalities suggests that both sides of the argument about the drivers of UES may have a point, possibly depending on other contextual factors. Their analysis yields contradictory results which offer partial support for the two competing governance frameworks: polycentric (importance of local factors) and multilevel (importance of higher levels of government). In any case, it is worth including a variable that measures country-level environmental performance. Firstly, this roughly accounts for cities' national environmental *policy* context and secondly, it hints at their *cultural* context, i.e. to what extent environmental protection seems to be valued in each country.

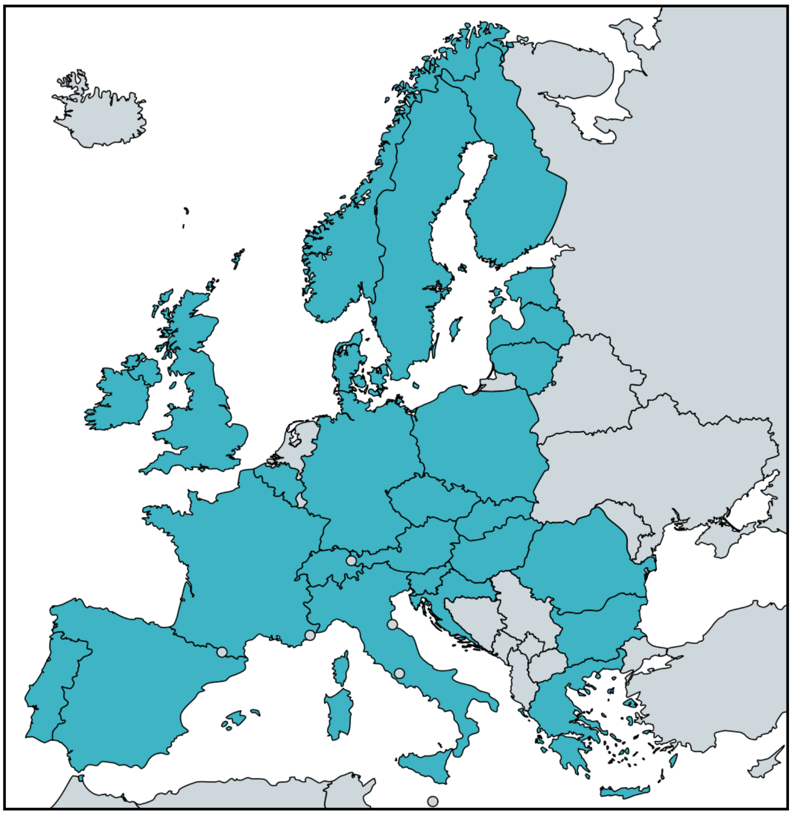
3. Methodology and Data

3.1. Scope

This thesis examines the conjunctural effect of local societal factors on UES based on a sample of 26 major European cities: Brussels, Sofia, Prague, Copenhagen, Berlin, Tallinn, Dublin, Athens, Madrid, Paris, Zagreb, Rome, Riga, Vilnius, Budapest, Vienna, Warsaw, Lisbon, Bucharest, Ljubljana, Bratislava, Helsinki, Stockholm, Oslo, Zurich, and London (cf. Graph 2). Firstly, these are all capital cities, except for Zurich which nevertheless enjoys a prominent position domestically: Switzerland does not have an official capital and Zurich is its most populous and economically strongest city (Schindler, 2020). Aksoy et al.'s (2016: 202-204) clustering of 385 European cities into 10 typologies based on economic, social, and environmental parameters indicates that capital cities have much in common, irrespective of their geographic location within the EU. Secondly, all selected cities are located in countries that were either an EU member state during the analysed time period, deeply engaged in accession negotiations (Zagreb) or otherwise closely associated with the EU (Oslo and Zurich). This is relevant due to the EU's tangible positive impact on domestic environmental legislation and funding opportunities (Shields et al., 2009: 19). Together, status as capital city and EU influence enhance the comparability of the selected locations.

The data used in the following QCA typically covers each city's metropolitan area, although it sometimes refers to the municipal level instead. Mixing metropolitan-level with municipal-level data is problematic because metropolitan areas and municipalities have different characteristics, at least concerning factors like population density (Aufochs Johnston et al., 2013: 202). This issue cannot be resolved, however, given the scarcity and low quality of available urban data — a problem which is frequently acknowledged in the literature (e.g.: Aksoy et al., 2016: 201; EU, 2018: 9; Gómez-Álvarez et al., 2018: 164).

Graph 2: States whose Capital City Is in the Sample



The information upon which the outcome variable is based is mostly associated with the year 2007 (Pace et al., 2016: 8). Therefore, all explanatory variables provide data for roughly the same year (ranging from 2008 to 2009[11]). As neither the selected societal factors nor a city's environmental performance are expected to change quickly, it is unlikely that these slight differences will affect the results. One may criticise that the year of analysis is not more recent but, unfortunately, there is no viable alternative (cf. Section 3.3.). These scope conditions may actually have an advantage in that they cover the

[11] Some estimates for missing values are based on older or more recent data

period just before European citizens were hit by the economic, political, and social ramifications of the 2007/8 global financial and economic crisis (Hochschild, 2010: 2, 14).

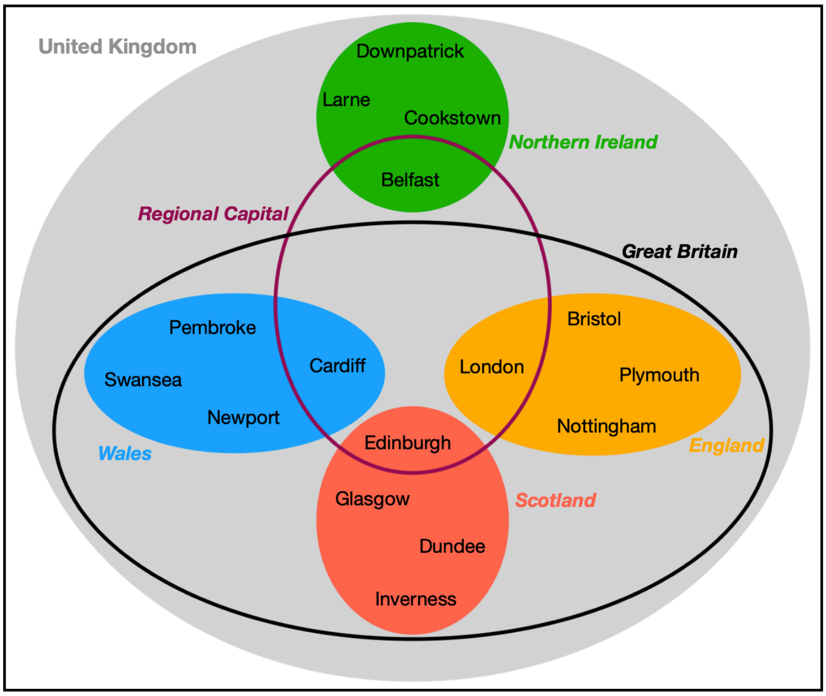
Nonetheless, the world has witnessed a noteworthy surge in the salience of environmental issues in recent years, especially following the adoption of the 2015 Paris Agreement and the global Fridays for Future protests. The share of Europeans considering environmental issues as a main challenge for the EU has grown from 7% in 2011 to 13% in 2016 to an astonishing 32% in 2021 (Eurobarometer, 2012: 78; Eurobarometer, 2016: 13; Eurobarometer, 2022: 37). Global news coverage of environmental protests has risen sharply and so has the number of sustainability-related google searches (EIU, 2021: 18, 22, 38). The outbreak of the Covid-19 pandemic has only added to this heightened environmental awareness (Kachaner et al., 2020). This raises the question of whether the following analysis would yield substantially different results if more recent data were used. Indeed, individuals' cost-benefit calculations might change once environmental issues gain salience. Nevertheless, cross-national survey data underlines the stark discrepancy between people's pro-environmental attitudes and their actual behaviour (e.g.: Inglehart, 1995: 59f.; Eurobarometer, 2020: 8, 52). Furthermore, despite significant media attention, the 2021 UN climate change conference in Glasgow was widely criticised as "not enough" (Mufson and Timsit, 2021) and "unambitious" (Harrabin, 2021). This suggests that many calls for sustainability remain empty talk and that pro-environmental attitudes additionally require an enabling context to trigger pro-environmental action. In light of this, it is unlikely that the temporal scope of the following analysis reduces the relevance of the results for today's society.

3.2. The QCA Method

Ever since Ragin (1987) introduced the QCA method (and approach) in an attempt to bridge the qualitative-quantitative divide in social science research, supporters of inferential statistics and promoters of QCA have engaged in a lively debate over which of the two is superior (e.g.: Ragin, 1987: 120; Clarke, 2020: 3). The most important difference between these two approaches does not concern the data processing technique but rather the distinct goals and underlying assumptions. Thus, quantitative approaches ask about the "effects of causes" (variable-based research), while qualitative approaches — including QCA — investigate the "causes of effects" (case-based research) (Goertz and Mahoney, 2012: 41f.). Whereas inferential statistics assumes that all predictor variables have an independent, additive, linear "net effect" on the dependent variable (Ragin, 2006: 13), QCA is guided by the assumptions of conjunctural causation, equifinality, and asymmetry (Van der Heijden, 2020: 5-7). These are also mirrored in the theoretical considerations underpinning the following analysis: UES is most likely facilitated by a combination of local societal factors rather than by a single one (*conjunctural causation*); there may be several, equally valid paths to UES (*equifinality*); and the combinations of conditions resulting in high UES are not necessarily the counterfactuals[12] of those resulting in low UES (*asymmetry*). An additional asset of QCA is that, unlike inferential statistics, it is well suited for small-/medium-N samples like the one examined here (Cronqvist, 2007: 25).

QCA is grounded in set theory (Schneider and Wagemann, 2012: 24), i.e., it conceptualises each "case" dichotomously as either a member or a non-member of a given group of cases called "set". All members of a set fall under one conceptual umbrella and the set membership status of each case is regarded as a "condition". This is visualised in Graph 3. For instance, London is the capital of England and therefore a member of the two sets "Regional Capital" and "England". Moreover, various sets (or parts thereof) are nested within larger sets. Thus, "Great Britain" is both a "superset" of "England" and a "subset" of "United Kingdom" (UK).

Graph 3: The UK Divided into "Sets"



[12] If the existence of A is associated with the outcome "success," this does not automatically mean that the absence of A is associated with the outcome "failure"

In QCA these set relations are expressed with Boolean algebra, where:

1	=	"membership"
0	=	"non-membership"
*	=	"and"
+	=	"or"
$\longrightarrow$	=	"results in"

Using these symbols, researchers can link individual conditions or configurations of conditions to a specific outcome of interest (which is itself a condition) in order to make causal statements. Causal paths to the outcome "good grade," for instance, could be described as follows[13]:

$$\text{Study}_1 + \text{Cheatsheet}_1\text{*Attention}_0 \longrightarrow \text{Grade}_1$$

Thinking in terms of "necessity" and "sufficiency," this solution formula indicates that studying is a "sufficient but unnecessary" condition for a good grade. Studying alone results in high academic performance, but there is an alternative route to success, namely copying from a cheatsheet, while the teacher is not paying attention. Furthermore, Attention_0 is an "Insufficient but Necessary part of a condition which is itself Unnecessary but Sufficient" (INUS) for the outcome (Schneider and Wagemann, 2012: 4). It is necessary since cheating is impossible when the teacher is looking, but it is insufficient as an inattentive teacher alone does not result in a good grade. Visually, necessary conditions can be seen as supersets of the outcome, while sufficient conditions are subsets of it (Greckhamer et al., 2013: 52).

Researchers who perform QCA aim for an "optimal solution" formula which only comprises so-called "prime implicants" (Cronqvist, 2007: 39; Ragin, 1987: 95f.). Taking the example in Graph 4, the prime implicant of the outcome "City on mainland Britain" would be "Great Britain". This set contains all cases (cities) and simple "implicants" (subsets) associated with the desired outcome, and there is no relevant superset. Consequently, Edinburgh's membership in this set "implies" its membership in "Scotland". Some samples require several prime implicants to cover all cases with the same outcome, e.g., Study_1 *and* $\text{Cheatsheet}_1\text{*Attention}_0$.

[13] Using Cronqvist's (2007) notational system

Obtaining an optimal solution formula from empirical data involves three steps. Firstly, all variables are operationalised and each case is "calibrated," i.e. assigned membership scores for all conditions and the outcome. These decisions must be theoretically and/or empirically motivated (Schneider and Wagemann, 2012: 32) and the selected thresholds should not separate close values (Cronqvist, 2007: 61). For illustrative purposes, Graph 4 divides the UK along the 54th northern latitude. Cities above this threshold have the outcome 1 and those below it 0.

Graph 4: Calibration of UK Cities

Source: Nations Online Project, 2022

Secondly, the configurations of conditions associated with the cases in the sample are visualised in a "truth table" (cf. Table 2).

Table 2: Truth Table

Configuration	Regional Capital (R)	England (E)	Wales (W)	Scotland (S)	Northern Ireland (N)	Great Britain (G)	Outcome	Cases
First	0	0	0	0	1	0	1	Downpatrick, Cookstown, Larne
Second	1	0	0	0	1	0	1	Belfast
Third	0	0	1	0	0	1	0	Pembroke, Swansea, Newport
Fourth	1	0	1	0	0	1	0	Cardiff
Fifth	0	0	0	1	0	1	1	Glasgow, Dundee, Inverness
Sixth	1	0	0	1	0	1	1	Edinburgh
Seventh	0	1	0	0	0	1	0	Bristol, Plymouth, Nottingham
Eighth	1	1	0	0	0	1	0	London

Thirdly, redundant conditions are omitted from these “primitive expressions” in a process called “logical minimisation” (Ragin, 1987: 94). This is done separately for each outcome. For instance, Table 2 indicates that four configurations result in Outcome 1:

$$R_0*E_0*W_0*S_0*N_1*G_0 + R_1*E_0*W_0*S_0*N_1*G_0 + R_0*E_0*W_0*S_1*N_0*G_1 + R_1*E_0*W_0*S_1*N_0*G_1 \longrightarrow Outcome_1$$

Researchers then identify configurations which differ in only *one* aspect, e.g., $R_0*E_0*W_0*S_0*N_1*G_0$ and $R_1*E_0*W_0*S_0*N_1*G_0$ differ regarding condition R. Both lead to Outcome 1, suggesting that regional capital status is irrelevant. Hence, the primitive expressions are combined in a shorter term. The next two configurations can be minimised in a similar fashion, which produces the new formula:

$$E_0*W_0*S_0*N_1*G_0 + E_0*W_0*S_1*N_0*G_1 \longrightarrow Outcome_1$$

Since both configurations differ in two respects (N and G), no further minimisations are possible. This is unusual and owed to the fact that, in this special case, the four regional conditions are mutually exclusive. The results indicate that, in order to be located above 54° northern latitude, cities must be neither English nor Welsh — a necessary but insufficient condition — and instead belong to Northern Ireland (outside Great Britain) or Scotland (inside Great Britain). These two options are “Sufficient but Unnecessary parts of a factor that is Insufficient but Necessary” (SUIN)[14] for the outcome.

The optimal solution formula strives to explain all cases, which contrasts with the disregard for outliers in inferential statistics. The two prime implicants above achieve this goal, thereby providing high internal validity. This comes at the expense of external validity, though (Cronqvist, 2007: 64), as the result has limited explanatory power for cases outside the sample. Thus, it is unable to explain the unexamined case “Newcastle” which is English but situated above 54° northern latitude. Had this city been included in the sample, it would have provoked a “contradiction” in the truth table. The seventh configuration $R_0*E_1*W_0*S_0*N_0*G_1$ would have contained three cases with the outcome 0 and one with the outcome 1, indicating a “consistency score” of 0.75. Due to the nature of empirical analyses, this happens frequently in QCA. As a rule of thumb, only consistency scores of ≥0.75 should be accepted (Schneider and Wagemann, 2012: 292), while configurations below this threshold should be ignored in the minimisation process. Ideally, researchers reexamine their cases in depth and resolve contradictions by adjusting their theoretical

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[14] This is more clearly visible when factorising the identical parts: $S_0*N_0*G_1*(E_0*W_1+E_1*W_0)$; since $S_0*N_0*G_1$ is necessary but insufficient for the outcome, it must be combined with *either* E_0*W_1 *or* E_1*W_0

framework (Ragin, 1987: 113). This "dialogue between ideas and evidence" (Ragin, 2000: 309) is a key element of the QCA approach and highly useful for developing (existing) theories (Van der Heijden, 2020: 14).

A second issue in QCA concerns the problem of "limited diversity," i.e., many possible configurations simply remain unobserved. In the UK example, there are 64[15] possible configurations, but only 8 appear in the sample of 16 cities. In these situations, scholars have three options (Ragin and Sonnett, 2004: 3f., 11). Firstly, they can use all "logical remainders" to minimise the observed configurations and obtain a very parsimonious solution, i.e. few prime implicants consisting of few conditions. The downside is that the result could be influenced by theoretically plausible yet practically impossible configurations, such as Northern Irish cities *inside* Great Britain. It is also problematic that the same logical remainders are used for both outcomes. Alternatively, researchers can ignore all logical remainders. However, especially for smaller samples this could mean that no minimisations are possible. A middle path between these two extremes (cf. Graph 5) involves the selective inclusion of "simplifying assumptions," i.e. logical remainders whose plausibility is corroborated by the literature and/or real-world evidence.

Graph 5: Dealing with "Logical Remainders"

no counterfactuals	→	*simplifying assumptions*	→	*all counterfactuals*
complexity	→	*intermediate complexity*	→	*parsimony*

Critics understandably question the ability of QCA to capture more complex social phenomena due to its exclusive reliance on dichotomous conditions (Clarke, 2020: 19). Therefore, this thesis employs Cronqvist's (2007) multi-value extension (mvQCA) which somewhat alleviates this problem by enabling the inclusion of multi-value conditions. Again, logical minimisation requires the existence of *all* manifestations of a condition (e.g. $A_1\mathbf{B_0}C_0 + A_1\mathbf{B_1}C_0 + A_1\mathbf{B_2}C_0 \longrightarrow A_1C_0$) (ibid.: 73). The mvQCA extension is valuable because, unlike other QCA variants[16], it can identify instances where the intermediate presence of a condition has a different effect than its full presence (Haesebrouck, 2016: 26). More nuanced classifications also help prevent and/or resolve contradictions (Cronqvist, 2007: 77-81). However, as multi-value conditions often require more simplifying

[15] Six binary conditions, i.e. 2^6 (cf. Ragin and Sonnett, 2004: 8)

[16] Ragin's (2000) fuzzy-set QCA is better suited for >30 cases (Cronqvist, 2007: 25)

assumptions (ibid.: 85f.), this option is only used for the two conditions which benefit most from the extension.

3.3. Operationalisation and Calibration of the Outcome

The outcome variable, i.e. the level of UES, is operationalised with cities' overall score in the 2009 European Green City Index (EGCI) (Shields et al., 2009; cf. Table A1 in the appendix[17]). This index was created by the Economist Intelligence Unit (EIU) and is cited by various researchers as a legitimate measure of UES (e.g.: Pace et al., 2016: 8-12; Meijering et al., 2014: 140; Aufochs Johnston et al., 2013: 201f.; Ferrão and Fernández, 2013: 130; EU, 2018: 5). Along with other regional indices[18], the EGCI received sponsoring from Siemens to help the company advertise relevant technologies (EIU, 2012: 2). Importantly, the methodology was developed in cooperation with an independent panel of more than 20 experts in UES associated with prominent international institutions (e.g. World Bank), universities (e.g. Harvard University), global networks (e.g. ICLEI), and non-governmental associations (e.g. Natural Resources Defense Council) (ibid.: 10), which strongly enhances the credibility of the index.

The EGCI evaluates cities' environmental performance based on 30 indicators covering eight issue areas which each contribute 12.5% to the overall ranking: CO_2, energy, buildings, transport, waste and land use, water, air quality, and environmental governance (cf. Graph 6). Neither Siemens nor the EIU clearly define the "green city" concept (Meijering et al., 2014: 138), but the EGCI indicators arguably capture all elements of the definition outlined in Section 2.2.: Putting sustainability issues on the public agenda (green action plan, green management); reducing the city's ecological footprint[19] (CO_2, energy, buildings, transport, waste and land use, water, and air quality categories); working towards a circular metabolism (waste recycling); resolving problems through participation (public participation in green policy); limiting urban sprawl (green land use policies); nurturing urban ecology (green land use policies); and promoting healthier lifestyles

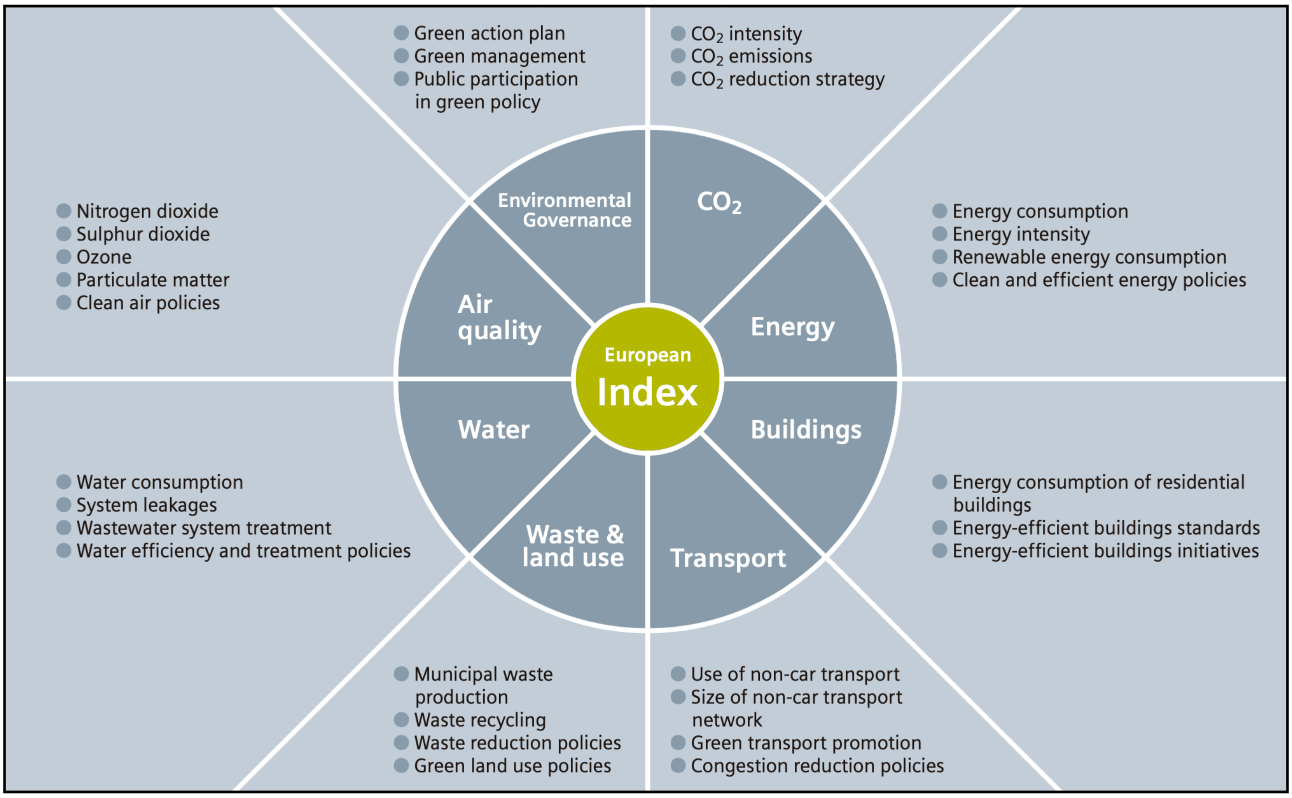
[17] Hereafter, all references to tables or graphs entitled A-*number* refer to the appendix

[18] Separate green city indices exist for Latin America (2010), Asia (2011), the USA and Canada (2011), Africa (2011), Germany (2011), and Australia and New Zealand (2012), but due to small methodological differences, they are not comparable (EIU, 2012: 8)

[19] Admittedly, the "green city" concept comprises both on-site and off-site (i.e. consumption-related) aspects of cities' environmental footprint, whereas the EGCI only measures on-site environmental externalities; this shortcoming is further discussed in Section 5.3.

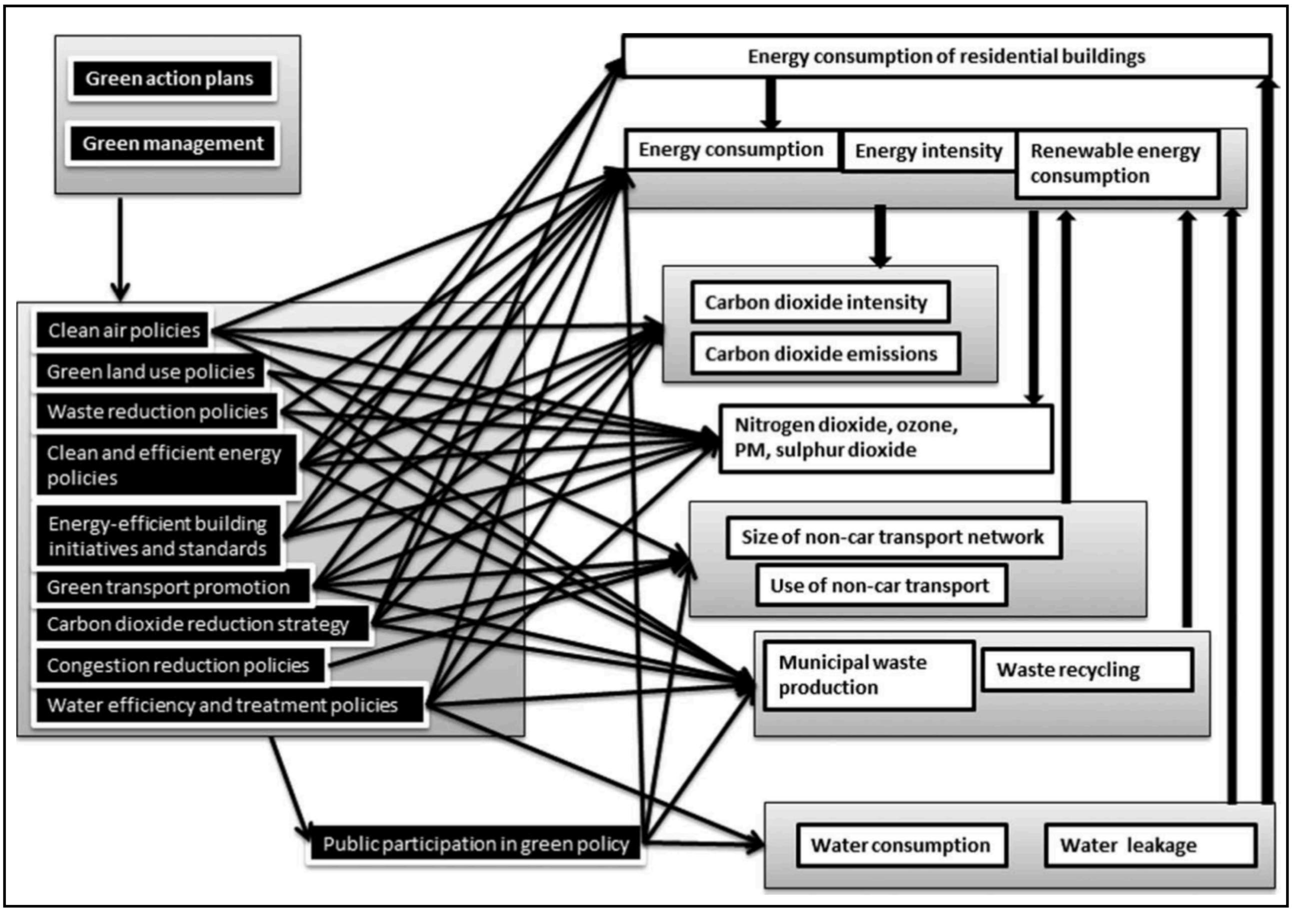
(touched upon in the transport and air quality categories) (cf. Table A2). This corroborates the claim that the EGCI "comprehensively covers all major areas of urban environmental sustainability" (EU, 2018: 15).

Graph 6: Components of the EGCI (EIU, 2012: 9)



All indicators range from 0 to 10. The 17 quantitative indicators were normalised based on existing international targets or min-max calculations, and the assessment of the 13 qualitative indicators followed pre-determined guidelines (Meijering et al., 2014: 137). While the quantitative measures indicate cities' *actual* performance, the qualitative indicators evaluate their ambition and *potential* future development (EIU, 2012: 8). Pace et al. (2016: 23) understandably criticise the inclusion of the latter because the mere aspiration to become greener does not necessarily result in tangible improvements. Therefore, they propose to replace all qualitative indicators with measures of observed changes in cities' environmental performance to indirectly capture the effectiveness and ambition of local strategies. Venkatesh (2014: 322-324) suggests another alteration: The EGCI components could be split into a qualitative "Cause Index" (black) and a higher-weighted quantitative "Effect Index" (white) (cf. Graph 7). This would help policy-makers by rendering the various overlaps, synergies, and conflicts between the indicators more visible (Venkatesh, 2014: 318).

Graph 7: Interrelations between EGCI Indicators (Venkatesh, 2014: 325)



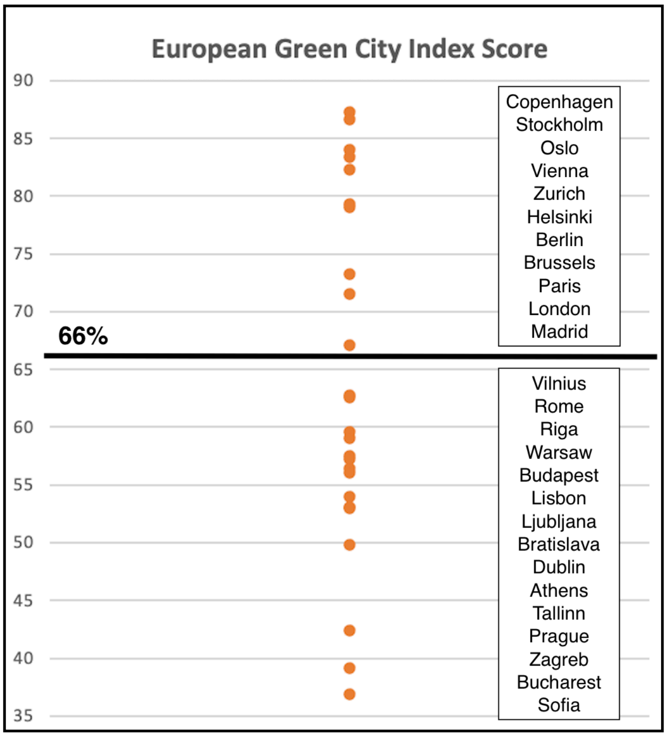
Although both propositions hold much potential, it is impossible to reconstruct the EGCI since the city results are only available for the issue categories, not for each indicator. Further criticism of the EGCI concerns its exclusive reliance on unverified, publicly available data and the lack of justifications for the weighting scheme (cf. Table 3; Meijering et al., 2014: 133, 137; Venkatesh, 2014: 323). In light of these shortcomings, it is worth examining alternative measures of UES. Many options exist (cf. EU, 2018: 3), but all have significant disadvantages. The EU's European Green Capital Award, for example, provides little variation as only frontrunner communities apply and winning cities cannot reapply for ten years (Pace et al., 2016: 4). Other relevant sets of indicators do not provide data or rankings at all but merely constitute voluntary self-assessment frameworks (EU, 2018: 16, 19). In contrast, the Urban Ecosystem Europe Index seems more promising. It was created by the research consultancy Ambiente Italia in collaboration with the banking group Dexia and the non-governmental organisation (NGO) Legambiente. The index is three years older than the EGCI, however, and its 26 participating cities are located in only 13 countries of which merely two are eastern European (Ambiente Italia, 2006: 4). These scope conditions make the EGCI preferable.

Another group of indices is unsuitable because they focus on a single issue area, such as the European Energy Award (energy policy performance), the European Soot-Free City Ranking (air quality) or the Renewable Energy Systems Champions League (solar energy usage) (Meijering et al., 2014: 137). Their narrow focus is problematic as some cities have advantages in this particular issue category due to natural endowments (e.g., solar energy panels work best in southern Europe), while others are disadvantaged (e.g., municipalities surrounded by mountains inevitably have lower air quality). The comprehensive nature of the EGCI is an asset in this respect, especially since the following analysis rests on the assumption that cities' (dis)advantages in different issue areas roughly equal each other out. The literature stresses that green cities excel in many issue areas (Portney, 2003: 99) and this is corroborated by the fact that only cities that scored well in most sub-categories were at the top of the overall EGCI ranking (cf. Table A1 and Graph A1).

One last alternative would be to construct a new, more recent index of UES. Unfortunately, limited data availability renders this proposition infeasible. Relevant datasets (e.g. Eurostat, 2022a) contain many missing values as participation in the Urban Audit is voluntary (EU, 2018: 18), and these gaps get larger for recent years. It is also not advisable to simply regard missing values as "bad" environmental performance since this could substantially distort the results. Taking all of the above into consideration, the EGCI provides the best currently available operationalisation of UES in Europe. It is not entirely performance-based, but the majority of its indicators are quantitative and even the qualitative ones go beyond the policy-output-based operationalisations in the literature in that they assess the *content* of policies and not simply their number.

The next step is to calibrate the EGCI. This proves difficult as the data structure does not suggest an obvious cut-off point. As has been said before, green cities should perform well in the majority of issue areas. At the same time, even frontrunners are still in the process of transitioning towards UES and therefore, they cannot be expected to have high scores in every category. In light of this, it seems best to set the threshold at 66% (cf. Graph 8). Cities that received at least two-thirds of all possible points in the EGCI are regarded as examples of high UES (Outcome 1) and cities with fewer points indicate low UES (Outcome 0). This cut-off point fits the data structure well as it splits the sample into two relatively equal halves without separating close observations (cf. Cronqvist, 2007: 61, 90).

Graph 8: Calibration of the Outcome



3.4. Operationalisation and Calibration of the Conditions

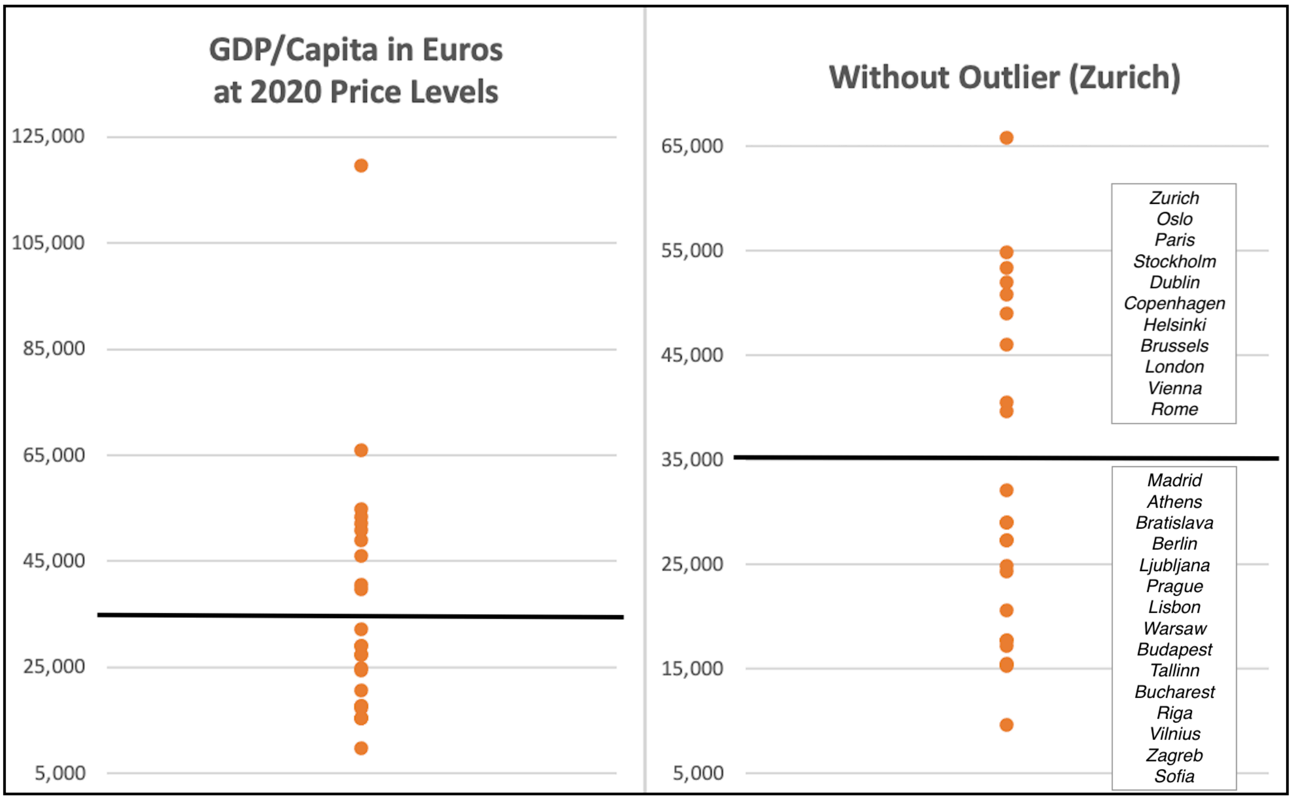
3.4.1. Wealth

The first condition, cities' wealth, is operationalised with the metropolitan-level GDP/capita rate for the year 2008[20]. The data is based on Eurostat's (2021a) Urban Audit and national statistical offices (cf. Table A3). Eurostat performs quality checks on the submitted data before publishing it (EU, 2018: 18), which makes it a reliable source. Admittedly, GDP/capita is a somewhat rough proxy for citizens' actual purchasing power as it disregards the exact distribution of wealth. Many scholars use gross national income per capita instead (e.g.: Lee and Koski, 2012: 612; Marquart-Pyatt, 2012: 1093), but this information is not available for the selected cities. Similarly, GDP/capita does not indicate the financial leeway of municipal administrations. Cities' ability to levy and collect taxes varies across countries (Ferrão and Fernández, 2013: 122) and so does the amount of subsidies, grants, and loans provided by higher levels of government. Nevertheless, GDP/capita remains an acceptable, frequently used proxy for wealth (e.g. Shields et al., 2009: 13). The specific distribution of this variable, i.e. the fact that there is a noticeable gap between the GDP/capita rates of Madrid and Rome, lends itself for dichotomising the values based on the

[20] The time-series dataset suggests that local GDP/capita was not affected by the global financial crisis until 2009

threshold €35,000 (cf. Graph 9). It is important to note that, in the absence of a clear indication as to what "wealthy" and "not wealthy" actually means in terms of GDP/capita, the chosen calibration assigns set membership based on each city's *relative* wealth compared to that of other cities in the sample.

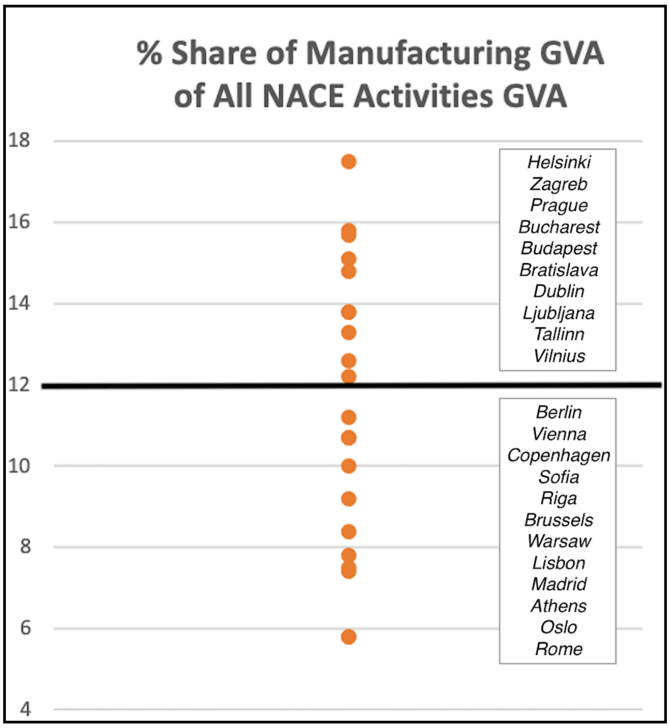
Graph 9: Calibration of Wealth



3.4.2. Industrial interests

The base of cities' local economy is operationalised with the metropolitan-level share of the gross value added (GVA) by the manufacturing sector in 2008. This has been used as a measure of local industrial interests before (e.g. Lee and Koski, 2012: 613). Again, the relevant data is taken from Eurostat (2021b) and missing values are imputed based on additional sources (cf. Table A4). According to the EU's Nomenclature of Economic Activities (NACE), manufacturing involves "the physical or chemical transformation of materials, substances, or components into new products". This excludes "the processing of waste into secondary raw materials" but includes the manufacturing of new final products which use waste as an input (NACEV2, 2022). Graph 10 shows the distribution of this variable and the selected threshold of 12%. Admittedly, the cut-off point is random and largely driven by the available data. However, there is no theoretical indication as to where the threshold should be set and the selected one nicely divides the observations into two similarly large groups just like the mean value (11.28%) would.

Graph 10: Calibration of Industrial Interests[21]



3.4.3. Social Trust

City dwellers' aggregated level of generalised social trust is based on the share of positive responses[22] to Eurostat's (2021c) perception survey item: "*Generally speaking, most people in this city can be trusted*" (cf. Tables A5-A7). This is a standard trust question as its phrasing resembles that of similar operationalisations (e.g.: Harring and Jagers, 2013: 216; Sønderskov, 2009: 151; Irwin and Berigan, 2013: 431). At the same time, its wording is less ambiguous than another popular version which adds "*or that you cannot be too careful in dealing with people?*" As Miller and Mitamura (2003: 69) demonstrate, respondents may misinterpret this as asking for their level of caution rather than their social trust[23].

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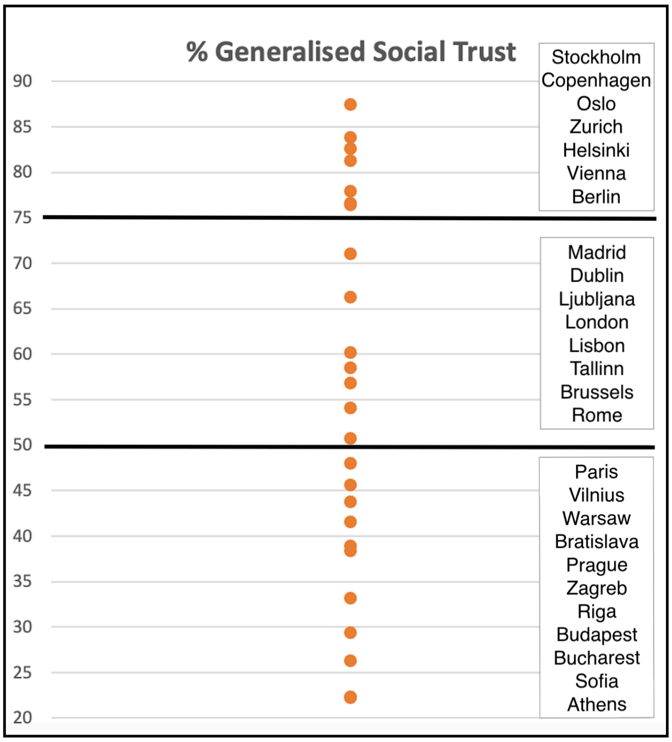
21 Imputed missing values not shown in Graph 10; cf. Table A4 instead

22 "Strongly agree" plus "Somewhat agree," standardised by excluding non-responses

23 The strong correlation between respondents' level of trust and their feeling of safety in the city (EU, 2010: 7) nevertheless highlights that these two concepts are either closely related or that the more conservative phrasing of the trust survey item is equally prone to misinterpretation

Survey respondents (>14-year-olds) were randomly selected and are representative of the wider city population (EU, 2010: 5). The data refers to the municipal level and the year 2009, although missing values for Oslo, Zurich, and London are replaced with the results of the 2012 survey round. The positive response rates fluctuate slightly between 2009 and 2012, but these differences are unlikely to affect the calibration of the three cities as the 2012 values are far from the selected thresholds (cf. Graph A2). Graph 11 visualises the distribution of this variable. Here, it makes sense theoretically to trichotomise the data since it is possible to assume that, in addition to cities with low interpersonal trust (<50%), there is a qualitative difference between societies where slightly more people are trusted than distrusted (50%-75%) and urban areas whose residents believe that a substantial majority of their fellow citizens are trustworthy (>75%).

Graph 11: Calibration of Social Trust



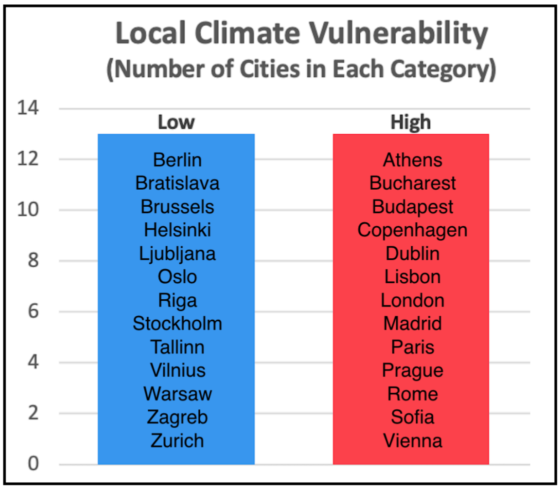
3.4.4. Climate Vulnerability

The operationalisation of local climate vulnerability is based on each city's experience with four types of natural disasters whose occurrence is expected to increase with advancing climate change (IPCC, 2014: 115): floods, droughts, heat waves, and wind storms. In each category, vulnerability is coded on a scale ranging from 1 (low) to 4 (extreme). Importantly, in line with the theoretical motivation of this variable, these indicators reflect cities' *past experiences* as opposed to *future vulnerabilities*.

Data for the frequency of large floods is taken from the Global Archive of Large Flood Events of the Dartmouth Flood Observatory (Skougaard Kaspersen et al., 2017: 16; cf. Graph A3). The information refers to cities' respective NUTS 2 region[24] and the period 1985-2017. Floods are considered large if they damage infrastructures or agriculture and/or result in fatalities. The observed trend in the frequency of meteorological droughts per decade between 1950 and 2012 (EEA, 2016; cf. Graph A4) and the average urban heat island[25] intensity during summers (90th percentile) are provided by the European Environment Agency (VITO and EEA, 2019 (EEA, 2020a); cf. Graph A5). The latter accounts for each city's "elevation above sea level, land use, soil sealing, vegetation index, and anthropogenic heat flux". Finally, local susceptibility to wind storms is operationalised with the number of times each city was affected (i.e. reported gust speeds of >25m/s) by the 44 severe wind storms hitting Europe between 1981 and 2008. This information is coded based on the respective gust speed animations published in the Extreme Wind Storms Catalogue of the Met Office and the Universities of Reading and Exeter (Met Office et al., 2022; cf. Tables A8-A9).

According to Cohen and Dong (2021: 118), both the visibility and quantity of negative externalities determine whether environmental issues gain political salience or not. Therefore, cities with an extreme vulnerability (4 points) in at least one category or with a high vulnerability (3 points) in at least three categories are regarded as highly susceptible to climate change (cf. Graph 12; cf. Table A10).

Graph 12: Calibration of Climate Vulnerability



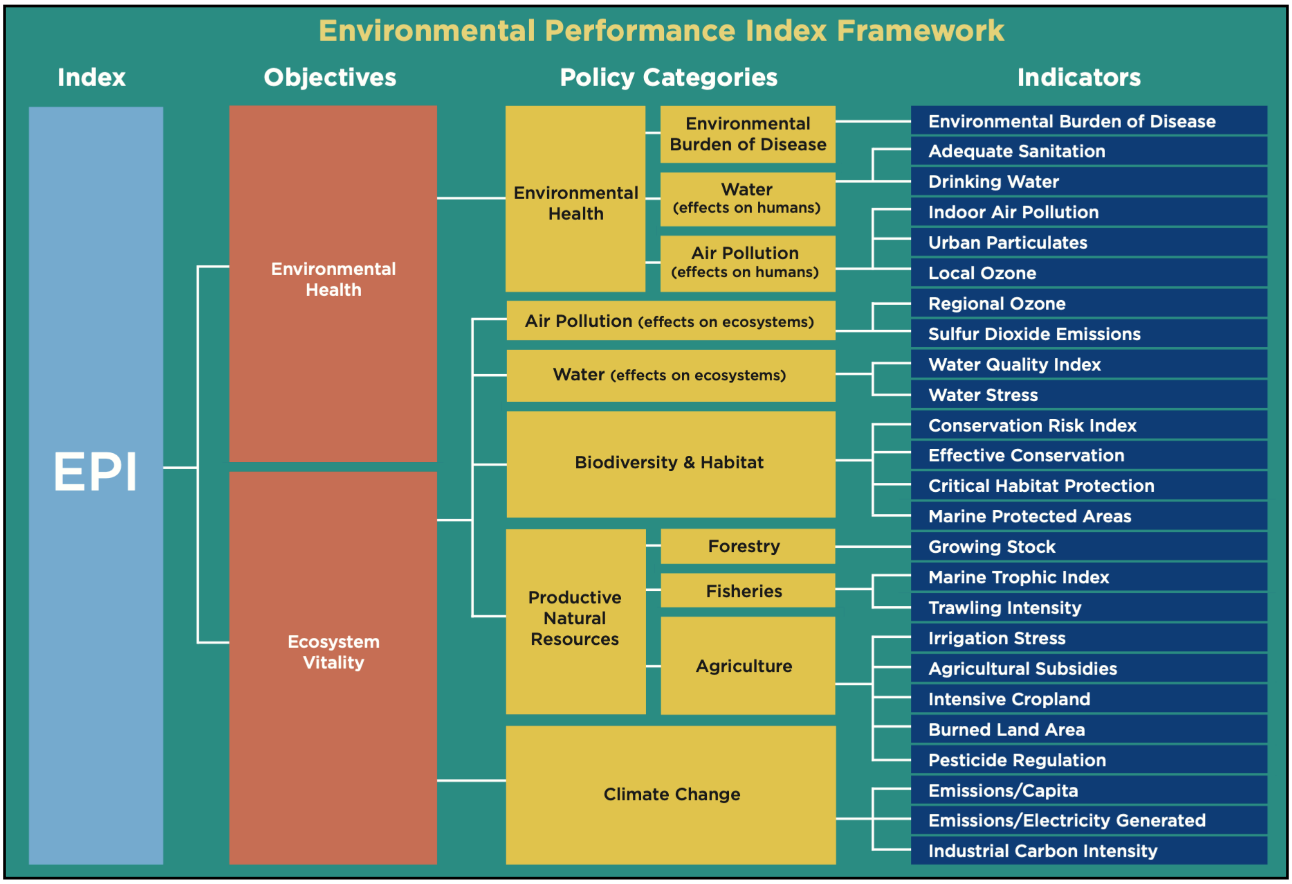
[24] Regions according to the EU's Nomenclature of Territorial Units for Statistics with approximately 800,000—3,000,000 inhabitants (Statistisches Bundesamt, 2022)

[25] The "heat island effect" refers to the phenomenon that cities are warmer than their surrounding areas due to emissions of waste heat and scarce vegetation (Hårsman and Wijkmark, 2013: 12)

3.4.5. National Context

Finally, to account for each city's national context, the respective country-level score in the 2008 Environmental Performance Index (EPI), produced annually by the Yale University and Columbia University (YCELP et al., 2008: 3), is included in the analysis (cf. Table A11). This popular operationalisation of national environmental performance (e.g.: Boleti et al., 2021: 254; Mavragani et al., 2016: 603) consists of 25 indicators assessed based on a proximity-to-target methodology (Esty et al., 2008: 8; cf. Graph 13). It provides insights into how well countries manage to balance the two objectives of environmental health (which is positively influenced by prosperity and economic growth) and ecosystem vitality (which is negatively affected by urbanisation and industrialisation) (Dan, 2019: 108).

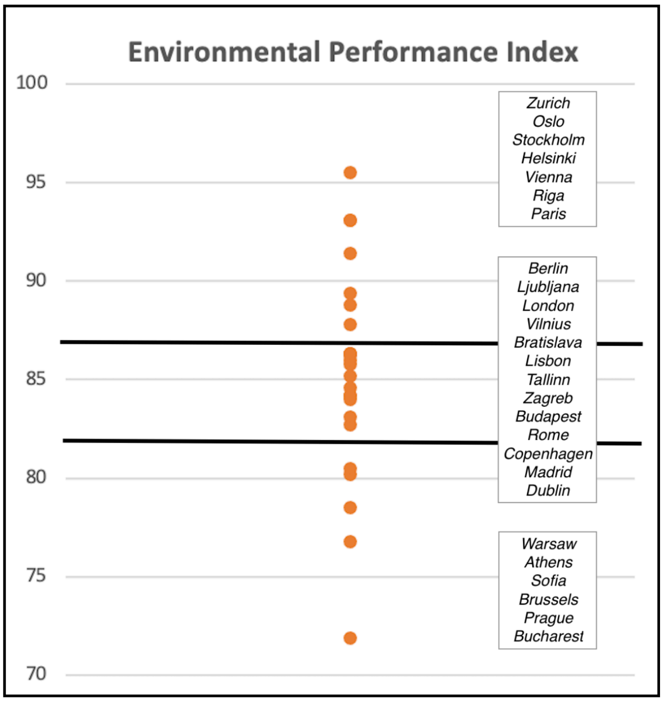
Graph 13: EPI Components (YCELP et al., 2008: 2)



The Environmental Policy Stringency Index (EPS) created by the OECD (2017a) is a possible alternative operationalisation. With a focus on climate and air pollution, its 15 indicators evaluate the "strength of the environmental policy signal," i.e. the extent to which (non-)market policies affect "the explicit or implicit cost of environmentally harmful behaviour" (OECD, 2016: 3-5). The underlying assumption is that policy stringency implies increased preoccupation with the environment and, consequently, higher environmental performance. Indeed, when analysing all available countries for 1990-2012, there is a significant overall correlation between the EPS and the EPI (ibid.: 8f.). This correlation disappears completely, however, when the analysis is restricted to states whose capital city is examined here and the year 2007/8 (cf. Graph A6). Exclusively focusing on "hard" policy instruments can be problematic as other factors like pro-environmental cultural norms or "soft" policy instruments also affect countries' environmental performance. Furthermore, the EPS disregards relevant issue areas like waste, biodiversity, water, or natural resources, which are all included in the EPI. Hence, the latter provides a more comprehensive picture of national environmental performance.

Graph 14 shows the distribution of this variable. Given the tight cluster of data points between 82% and 87% which indicate average environmental performance, it seems appropriate to trichotomise this condition.

Graph 14: Calibration of National Context



4. Main Analysis

4.1. Results of the mvQCA

Summarising all configurations which characterise cases in the sample in a truth table (cf. Table 3) reveals two contradictions. Madrid and Lisbon share the same conditions, but the former features high UES (Outcome 1) and the latter low UES (Outcome 0). Likewise, London is associated with Outcome 1 and Rome with Outcome 0, although both cities have very similar characteristics.

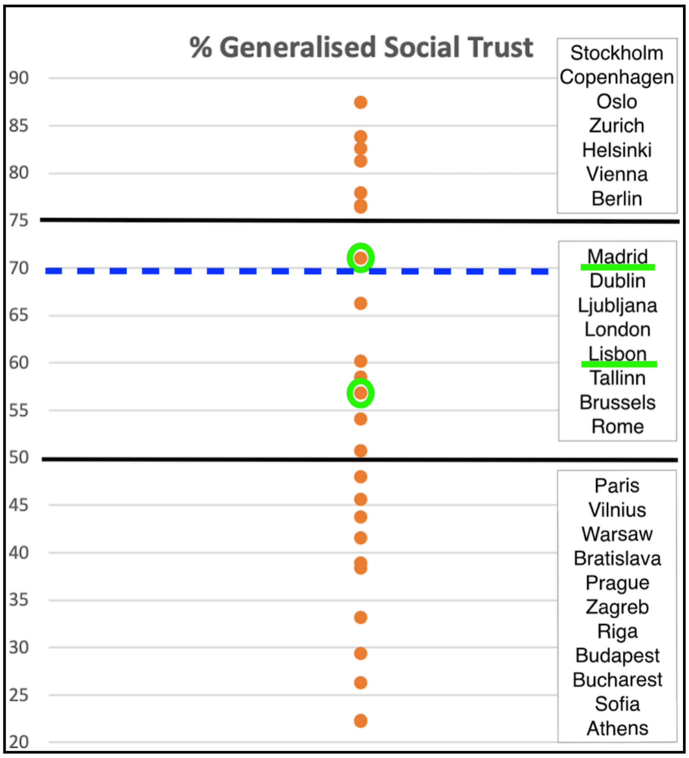
Table 3: Truth Table for mvQCA

Row	CITY	WEALTH	INDUSTRY	TRUST	CLIMATE	COUNTRY	OUTCOME
1	Brussels	1	0	1	0	0	1
2	Copenhagen	1	0	2	1	1	1
3	Berlin	0	0	2	0	1	1
4	Paris	1	0	0	1	2	1
5	Vienna	1	0	2	1	2	1
6	Helsinki	1	1	2	0	2	1
7	Stockholm, Oslo, Zurich	1	0	2	0	2	1
8	Madrid, Lisbon	0	0	1	1	1	1/0
9	London, Rome	1	0	1	1	1	1/0
10	Sofia, Athens	0	0	0	1	0	0
11	Prague, Bucharest	0	1	0	1	0	0
12	Tallinn, Ljubljana	0	1	1	0	1	0
13	Dublin	1	1	1	1	1	0
14	Zagreb, Vilnius, Bratislava	0	1	0	0	1	0
15	Riga	0	0	0	0	2	0
16	Budapest	0	1	0	1	1	0
17	Warsaw	0	0	0	0	0	0

Preferably, these contradictions are resolved before starting the process of logical minimisation, and there are several non-exclusive options for doing so (Schneider and Wagemann, 2012: 120-123, 127). Firstly, one could add a new condition which explains the difference between the contradictory observations. Since this would aggravate the problem of logical remainders, however, this strategy is treated as a last resort. Secondly, one should reevaluate the appropriateness of the scope conditions and the comparability of the cases in the sample. As this thesis only examines European cities with the same domestic status, this should not be an issue here. Three additional strategies propose that the minimisation process should fully exclude contradictory rows, fully include contradictory rows or only include those contradictory rows which reach a consistency score of ≥0.75. The contradictory configurations in this mvQCA have a consistency score of 0.5, which makes it difficult to justify their inclusion. Nonetheless, fully excluding the rows is not ideal either as this means that the solution formula would only explain 85% of the sample. The final, seemingly most promising option involves reconsidering the conceptualisation of the conditions and altering the operationalisation and/or calibration of the variables where necessary.

A closer look at the first two contradictory cases suggests that the substantial difference between their levels of generalised social trust might be responsible for the distinct outcomes. Whereas 71% of residents in Madrid indicate high interpersonal trust, in Lisbon, only 56.9% of city dwellers share this view. The figures seem robust as they hardly differ from the results of the 2012 survey round (Madrid: 69.8% and Lisbon: 53.1%). Despite this large gap, both cases fall into the $Trust_1$ category. It might therefore be fruitful to recalibrate the trust variable so that it better reflects this difference. Graph 15 illustrates that Madrid has the highest trust level in this value category, while the trust level of the next best city, Dublin, is roughly 5% lower (66.3%).

Graph 15: Recalibration of the Trust Variable



It is important to remember that — in contrast to the 50% threshold which does indicate a plausible qualitative difference between values below and above it — the 75% threshold has been set randomly. Although this “catchy” number appeals to human rationality, it is difficult to see why there should be a perceptible qualitative difference between trust levels of 75% and levels slightly lower than that.

Naturally, other conditions could be equally responsible for the contradiction in the truth table row. Madrid has the highest score in the $Wealth_0$ category and might therefore be considered a doubtful case. Indeed, there is a huge gap between Madrid's GDP/capita rate (€32,000) and that of Lisbon (€24,300). There is also a visible gap between Madrid and the next best city, Rome (€39,600), however, which should caution against upgrading Madrid to the $Wealth_1$ category. Furthermore, the negligible difference between Madrid's and Lisbon's share of the local manufacturing industry of total GVA, their degree of climate vulnerability, and their national environmental (policy) context clearly indicates that these conditions are not causing the contradiction. In contrast, one could argue that the chosen threshold for the outcome variable mischaracterises Madrid as it is the worst performer in the high UES category and its distance to the next best city, London, is slightly larger (+4.5%) than its distance to the best observation in the lower category, Vilnius (-4.3%). Madrid's position right between these two values nevertheless implies that it may be permissible to leave the calibration of the outcome variable as it is. This is preferred because raising the threshold beyond the stipulated two-thirds score in the EGCI arguably places an unnecessarily high expectation on the cities in this sample. In comparison to this, recalibrating the trust variable seems to be a less contentious strategy and thus, the contradiction is resolved by lowering the threshold for the $Trust_2$ condition to 70%[26].

Interestingly, the trust variable may also be responsible for the second contradiction. With its 50.7%, Rome barely surpasses the 50% threshold, whereas London (58.5%) is well above it. It is therefore possible that measurement error in the raw data has led to the erroneous categorisation of Rome as a $Trust_1$ city. Nevertheless, two facts weaken this assumption. Firstly, Rome achieved 52.6% in the 2012 survey round and secondly, it is not certain that London actually had a substantially higher percentage than Rome in 2009 since this information is missing and the 2012 data has been used instead. As with the first contradiction, the wealth, climate vulnerability and national context variables seem un-problematic, but Rome is a doubtful case regarding the calibration of the outcome. A more lenient threshold of 60% would move the city to the Outcome 1 category, thereby resolving the contradiction. The selected cut-off point is preferred, though, as it better fits the theo-

[26] Lowering the threshold even further to also include Dublin (which reached 69.4% in the 2012 survey round) is equally plausible, cf. robustness check 2 in Section 4.2.

retical conceptualisation of UES. Finally, unobserved differences may be causing the contradiction. For instance, Madrid and London both have a larger population and a higher share of university-educated residents than their worse-performing counterparts Lisbon and Rome (cf. Tables A13-A14). Considering the substantial number of omitted variables (cf. Section 5.3.), however, identifying the key difference comes close to finding a needle in a haystack. Ideally, this search should be based on an in-depth reexamination of the problematic observations. This is recommended for future research, while in the present analysis, it is deemed best to simply exclude London and Rome. Possible implications of this decision as well as alternative ways to deal with the two contradictions are further examined in the robustness checks in Section 4.2.

Table 4: Revised Truth Table for mvQCA

Row	CITY	WEALTH	INDUSTRY	TRUST	CLIMATE	COUNTRY	OUTCOME
1	Brussels	1	0	1	0	0	1
2	Copenhagen	1	0	2	1	1	1
3	Berlin	0	0	2	0	1	1
4	Madrid	0	0	2	1	1	1
5	Paris	1	0	0	1	2	1
6	Vienna	1	0	2	1	2	1
7	Helsinki	1	1	2	0	2	1
8	Stockholm, Oslo, Zurich	1	0	2	0	2	1
9	Sofia, Athens	0	0	0	1	0	0
10	Prague, Bucharest	0	1	0	1	0	0
11	Tallinn, Ljubljana	0	1	1	0	1	0
12	Dublin	1	1	1	1	1	0
13	Lisbon	0	0	1	1	1	0
14	Zagreb, Vilnius, Bratislava	0	1	0	0	1	0
15	Riga	0	0	0	0	2	0
16	Budapest	0	1	0	1	1	0
17	Warsaw	0	0	0	0	0	0

All rows in the revised truth table (cf. Table 4) are subsequently used for logical minimisation. This is done separately for each outcome with Cronqvist's (2019) free software

Tosmana (version 1.61; cf. Table A12). The mvQCA yields two solution formulas[27] that comprise the following prime implicants:

Table 5: Prime Implicants for Outcome 1 — Conservative Approach

Row	Prime Implicant	Cases Covered by the Prime Implicant
1	$Industry_0$ * $Trust_2$ * $Climate_1$ * $Country_1$	Copenhagen, Madrid
2	$Wealth_0$ * $Industry_0$ * $Trust_2$ * $Country_1$	Madrid, Berlin
3	$Wealth_1$ * $Industry_0$ * $Trust_2$ * $Country_2$	Vienna, Stockholm, Oslo, Zurich
4	$Wealth_1$ * $Trust_2$ * $Climate_0$ * $Country_2$	Helsinki, Stockholm, Oslo, Zurich
5	$Wealth_1$ * $Industry_0$ * $Trust_1$ * $Climate_0$ * $Country_0$	Brussels
6	$Wealth_1$ * $Industry_0$ * $Trust_0$ * $Climate_1$ * $Country_2$	Paris

Table 6: Prime Implicants for Outcome 0 — Conservative Approach

Row	Prime Implicant	Cases Covered by the Prime Implicant
1	$Wealth_0$ * $Trust_0$ * $Climate_1$ * $Country_0$	Sofia, Athens, Prague, Bucharest
2	$Wealth_0$ * $Industry_0$ * $Trust_0$ * $Country_0$	Sofia, Athens, Warsaw
3	$Wealth_0$ * $Industry_1$ * $Trust_0$ * $Country_1$	Zagreb, Vilnius, Bratislava, Budapest
4	$Wealth_0$ * $Industry_1$ * $Trust_1$ * $Climate_0$ * $Country_1$	Tallinn, Ljubljana
5	$Wealth_1$ * $Industry_1$ * $Trust_1$ * $Climate_1$ * $Country_1$	Dublin
6	$Wealth_0$ * $Industry_0$ * $Trust_0$ * $Climate_0$ * $Country_2$	Riga
7	$Wealth_0$ * $Industry_0$ * $Trust_1$ * $Climate_1$ * $Country_1$	Lisbon

As expected, multiple configurations of conditions are sufficient for high and low UES respectively. These rather long prime implicants are unsatisfactory, however, as QCA aims for parsimonious solution formulas. The root cause of the problem lies in the substantial number of logical remainders which render further minimisations impossible. Of the 72[28] possible configurations of conditions, only 19 are observed in the sample. In order to mitigate this problem, a number of simplifying assumptions must be introduced. As re-commended, only “easy counterfactuals” (Ragin and Sonnett, 2004: 10) are allowed to enter the analysis, i.e. simplifying assumptions which are strongly supported by the theories discussed in this thesis. For the sake of completeness, *all* theoretically sound

[27] The formulas could equally be written with an arrow (cf. Section 3.2.), but for reasons of space and clarity, the tabular form is preferred

[28] Three dichotomous and two trichotomous conditions, i.e. 2*2*2*3*3=72 (cf. Cronqvist, 2007: 69)

simplifying assumptions are included, irrespective of their (in)ability to produce a more parsimonious solution. Although researchers rarely do this, it is explicitly encouraged by Schneider and Wagemann (2012: 212) who stress that parsimony should never be the ultimate goal of scholarly work.

As a guiding principle, all observed configurations of conditions are "upgraded" if they are associated with Outcome 1 and "downgraded" if they lead to Outcome 0. For example, Paris features the conditions $Wealth_1*Industry_0*Trust_0*Climate_1*Country_2$. This combination of local societal factors is sufficient for high UES and it largely conforms to the theoretical expectations of this thesis, i.e. that wealth, climate vulnerability and a supportive national (policy) context are positively associated with high UES, while strong industrial interests (which are absent in this case) negatively influence cities' ability to be green. Nonetheless, existing theories and empirical evidence also suggest that higher trust levels correlate with stronger pro-environmental attitudes and behaviour. It therefore seems reasonable to assume that a city with the exact same conditions as Paris but with higher trust levels (i.e. $Trust_1$ or $Trust_2$) would equally boast high UES. Similar assumptions can be made for Outcome 0. Here, it is assumed that the lower cities' wealth, level of social trust and climate vulnerability, the higher the importance of local industries, and the weaker the national (policy) context, the less likely these areas are to transition towards high UES.

Many observed configurations feature more than one condition that could be up- or down-graded and therefore, all possible combinations of these up- or downgrades are used as simplifying assumptions. Additionally, it is assumed that conditions which have already been eliminated in the conservative minimisation process (i.e. the redundant element of each minimised prime implicant) continue to be irrelevant in the upgraded or downgraded adaptations of these configurations. In these instances, two versions of the simplifying assumptions are computed, one containing the existence of the redundant condition and one featuring its absence. In total, 28 simplifying assumptions can be derived from the empirical data (11 for Outcome 1 and 17 for Outcome 0). A detailed list is attached in the appendix (cf. Tables A15-A16).

Rerunning the mvQCA with these simplifying assumptions (SA) yields the following solution formula for Outcome 1:

Table 7: Prime Implicants for Outcome 1 — Including Simplifying Assumptions[29]

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Industry_0$ * $Trust_2$ * $Country_{1-2}$	Copenhagen, Berlin, Madrid (SA2) *[$Country_1$]* ——— Vienna, Stockholm, Oslo, Zurich (SA1, SA3) *[$Country_2$]*	0.64	0.64
2	$Wealth_1$ * $Industry_0$ * $Trust_2$	Copenhagen, Vienna, Stockholm, Oslo, Zurich (SA2, SA5, SA9)	0.45	0
3	$Wealth_1$ * $Trust_2$ * $Country_2$	Vienna, Helsinki, Stockholm, Oslo, Zurich (SA4)	0.45	0.09
4	$Wealth_1$ * $Industry_0$ * $Trust_1$ * $Country_0$	Brussels (SA6)	0.09	0.09
5	$Wealth_1$ * $Industry_0$ * $Trust_1$ *$Climate_0$	Brussels (SA7, SA8)	0.09	0
6	$Wealth_1$ * $Industry_0$ * $Climate_1$ * $Country_2$	Paris, Vienna (SA11)	0.18	0.09

The whole solution formula explains 91% of cases with Outcome 1 in the original sample. Six paths towards high UES can be identified, although rows 2 and 5 could be omitted as all cases covered by them are equally explained by rows 1 and 4 (cf. Ragin, 1987: 97). The high coverage of row 1 underlines the importance and wider generalisability of this prime implicant. This contrasts with the low coverage of rows 3-6. As these only uniquely explain Helsinki, Brussels, and Paris respectively, they could indicate spurious relationships (cf. Rutten, 2020: 9).

The solution formula suggests that local societal contexts featuring weak industrial interests, high trust, and at least average national environmental performance strongly facilitate high UES (row 1). Although cities with these conditions are often affluent (row 2), wealth is not required for achieving the outcome. This corroborates the assertion that pro-environmental behaviour does not have to entail costs, especially in cities with small manufacturing industries. Nonetheless, wealth seems to provide cities in unsupportive

[29] cf. Schneider and Wagemann, 2012: 130-135

$$\text{Raw coverage} = \frac{\text{Number of cases covered by the prime implicant}}{\text{Total number of cases with the same outcome}}$$

$$\text{Unique coverage} = \frac{\text{Number of cases } \textit{solely} \text{ covered by the prime implicant}}{\text{Total number of cases with the same outcome}}$$

national contexts with the necessary leeway to be green (rows 2, 4-5). With some caution, one may add three further statements. Firstly, a combination of wealth, high trust, and an ambitious national context can compensate strong industrial interests (row 3). This could be due to wealthy cities' financial ability to mitigate adverse consequences for the manufacturing sector. Additionally, trusting citizens arguably have more confidence in the collective capacity to successfully deal with structural changes. Secondly, *average* trust levels are sufficient for high UES when combined with wealth and weak industrial interests (rows 4-5). This particular observation could be owed to additional enabling factors, however, such as Brussels' status as the de facto EU capital. Thirdly, high UES can also be achieved in low-trust contexts, but only if all other factors are favourable in line with the theory, i.e., cities are wealthy, climate vulnerable, only have weak industrial interests, and are supported by an ambitious national context.

Next, it is worth analysing the solution formula for Outcome 0:

Table 8: Prime Implicants for Outcome 0 — Including Simplifying Assumptions

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Wealth_0$ * $Trust_0$ * $Country_{0\text{-}1}$	Sofia, Athens, Prague, Bucharest, Warsaw (SA12) *[$Country_0$]* ——— Zagreb, Vilnius, Bratislava, Budapest (SA24, SA25) *[$Country_1$]*	0.6	0.6
2	$Industry_1$ * $Trust_0$ * $Country_{0\text{-}1}$	Prague, Bucharest (SA12, SA20, SA22) *[$Country_0$]* ——— Zagreb, Vilnius, Bratislava, Budapest (SA15, SA19) *[$Country_1$]*	0.4	0
3	$Industry_1$ * $Trust_{0\text{-}1}$ * $Country_1$	Zagreb, Vilnius, Bratislava, Budapest (SA15, SA19) ——— Tallinn, Ljubljana, Dublin (SA14, SA16) [*$Trust_1$*]	0.46	0.2
4	$Wealth_0$ * $Trust_1$ * $Country_1$	Tallinn, Ljubljana, Lisbon (SA14, SA26)	0.2	0.07
5	$Wealth_0$ * $Trust_0$ * $Climate_0$	Zagreb, Vilnius, Bratislava, Riga, Warsaw (SA12, SA23, SA24)	0.33	0.07

The solution formula explains 94% of cases featuring low UES in the sample and, again, some paths are more important than others. Row 1 has by far the highest coverage, followed by row 3, while rows 4-5 only uniquely explain one case each and row 2 could be omitted entirely.

First of all, it is noteworthy that none of the cities associated with Outcome 0 feature high trust, i.e., the absence of high trust seems to be a *necessary* condition for low UES. In contrast, Outcome 1 can be achieved in contexts of low, average, and high trust. This nicely illustrates the benefits of the asymmetry assumption underlying QCA. The solution formula suggests that a combination of low levels of wealth, low to average social trust levels, and low to average national environmental performance prevents cities from being green (rows 1, 4). Indeed, low levels of wealth and social trust coupled with low climate vulnerability can impede the transition towards good environmental performance even in very favourable national contexts[30] (row 5). This underlines that UES cannot be imposed from above and that national policies additionally require local ambition and/or capacity to be successful. Finally, strong industrial interests have a negative impact on cities which lack high trust and a favourable national context, regardless of their level of wealth (rows 2-3). Again, this indicates that wealth is not a guarantor of high UES and that the source of cities' wealth matters.

4.2. Robustness Checks

The QCA approach encourages alterations of the research design choices throughout the analysis process to ensure an effective "dialogue between ideas and evidence" (Ragin, 2000: 309). As this gives researchers considerable leeway, the implications of strategic decisions should be examined with the help of robustness checks. QCA results are considered robust if small changes in the research design do not substantially affect the interpretation. In these instances, the alternate paths are generally supersets or subsets of the original ones. However, specific robustness criteria, such as those formulated in inferential statistics, do not exist (Schneider and Wagemann, 2012: 285f.).

It is worth noting that QCA is compatible with the critical realist notion of causality. Acknowledging the fact that many other causes could be missing from the analysis, this

[30] This statement is based on Riga, but according to Esty et al.'s (2008: 26) sensitivity analysis of the EPI, Latvia should rank much lower in the index

approach regards sufficient configurations of conditions as “enablers” rather than guarantors of the desired outcome. It follows from this that “uncertainty in QCA is *possibilistic* in nature rather than *probabilistic*” (Rutten, 2020: 7, emphasis added). Moreover, the “uncertainty of knowing” whether logical remainders really would have the expected outcome if they were observed differs from the statistical “uncertainty that follows from randomness in data”. Given this distinction, robustness checks must not emulate tests employed in inferential statistics but should match the ontological base of QCA. This essentially means that “analytical robustness” is of greater importance than “empirical robustness”. More specifically, small changes in the solution formula related to measurement error and/or parameter sensitivity are unproblematic as long as they do not affect the substantive interpretation of the results (ibid.: 7f., 11).

Eisenack and Roggero (2022: 7) identify three critical research design choices which strongly influence the solution formula: the adequacy of the operationalisations, potential measurement error in the original data (these two issues are further discussed in Section 5.3.), and the appropriateness of the selected cut-off points. Indeed, wrong calibrations of the conditions (empirical) and weak justifications for the selected thresholds (analytical) negatively affect the construct validity of the concepts used in the analysis (Rutten, 2020: 11). Regarding this, one may criticise that this thesis mainly measures cities’ characteristics and level of UES in *relative* terms. According to prominent QCA researchers, it is permissible to base cut-off points on “convenient gaps” in the distribution (Ragin, 2008 (Rutten, 2020: 13)) or on the relative value of cases (Cronqvist, 2007: 89f.). The absence of clear, theoretically motivated conceptual boundaries nevertheless renders it difficult to justify these decisions (Rutten, 2020: 13). Unfortunately, the present mvQCA must rely on this approach to threshold-setting because the literature does not provide much guidance as to how the theoretical concepts used as conditions and outcome must be calibrated to mark meaningful qualitative differences.

For reasons of time and scope, it is impossible to test alternate calibrations for every single condition and therefore, the robustness checks focus on the most striking cause of uncertainty in this analysis, namely the selected strategy for dealing with the contradictory configurations. More specifically, the original mvQCA is rerun five times with slightly altered research designs. The respective changes are highlighted in Table 9. Whereas the original version of the analysis relies on a lowered $Trust_2$ threshold (70%), in the first robustness check, the initial cut-off point is retained and all contradictory observations are excluded from the minimisation process instead. An adjacent gap in the distribution (cf. Graph 15 above) suggests that the $Trust_2$ threshold could have also been lowered to 66%, thereby additionally upgrading Dublin to the higher category. This alternative is further examined in the second robustness check. The third test resolves the contradiction between Madrid and Lisbon by raising the threshold for high UES so that Madrid is downgraded to Outcome 0. The fourth robustness check does the opposite, i.e., it lowers the threshold for high UES so that this category additionally includes Vilnius and Rome. This effectively resolves the latter city's contradiction with London. Nevertheless, this option is problematic as it not only waters down the conceptualisation of high UES but also creates a new unresolvable contradiction between Vilnius (Outcome 1), Zagreb and Bratislava (both Outcome 0). The final test includes all cases in the sample. Full coverage is achieved by using the $Trust_2$ threshold of the original version and additionally raising the $Trust_1$ threshold by one percentage point. This is based on the assumption that Rome actually belongs to the $Trust_0$ category.

Table 9: Overview of All Robustness Checks

Version of mvQCA	Trust Calibration	Outcome Calibration	Solution Coverage	Excluded
Original	50 ; **70**	66	92%	London, Rome
R1	50 ; 75	66	85%	**Madrid, Lisbon, London, Rome**
R2	50 ; **66**	66	92%	London, Rome
R3	50 ; 75	**70**	92%	London, Rome
R4	50 ; 75	**60**	81%	Madrid, Lisbon, Vilnius, Zagreb, Bratislava
R5	**51** ; **70**	66	100%	—

As proposed by Rutten (2020: 24f.), the results of these checks are summarised in a robustness table (cf. Tables 10-11) using the following symbols:

● = the prime implicant remains unchanged

$\overleftarrow{\varnothing}$ = the new prime implicant is a subset of the original one[31]

$\overrightarrow{\varnothing}$ = the new prime implicant is a superset of the original one

⊗ = the new prime implicant differs but the substantive interpretation is unchanged

⚠️ = the new prime implicant differs and this affects the substantive interpretation

[31] E.g., $Industry_1$*$Trust_1$*$Climate_0$*$Country_1$ is a subset of $Industry_1$*$Trust_1$*$Country_1$ while the latter is a superset of the former

More detailed versions of these tests and the respective (altered) simplifying assumptions can be found in the appendix (cf. Tables A17-A34).

Table 10: Results of Robustness Checks — Outcome 1

Row	Original Prime Implicant	R1	R2	R3	R4	R 5
1	$Industry_0$ * $Trust_2$ * $Country_{1-2}$	●	●	●	●	●
2	$Wealth_1$ * $Industry_0$ * $Trust_2$	●	●	●	●	●
3	$Wealth_1$ * $Trust_2$ * $Country_2$	●	●	●	●	●
4	$Wealth_1$ * $Industry_0$ * $Trust_1$ * $Country_0$	$\vec{\varnothing}$	●	$\vec{\varnothing}$	$\vec{\varnothing}$	$\vec{\varnothing}$
5	$Wealth_1$ * $Industry_0$ * $Trust_1$ *$Climate_0$	$\vec{\varnothing}$	●	$\vec{\varnothing}$	$\vec{\varnothing}$	$\vec{\varnothing}$
6	$Wealth_1$ * $Industry_0$ * $Climate_1$ * $Country_2$	●	●	●	●	●
7	Additional prime implicants	—	—	—	—	—

As Table 10 highlights, the results for Outcome 1 are highly robust to plausible alterations of the research design. This is in line with Schneider and Wagemann's (2012: 143) assertion that researchers' ability to manipulate their QCA results is largely exaggerated. All robustness checks yield exact replica of four of the six prime implicants identified in the original analysis. Merely the equivalents of rows 4 and 5 deviate from the original prime implicants in most tests. This is due to the inclusion or exclusion of certain observations (and simplifying assumptions) in the various research designs. Since the new, shortened prime implicants are essentially supersets of rows 4 and 5 (the conditions $Country_0$ and $Climate_0$ can be minimised respectively), these differences are unproblematic. In fact, they simply corroborate the main finding of the original analysis, i.e. that wealth, weak local industrial interests and average to high trust levels are key facilitators of high UES.

While the results for Outcome 0 are also more or less robust to the proposed changes, this is less apparent than for Outcome 1 for several reasons (cf. Table 11). Firstly, many new prime implicants differ from the original ones. This is less problematic than it seems, however, as the differences are only minor. For instance, the $Country_1$ part of condition $Country_{0-1}$ is missing in the first prime implicant of R1. Similarly, the $Trust_0$ part of condition $Trust_{0-1}$ does not appear in the fourth prime implicant of R5. Arguably, these changes do not substantially affect the overall interpretation of the results. The same is true for the two additional prime implicants. Secondly, unlike all other robustness checks, R2 does not identify low to average trust as a necessary condition for low UES. This underlines that the necessity statement is only valid when high trust is defined as a >70% trust rate. However, once the more lenient consistency threshold of 0.9 for necessary conditions is applied (cf. Schneider and Wagemann, 2012: 143), even the second robustness check supports the claim that low to average trust is a necessary condition for low UES[32]. Thirdly, R5 contains one larger change, i.e., the *Wealth*$_0$ condition is completely missing from the first prime implicant. Although the remaining configuration *Trust*$_0$***Country*$_{0\text{-}1}$ is essentially a superset of the original prime implicant, it is worth noting that this minimisation slightly alters the interpretation of the whole solution formula. Thus, it puts additional emphasis on the constraining effect of having low social trust in an unambitious national (policy) context. With this combination, cities always struggle to be green, irrespective of their level of wealth and the size of the local manufacturing industry. The fact that this prime implicant explains 66% of cases featuring low UES in the sample underscores the importance of this finding, although it must be kept in mind that it appears exclusively in the fifth robustness check.

Table 11: Results of Robustness Checks — Outcome 0

Row	Original Prime Implicant	R1	R2	R3	R4	R 5
1	Wealth$_0$ * Trust$_0$ * Country$_{0\text{-}1}$	⦻	●	●	⦻	⚠
2	Industry$_1$ * Trust$_0$ * Country$_{0\text{-}1}$	●	●	●	⦻	$\vec{\varnothing}$
3	Industry$_1$ * Trust$_1$ * Country$_1$	●	$\overleftarrow{\varnothing}$	●	●	●
4	Wealth$_0$ * Trust$_{0\text{-}1}$ * Country$_1$	—	●	●	—	⦻
5	Wealth$_0$ * Trust$_0$ * Climate$_0$	●	●	●	$\overleftarrow{\varnothing}$	●
6	Additional prime implicants	—	1	—	1	—
7	Trust$_{0\text{-}1}$ is a necessary condition	Yes	No	Yes	Yes	Yes

Having established the robustness of the results to varying calibrations of the problematic conditions, one final criticism could pertain to the choice of simplifying assumptions. For instance, one could argue that it is not entirely clear whether a favourable national (policy) context spurs local actors to enhance UES or whether it weakens their ambition by making them believe that the state is already doing enough. So far, the literature has only provided evidence of the *positive* effect played by supportive higher levels of government (e.g.: Opp and Saunders, 2012: 689; Eisenack and Roggero, 2022: 6f.), however, which corroborates the appropriateness of the selected assumptions. The literature is also ambiguous regarding the effect of wealth on UES. The results in Tables 7-8 nevertheless demonstrate that

[32] Only Dublin violates the necessity statement, i.e. $1 - \frac{1}{15} = 0.93$

the wealth variable behaves as theorised in this thesis, i.e., most cities with Outcome 1 are relatively wealthy, while most cities with Outcome 0 are not. In light of this, robustness checks involving alterations of the simplifying assumptions are deemed unnecessary.

5. Discussion

5.1. Implications for Research

The identified paths towards high and low UES enjoy high causal interpretability (cf. Section 4.1.), which underscores the internal validity of the results (cf. Rutten, 2020: 11). The findings are mostly in line with the theoretical literature and corroborate previous analyses in which wealth (e.g.: Reckien et al., 2015; Wang, 2012), industrial interests (e.g.: Sharp et al., 2011; Portney, 2002), and the higher-level policy context (e.g.: Eisenack and Roggero, 2022; Opp and Saunders, 2012) are statistically significant predictors of UES. Moreover, the fact that all conditions only facilitate cities' ecological transition in combination with other conditions may explain the large number of contradictory findings in the literature. Its ability to reveal such instances of causal complexity is a major advantage of the QCA method. However, unlike inferential statistics, it cannot determine the effect size, that is, the relative importance of each condition. QCA should therefore be seen as a complement to conventional quantitative methods rather than as a replacement or simple precursor of statistical analyses.

Importantly, the mvQCA identifies social trust as a key determinant of cities' (in)ability to improve their environmental performance. This represents a valuable contribution to the literature as UES research has so far largely ignored this association (for a rare exception, cf. Pierce et al.'s (2014) analysis of US cities). Admittedly, there is a strong correlation[33] between cities' wealth and social trust levels, but notable exceptions (Berlin: low wealth, high trust / Paris: high wealth, low trust) demonstrate that both characteristics can exist independently of each other. What is more, the mvQCA results highlight that, in combination with other enabling factors (i.e. weak industrial interests and a supportive national context), high trust can compensate low levels of wealth and vice versa. Coupled with the fact that the absence of high trust seems to be a necessary condition for low UES, this finding underlines the potential added value of examining the relationship between trust and UES in more depth. Considering that social trust is also closely linked to corruption,

[33] Full sample: $r = 0.66$, $p < 0.01$
Without the outlier Zurich: $r = 0.72$, $p < 0.01$

future research could additionally aim to disentangle the effect of these concepts by analysing to what extent the presence of social trust and the absence of corruption facilitate UES respectively. Lastly, assuming that the difference between Madrid's and Lisbon's trust levels is indeed responsible for the cities' distinct outcomes, this thesis does not find evidence for Irwin and Berigan's (2013: 436f.) claim that social trust only predicts pro-environmental behaviour in individualist societies.

The four contradictory cases provide additional insights as they arguably occupy "grey zones" in the theory. Thus, Madrid, Lisbon ($Wealth_0*Industry_0*Trust_1*Climate_1*Country_1$), London, and Rome ($Wealth_1*Industry_0*Trust_1*Climate_1*Country_1$) all share *moderate* trust levels and an *average* national (policy) context. Moreover, Madrid and Rome are doubtful cases concerning the calibration of the wealth, trust, and outcome conditions. This indicates the existence of tipping points (e.g. Madrid's comparatively high trust levels) and suggests that in ambiguous situations, other, possibly more proximate factors, such as skilled green policy entrepreneurs or external shocks, provide the final push towards high or low UES. Hence, future research could expand the present analysis by adding a range of proximate factors in a two-step QCA design (cf. Schneider and Wagemann, 2012: 253f.).

It is noticeable that none of the "green cities" in the sample are located in Eastern European states, while only few non-Eastern European cities belong to the low-UES category (Lisbon, Dublin, Rome in R4-5, Madrid in R3). This implies that the stickiness of Soviet legacy (Chaisty and Whitefield, 2015: 613; Haller and Hadler, 2008: 298) could be an important confounding variable in the analysis. Although it is crucial to acknowledge this fact, it arguably does not weaken the validity of the empirical findings. The mvQCA results simply highlight that characteristics which are frequently associated with post-communist cities, i.e. low levels of wealth[34], low social trust[35], and an unsupportive national context[36] (both in terms of policy-making and cultural attitudes) are key determinants of low UES.

Interestingly, the empirical findings do not support the theoretical expectation that climate vulnerability strengthens cities' pro-environmental efforts. This condition solely features in

[34] $r = -0.57, p < 0.01$

[35] $r = -0.65, p < 0.01$

[36] $r = -0.42, p < 0.05$

one essential prime implicant of high UES[37] which only uniquely explains Paris. Conversely, low vulnerability merely appears in the last prime implicant of low UES which only uniquely covers Riga. Since the other conditions in these two prime implicants all behave in line with the theory, it is unlikely that Paris' and Riga's degree of climate vulnerability is a crucial determinant of their environmental performance. While this confirms some previous findings (e.g.: Simon Rosenthal et al., 2015; Zahran et al., 2008a), it contradicts the results of other academic work. This could be due to the specific operationalisation of climate vulnerability used in this thesis. Whereas the index constructed for the mvQCA is objective and experience-based, scholars who find a statistically significant effect often operationalise vulnerability with predicted *future* threats, e.g. cities' vulnerability to rising sea levels (Lee, 2013: 116), or mayors' *perceptions* of climate vulnerability (Hultquist et al., 2017: 153). Despite this, the experience-based index seems superior. Firstly, coastal location does not always accurately reflect future vulnerabilities: Stockholm's fresh water supply is highly susceptible to rising sea levels (Snickars et al., 2013: 103), but due to an ongoing process of post-glacial uplift which started 10,000 years ago, Sweden's and Finland's landmasses are actually rising up to three times faster than the level of the Baltic sea (Magnússon, 2017). Secondly, data on city dwellers' perceptions of long-term (local) climate risks remains scarce (Tapia et al., 2017: 146). Since media framing, political activism, cultural factors (Smith and Mayer, 2018: 142), "optimism bias" (Trumbo et al., 2014: 1020), and individuals' world views (Whitmarsh and Capstick, 2018: 23-25) all shape risk perceptions, questionnaire surveys arguably represent the best way to obtain this information. Thirdly, Romero-Lankao et al. (2018: 96, 106) correctly assert that cities' climate vulnerability goes beyond their level of exposure and sensitivity. Thus, it is equally influenced by the local *capacity* to mitigate the adverse effects of climate change. The capacity concept is difficult to grasp with publicly available data, however, and arguably, two rough proxies already feature in the analysis, namely wealth and social trust.

The sample examined in this thesis includes nearly the whole underlying population, i.e. capital cities of states which were either members of the EU or otherwise closely associated with the supranational organisation during the studied time period. Only Amsterdam, Luxembourg City, Valetta, and Reykjavík are missing. This enhances the comparability of the analysed urban areas and strengthens the external validity of the

[37] *Climate$_0$* also appears in the fifth prime implicant which describes Brussels, but since it does not have any unique coverage, it is inessential and can be ignored (cf. Andreas et al., 2017: 83)

results. However, due to the particular domestic status of these cities, it is unclear to what extent the findings also apply to large non-capital cities or smaller towns. Especially the latter are of great importance since 51% of the global urbanised population lives in cities with fewer than 500,000 inhabitants (Chávez et al., 2018: 69). Future research could therefore build upon this thesis by expanding the scope in this regard. Similarly, it would be valuable to replicate the analysis with samples from other geographic regions to determine whether the identified causal paths are generalisable beyond the EU context. The EIU's (2012: 8) other green city indices might be helpful for this. Particularly cities in the Global South should be of interest, given that they are expected to account for 90% of global urban growth in the decades to come (Parnell et al., 2018: 4).

5.2. Implications for Policy-Making

The findings of this thesis are also relevant for policy-makers and NGOs. For instance, they suggest that national governments can increase the probability that cities become green by providing an ambitious regulatory framework. The European Commission (2019: 10, 17, 23) should therefore work hard on delivering its established goal of lifting national regulatory barriers, promoting green budgeting tools, and ensuring that all member states adopt and enforce effective environmental policies. The EU's Fit for 55 package is particularly important in this regard. It consists of a number of legislative proposals aimed at setting the member states on the right track to collectively achieve climate neutrality by 2050 (European Council, 2022). If done well, European environmental regulations can provide valuable stimuli for national policy-making.

At the same time, the mvQCA highlights that a favourable national (policy) context is neither a necessary nor a sufficient condition for green cities. High UES cannot be imposed from above since national-level policies additionally require local ambition and capacity to be effective. Indeed, city administrations that enjoy considerable autonomy and power vis-à-vis higher levels of government and non-state actors are more successful at green policy-making than local authorities that merely implement national decisions (Eckersley, 2017: 161). This is also reflected in the 2020 Mannheim Message. In this document, European mayors demand greater say "in a multi-level governance system that works bottom-up as well as top-down" and that treats local authorities as co-creators of relevant fiscal and regulatory frameworks rather than “purely implementation partners” (European Mayors, 2020: 3f.).

In a similar vein, the Mannheim Message calls for “sufficient continuous financial support from European and national levels” and an expansion of cities’ financing portfolio (e.g. green bonds) to promote local autonomy and capacity building (ibid.: 3). This is in line with the finding that wealth is a powerful tool in municipalities’ transition towards high UES. Among others, cities can currently obtain funding from the European Urban Initiative for testing transferable sustainability-related innovations. By sharing their experiences, these frontrunners subsequently contribute to capacity building elsewhere (EU, 2021: 15). Similarly, the Covenant of Mayors initiative launched by the European Commission (2022b) in 2008 helps municipalities build the necessary administrative capacities for data collection and the development of climate strategies. Unfortunately, signatory cities often struggle to follow through on their commitments because the initiative is not directly connected to a financing system and some local authorities lack the legal competences to implement sustainability-related activities (Basso and Tonin, 2022: 9f.). Moreover, Basso and Tonin (2022: 11) contend that regional and provincial governments should be more integrated in the implementation process as they are better equipped to provide tailored support to cities than the central European office.

Another issue highlighted in the mvQCA concerns the potentially negative effect of local industrial interests. Specifically for this reason, the EU created the Just Transition Fund (JTF) in 2021. It is intended to alleviate the socio-economic costs of the ecological transition by financially supporting regions with large carbon-intensive industries. All member states can obtain funding for diversifying the respective regional economy away from polluting industries, up- and reskilling workers, transforming industrial installations, and regenerating contaminated sites (European Parliament, 2021). It is questionable, however, whether the JTF can live up to its promises. Its size fails to match the magnitude of the challenge and it relies heavily on private capital injections. Furthermore, the funding process is highly bureaucratic and it presupposes substantial multi-level coordination. For instance, member states must prepare territorial just transition plans at a time where one-third of them still lack national climate strategies (Mendez and Fonseca, 2021).

Finally, the results suggest that particularly policy-makers in poorer states should focus on fostering social trust as this strong facilitator of high UES can potentially compensate low levels of wealth. Admittedly, this is easier said than done, especially considering that social trust is closely associated with individuals' personal financial situation (Lee, 2022: 8f.). Nonetheless, the literature implies that some non-monetary strategies could also be effective. Firstly, governments should improve access to education (Glanville, 2016: 45; Freitag, 2003: 227) and public safety (Delhey and Newton, 2003: 109f.) as both are strong predictors of social trust. Small improvements may already be achieved through better planning and information campaigns. Secondly, it might be helpful for cities to incentivise the creation of cooperative enterprises. There is some evidence that this particular form of business organisation boosts workers' social trust, probably due to the more horizontal governance system and weaker interest in profit maximisation (Sabatini et al., 2014: 635). Thirdly, local actors could initiate projects aimed at strengthening residents' neighbourhood attachment and community identity as this encourages participation in local (green) projects (Kalkbrenner and Roosen, 2016: 62). In fact, loose neighbourhood ties are a crucial source of social capital for individuals with a lower socio-economic status (Li et al., 2005: 119f.). Furthermore, experimental research underlines the importance of network density (Lo Iacono, 2018: 126, 135f.). Each local social network essentially functions as a reputation system and overlaps between them increase the probability that defective behaviour will be sanctioned. This encourages trusting behaviour, even among poorly integrated individuals[38]. A related factor concerns network diversity (Glanville, 2016: 44f.). Whereas weak ties with heterogenous groups enhance social trust, strong ties with homogenous groups reduce it. As the latter is a pervasive problem in post-communist societies (Łopaciuk-Gonczaryk, 2019: 21), particularly Eastern European policy-makers and NGOs should find ways to increase citizen interaction across the whole societal spectrum.

Naturally, fostering social trust is not an exclusively local responsibility. Favourable macro-level conditions are equally important. As Gelderblom (2018: 1315, 1317f., 1322) highlights, "macro actors," i.e. powerful politicians and entrepreneurs, facilitate or constrain the ability of less powerful actors to improve social trust at the micro level. For example, their decisions on resource allocation, norm setting, and rule enforcement influence power relations in society and the stability of social networks. Considering that societal conflicts between the rich and poor (Delhey and Newton, 2003: 109-111), perceived ideological polarisation (Lee, 2022: 15f.), and economic instability (Torrente et al., 2019: 649f.) all

[38] However, network density only stimulates *trustworthy* behaviour among well-integrated individuals

have detrimental effects on social trust, it is crucial that these macro actors systematically tackle the deepening socio-economic (OECD, 2017b: 5) and ideological divides (Galston, 2018) that run through Europe. This also means that they must restore citizens' confidence in democracy by improving the performance and transparency of political institutions and possibly rendering policy-making more participatory (Caferra et al., 2021: 5; Freitag, 2003: 227). The features of democratic systems, e.g. human rights and the rule of law, not only promote social trust through direct experience (Delhey and Newton, 2003: 109f.) and parental transmission (Ljunge, 2014: 47f.). Impartial, democratic institutions and honest politicians also serve as role models for society at large (Kashefi, 2015: 35).

It is a good sign that most of the above-mentioned strategies for increasing social trust appear in Von der Leyen's (2019: 3, 8-11, 14-16, 21) vision for the EU commission presidency. For example, she intends to improve education, lower crime levels, foster social fairness and diversity through anti-discrimination legislation, guarantee workers' rights, fight poverty, promote good welfare systems, enhance institutional performance, strengthen the rule of law, and render policy-making more transparent. Only time will tell to what extent she can deliver on these promises. In any case, the complexity of European policy-making, strong competing interests, and the existence of negative feedback loops constitute major challenges. If the relationship between societal attitudes and policy-makers' actions is indeed as close as the theoretical framework of this thesis posits, environmental NGOs will have to play a key role in nudging European society in the desired direction of development to kick-start a process of positive feedback loops.

5.3. Limitations of the Analysis

Like any other scholarly work, this thesis has some limitations. These mainly pertain to the quality of the raw data, the operationalisation of UES with the EGCI, potential omitted variable bias, the static nature of the theoretical framework and empirical analysis as well as possible reverse causality.

This thesis fully relies on publicly available data and, although care has been taken to select reliable sources, some of the information is unverified. Furthermore, the replacement of missing values with estimates based on third sources and the mixing of city-level with metropolitan-level data could have affected the results. Another issue concerns the operationalisation of the outcome. While the EGCI does a good job of capturing cities' on-site environmental performance, it completely disregards city dwellers' consumption-related emissions. This is problematic as it biases the analysis in favour of affluent cities with high rates of imported goods. For example, Stockholm's on-site environmental performance suggests that the city managed to reduce its CO_2 emissions per capita by 25% between 1990 and 2013. When local consumption patterns are included in the evaluation, however, Stockholm's CO_2 emissions actually increased by 9% during the same time period (Bradley et al., 2013: 177f.). In light of this, it would be highly valuable to replicate the present analysis with an alternative operationalisation of the outcome which also accounts for cities' consumption-related emissions. Unfortunately, such an indicator does not yet exist for the cities in the sample. Research on urban metabolisms has already transitioned from an exclusive focus on energy flows within the city boundaries to one including the cities' hinterlands and supply chains, but data collection efforts have not yet followed suit (Chávez et al., 2018: 70). Given the scarcity and inadequacy of available urban data in general (EU, 2018: 9; EIU, 2012: 11) and considering cities' key role in the fight against climate change, it is imperative to up-scale current data collection initiatives, improve data quality, and elaborate global benchmarks and indicators that facilitate comparisons between urban areas. Some initial steps have already been taken in this direction, but so far, only few cities are using the proposed measurement frameworks (Chávez et al., 2018: 74f.).

In addition, the analysis suffers from omitted variable bias as QCA can only deal with a limited number of conditions. The list of potentially relevant factors is long (cf. Table A35). For instance, cultural characteristics (cf.: Reese and Rosenfeld, 2012; Dan, 2019), the strength of local civil society (cf. Sharp et al., 2011) or the efficiency of the municipal administration (cf. Povitkina and Matti, 2021) may affect cities' environmental performance. Unfortunately, no local-level data is available for these factors. Another group of variables has been deliberately disregarded as they are arguably less important than the selected conditions. For example, social trust already indirectly captures corruption perceptions (cf. Rothstein, 2005: 3f.). Moreover, population size (cf. Cohen and Dong, 2021) and latitude (Lee, 2013) seem more relevant in the context of highly heterogenous samples. Finally, within the theoretical framework developed in Section 2.2., variables such as the existence of sustainability directors (cf. Pitt, 2010) or membership in transnational city networks (cf. Lee and Koski, 2012) are too closely associated with the outcome. Arguably, these characteristics are as much the *result* of a favourable local societal context as they are a *cause* of it.

Moreover, this thesis is severely constrained by the static nature of the theoretical framework and empirical analysis. Firstly, the exclusive focus on local urban society is problematic, given that climate action is better conceptualised within a framework of polycentric systems (Ostrom, 2010: 554). Cities and their constituent parts are interwoven with multiple actors at different (higher) levels and therefore, they can only ever be studied as "incomplete local societies" (Le Galès, 2002: 13).

Secondly, the mvQCA merely examines a snapshot in time, thereby disregarding the long-term nature of transitioning towards UES. The analysis is unable to detect whether the high-performing cities in the sample are simply those that first initiated pro-environmental efforts. Indeed, two cities which ranked 18th and 19th out of 30 in the 2009 EGCI later won the European Green Capital Award (2020: Lisbon and 2016: Ljubljana) in recognition of their ambitious transformation[39] (European Commission, 2022c). Unfortunately, this problem is pervasive in quantitative studies on the determinants of UES (e.g. Portney, 2003: 222; for rare exceptions cf. Vasi, 2006 (event-history analysis); Wang, 2012 (survival analysis); Pierce et al., 2014 (longitudinal analysis)). Statistical time-series analyses and temporal QCA (tQCA: Caren and Panofsky, 2005) thus represent promising avenues for future research. Alternatively, one could complement the present analysis with a condition reflecting each city's history of sustainability-related action. This is more easier said than done, however, as it is not clear what aspects (e.g.: "green boosterism" rhetoric (Garcia-Lamarca et al., 2021: 99); reaction to war-related destruction (Lachmund, 2013: 32); response to deindustrialisation (Beatley, 2000: 381f.)) or what timeframe should be considered in the coding (e.g., the origins of Berlin's greening policies can be traced back to the nineteenth century (Lachmund, 2013: 221)). Differentiating important from irrelevant historical information therefore requires extensive in-depth research into the trajectories of each individual city.

Finally, the mvQCA results could have been influenced by undetected reverse causality. This possibility applies especially to the wealth and industrial interest variables. High UES can stimulate (foreign) investments and attract tourists as well as the "creative class," i.e.

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[39] It is unlikely, however, that they now outperform the best cities in the 2009 EGCI

well-trained, highly educated individuals who tend to work in better paid sectors and often choose their place of residence based on the quality of life provided by that location (Florida, 2012 (Aufochs Johnston et al., 2013: 11)). The demands and lifestyles of these people may accelerate the transition towards high UES in a positive feedback loop. In contrast, strong industrial interests and UES could be connected in a negative feedback loop. Thus, it seems plausible to believe that cities featuring low UES have laxer environmental policies and regulations in place, which attracts polluting industries. Once the relative importance of the local manufacturing sector increases, local actors have stronger incentives to postpone or prevent the transition towards high UES.

It is less clear, however, why UES should have a direct effect on social trust levels. While high UES may enhance city dwellers' *institutional* trust by underlining the effectiveness of local policies and the efficiency of the municipal administration, this causal explanation is less convincing in the context of citizens' generalised *social* trust. Indeed, sustainability-related activities, such as urban gardening or environmental policies with a strong social or economic development component, might promote social interaction and thereby foster social trust. Nevertheless, in these instances, improvements in trust levels stem from the specific implementation of green initiatives not from high UES per se.

The local climate vulnerability and national context variables have an even lower potential for reverse causality. Admittedly, cities featuring high UES often have qualities that reduce the impact of climate change. Larger green spaces and lower traffic rates, for instance, mitigate the urban heat island effect, flood risk, and air pollution. Nonetheless, the majority of climate-related vulnerabilities cannot be tackled locally (Krause, 2011a: 46f.). Although high UES can reduce cities' vulnerability to some of the components in the vulnerability index constructed for the analysis (urban heat island intensity and flood risk), local adaptation efforts cannot change the fact that average temperatures are rising (which exacerbates the urban heat island effect) or that severe droughts, alluvial rain or wind storms occur with a higher frequency and intensity. Similarly, cities only have a limited influence on national environmental policy-making. While urban areas can serve as role models and encourage other cities and the national government to follow the example they have set, a single city cannot substantially alter the environmental performance of the entire country on its own.

6. Conclusion

In light of cities' comparatively large environmental footprint and continuously growing levels of urbanisation worldwide, the notion of "thinking globally while acting locally" (Ferrão and Fernández, 2013: 120) is more relevant today than ever before. Indeed, European policy-makers underline cities' role as the "drivers of sustainable development in Europe" (EU, 2021: 4). Using a sample of 26 European capital cities, this thesis has performed a multi-value Qualitative Comparative Analysis to identify what combinations of local factors facilitate or prevent the transition towards high urban environmental sustainability (UES) as measured in the 2009 European Green City Index. In line with the theoretical framework which posits that pro-environmental change can only be achieved in contexts where ordinary citizens have the will and capacity to alter their individual and collective behaviour, all explanatory variables capture elements of the opportunity structure of each city's local society. More specifically, the thesis has examined the conjunctural effect of cities' relative wealth, the size of the local manufacturing industry, social trust levels, local climate vulnerability, and the ambitiousness of the national environmental policy context.

The results highlight that no local societal factor is necessary or by itself sufficient for achieving high UES. Rather, cities' ability to improve their environmental performance depends on the interplay between various local characteristics. Consequently, there is no one-size-fits-all solution and no one-condition panacea for cities that struggle to become green. Except for local climate vulnerability which does not seem to affect cities' environmental performance, all examined factors have explanatory value in certain combinations. This demonstration of causal complexity may explain the large number of contradictory findings in the quantitative literature. Additionally, it emphasises that UES cannot be imposed from above and that national policies require local ambition and capacity to be successful. The analysis reveals that a combination of weak industrial interests, high social trust, and a moderately to highly ambitious national environmental policy context facilitates cities' ecological transformation. Moreover, it suggests that in cities with a favourable national context and weak industrial interests, high social trust can compensate low levels of wealth and vice versa.

The identified causal paths towards low UES similarly reject the idea that a single local characteristic is sufficient for the outcome. Thus, a combination of low levels of wealth, low social trust, and an unambitious to average national environmental policy context impedes cities' transition towards high UES. Even when cities with this combination are wealthy instead, they struggle to improve their environmental performance if they are additionally faced with strong industrial interests. Moreover, the absence of high trust (i.e., less than 70% of city residents (somewhat) agree that others can be trusted) is a necessary condition for cities' inability to become green. This implies that particularly poorer cities could benefit from putting more effort into fostering social trust. As this thesis has shown in the discussion section, there are many non-monetary options for doing so. Overall, the findings are robust to the use of equally plausible alternative research designs and they enjoy high internal validity.

It is a good sign that European policy-makers are already developing and implementing many strategies that have the potential to enhance cities' opportunity structure. To what extent this potential can be tapped, however, depends on how serious they are about the proposed changes and how effectively the policies are implemented on all relevant levels. In any case, given the complexity of European policy-making and the existence of powerful negative feedback loops, environmental NGOs will have to play a key role in nudging European society in the right direction of development to kick-start the creation of *positive* feedback loops. As this thesis has argued, that process should start at the local level.

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APPENDIX

Table A1: EGCI Ranking and Sub-indices (Shields et al., 2009: 10f.)

Overall Rank	Overall City	Overall Score	CO_2 Rank	CO_2 City	CO_2 Score	Energy Rank	Energy City	Energy Score
1	Copenhagen	87,31	1	Oslo	9,58	1	Oslo	8,71
2	Stockholm	86,65	2	Stockholm	8,99	2	Copenhagen	8,69
3	Oslo	83,98	3	Zurich	8,48	3	Vienna	7,76
4	Vienna	83,34	4	Copenhagen	8,35	4	Stockholm	7,61
5	Amsterdam	83,03	5	Brussels	8,32	5	Amsterdam	7,08
6	Zurich	82,31	6	Paris	7,81	6	Zurich	6,92
7	Helsinki	79,29	7	Rome	7,57	7	Rome	6,40
8	Berlin	79,01	8	Vienna	7,53	8	Brussels	6,19
9	Brussels	78,01	9	Madrid	7,51	9	Lisbon	5,77
10	Paris	73,21	10	London	7,34	10	London	5,64
11	London	71,56	11	Helsinki	7,30	11	Istanbul	5,55
12	Madrid	67,08	12	Amsterdam	7,10	12	Madrid	5,52
13	Vilnius	62,77	13	Berlin	6,75	13	Berlin	5,48
14	Rome	62,58	14	Ljubljana	6,67	14	Warsaw	5,29
15	Riga	59,57	15	Riga	5,55	15	Athens	4,94
16	Warsaw	59,04	16	Istanbul	4,86	16	Paris	4,66
17	Budapest	57,55	=17	Athens	4,85	17	Belgrade	4,65
18	Lisbon	57,25	=17	Budapest	4,85	18	Dublin	4,55
19	Ljubljana	56,39	19	Dublin	4,77	19	Helsinki	4,49
20	Bratislava	56,09	20	Warsaw	4,65	20	Zagreb	4,34
21	Dublin	53,98	21	Bratislava	4,54	21	Bratislava	4,19
22	Athens	53,09	22	Lisbon	4,05	22	Riga	3,53
23	Tallinn	52,98	23	Vilnius	3,91	23	Bucharest	3,42
24	Prague	49,78	24	Bucharest	3,65	24	Prague	3,26
25	Istanbul	45,20	25	Prague	3,44	25	Budapest	2,43
26	Zagreb	42,36	26	Tallinn	3,40	26	Vilnius	2,39
27	Belgrade	40,03	27	Zagreb	3,20	27	Ljubljana	2,23
28	Bucharest	39,14	28	Belgrade	3,15	28	Sofia	2,16
29	Sofia	36,85	29	Sofia	2,95	29	Tallinn	1,70
30	Kiev	32,33	30	Kiev	2,49	30	Kiev	1,50

Buildings Rank	Buildings City	Buildings Score	Transport Rank	Transport City	Transport Score	Water Rank	Water City	Water Score
=1	Berlin	9,44	1	Stockholm	8,81	1	Amsterdam	9,21
=1	Stockholm	9,44	2	Amsterdam	8,44	2	Vienna	9,13
3	Oslo	9,22	3	Copenhagen	8,29	3	Berlin	9,12
4	Copenhagen	9,17	4	Vienna	8,00	4	Brussels	9,05
5	Helsinki	9,11	5	Oslo	7,92	=5	Copenhagen	8,88
6	Amsterdam	9,01	6	Zurich	7,83	=5	Zurich	8,88
7	Paris	8,96	7	Brussels	7,49	7	Madrid	8,59
8	Vienna	8,62	8	Bratislava	7,16	8	London	8,58
9	Zurich	8,43	9	Helsinki	7,08	9	Paris	8,55
10	London	7,96	=10	Budapest	6,64	10	Prague	8,39
11	Lisbon	7,34	=10	Tallinn	6,64	11	Helsinki	7,92
12	Brussels	7,14	12	Berlin	6,60	12	Tallinn	7,90
13	Vilnius	6,91	13	Ljubljana	6,17	13	Vilnius	7,71
14	Sofia	6,25	14	Riga	6,16	14	Bratislava	7,65
15	Rome	6,16	15	Madrid	6,01	15	Athens	7,26
16	Warsaw	5,99	16	London	5,55	=16	Dublin	7,14
17	Madrid	5,68	17	Athens	5,48	=16	Stockholm	7,14
18	Riga	5,43	18	Rome	5,31	18	Budapest	6,97
19	Ljubljana	5,20	=19	Kiev	5,29	19	Rome	6,88
20	Budapest	5,01	=19	Paris	5,29	20	Oslo	6,85
21	Bucharest	4,79	=19	Vilnius	5,29	21	Riga	6,43
22	Athens	4,36	=19	Zagreb	5,29	22	Kiev	5,96
23	Bratislava	3,54	23	Istanbul	5,12	23	Istanbul	5,59
24	Dublin	3,39	24	Warsaw	5,11	24	Lisbon	5,42
25	Zagreb	3,29	25	Lisbon	4,73	25	Warsaw	4,90
26	Prague	3,14	26	Prague	4,71	26	Zagreb	4,43
27	Belgrade	2,89	27	Sofia	4,62	27	Ljubljana	4,19
28	Istanbul	1,51	28	Bucharest	4,55	28	Bucharest	4,07
29	Tallinn	1,06	29	Belgrade	3,98	29	Belgrade	3,90
30	Kiev	0,00	30	Dublin	2,89	30	Sofia	1,83

Waste and land use Rank	Waste and land use City	Waste and land use Score	Air quality Rank	Air quality City	Air quality Score	Environmental governance Rank	Environmental governance City	Environmental governance Score
1	Amsterdam	8,98	1	Vilnius	9,37	=1	Brussels	10,00
2	Zurich	8,82	2	Stockholm	9,35	=1	Copenhagen	10,00
3	Helsinki	8,69	3	Helsinki	8,84	=1	Helsinki	10,00
4	Berlin	8,63	4	Dublin	8,62	=1	Stockholm	10,00
5	Vienna	8,60	5	Copenhagen	8,43	=5	Oslo	9,67
6	Oslo	8,23	6	Tallinn	8,30	=5	Warsaw	9,67
7	Copenhagen	8,05	7	Riga	8,28	=7	Paris	9,44
8	Stockholm	7,99	8	Berlin	7,86	=7	Vienna	9,44
9	Vilnius	7,31	9	Zurich	7,70	9	Berlin	9,33
10	Brussels	7,26	10	Vienna	7,59	10	Amsterdam	9,11
11	London	7,16	11	Amsterdam	7,48	11	Zurich	8,78
12	Paris	6,72	12	London	7,34	12	Lisbon	8,22
13	Dublin	6,38	13	Paris	7,14	=13	Budapest	8,00
14	Prague	6,30	14	Ljubljana	7,03	=13	Madrid	8,00
15	Budapest	6,27	15	Oslo	7,00	=15	Ljubljana	7,67
16	Tallinn	6,15	16	Brussels	6,95	=15	London	7,67
17	Rome	5,96	17	Rome	6,56	17	Vilnius	7,33
18	Ljubljana	5,95	18	Madrid	6,52	18	Tallinn	7,22
19	Madrid	5,85	19	Warsaw	6,45	19	Riga	6,56
20	Riga	5,72	20	Prague	6,37	20	Bratislava	6,22
21	Bratislava	5,60	21	Bratislava	5,96	=21	Athens	5,44
22	Lisbon	5,34	22	Budapest	5,85	=21	Dublin	5,44
23	Athens	5,33	23	Istanbul	5,56	=23	Kiev	5,22
24	Warsaw	5,17	24	Lisbon	4,93	=23	Rome	5,22
25	Istanbul	4,86	25	Athens	4,82	25	Belgrade	4,67
26	Belgrade	4,30	26	Zagreb	4,74	26	Zagreb	4,56
27	Zagreb	4,04	27	Bucharest	4,54	27	Prague	4,22
28	Bucharest	3,62	28	Belgrade	4,48	28	Sofia	3,89
29	Sofia	3,32	29	Sofia	4,45	29	Istanbul	3,11
30	Kiev	1,43	30	Kiev	3,97	30	Bucharest	2,67

Table A2: Detailed Description of EGCI Indicators (EIU, 2012 (Pace et al., 2016: 10-12))

List of categories, indicators and their weightings					
Category	**Indicator**	**Type**	**Weighting**	**Description**	**Normalisation technique**
CO_2	CO_2 emissions	Quantitative	33 %	Total CO_2 emissions, in tonnes per head.	Min-max.
	CO_2 intensity	Quantitative	33 %	Total CO_2 emissions, in grams per unit of real GDP (2000 base year).	Min-max; lower benchmark of 1,000 grams inserted to prevent outliers.
	CO_2 reduction strategy	Qualitative	33 %	An assessment of the ambitiousness of CO_2 emissions reduction strategy.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
Energy	Energy consumption	Quantitative	25 %	Total final energy consumption, in gigajoules per head.	Min-max.
	Energy intensity	Quantitative	25 %	Total final energy consumption, in megejoules per unit of real GDP (in euros, base year 2000).	Min-max; lower benchmark of BMJ/€GDP. Inserted to prevent outliers.
	Renewable energy consumption	Quantitative	25 %	The percentage of total energy derived from renew-able sources, as a share of the city`s total energy consumption, in terajoules.	Scored against an upper benchmark of 20 % (EU target).
	Clean and efficient energy policies	Qualitative	25 %	An assessment of the extensiveness of policies promoting the use of clean and efficient energy.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
Buildings	Energy consumption of residential buildings	Quantitative	33 %	Total final energy consump-tion in the residential sector, per square metre of residential floor space.	Min-max.
	Energy-efficient buildings standards	Qualitative	33 %	An assessment the extensiveness of cities`energy efficiency standards for buildings.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
	Energy-efficient buildings initiatives	Qualitative	33 %	An assessment of the extensiveness of efforts to promote energy efficiency of buildings.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
Transport	Use of non-car transport	Quantitative	29 %	The total percentage of the working population travelling to work on public transport, by bicyde and by foot.	Converted to a scale of 0 to 10,
	Size of non-car transport network	Quantitative	14 %	Length of cycling lanes and the public transport network, in km per square metre of city area.	Min-max. Upper benchmarks of 4 km/km² and 5 km/km² inserted to prevent outliers.
	Green transport promotion	Qualitative	29 %	An assessment of the extensiveness of efforts to increase the use of cleaner transport.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
	Congestion reduction policies	Qualitative	29 %	An assessment of efforts to reduce vehicle traffic within the city.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.

Water	Water consumption	Quantitative	25%	Total annual water consumption, in cubic metres per head.	Min-max.
	Water system leakages	Quantitative	25%	Percentages of water lost in the water distribution system.	Scored against an upper target of 5%.
	Wastewater treatment	Quantitative	25%	Percentages of dwelings connected to the sewage system.	Scored against an upper benchmark of 100% and a lower benchmark of 80%.
	Water efficiency and treatment policies	Qualitative	25%	An assessment of the comprehensiveness of measures to improve the efficiency of water usage and the treatment of wastewater.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
Waste and land use	Municipal waste production	Quantitative	25%	Total annual municipal waste collected, in kg per head.	Scored against an upper benchmark of 300 kg (EU target). A lower benchmark of 1,000 kg inserted to prevent outliers.
	Waste recycling	Quantitative	25%	Percentage of municipal waste recycled.	Scored against an upper benchmark of 50% (EU target).
	Waste reduction and policies	Qualitative	25%	An assessment of the comprehensiveness of measures to reduce the overall production of waste, and to recycle and reuse waste.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
	Green land use policies	Qualitative	25%	An assessment of the comprehensiveness of policies to contain the urban sprawland promote the availability of green spaces.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
Air quality	Nitrogen dioxide	Quantitative	20%	Annual daily mean of NO_2 emissions.	Scored against a lower benchmark of 40 ug/m^3 (EU target).
	Ozone	Quantitative	20%	Annual daily mean of O_3 emissions.	Scored against a lower benchmark of 120 ug/m^3 (EU target).
	Particulate matter	Quantitative	20%	Annual daily mean of PM_{10} emissions.	Scored against a lower benchmark of 50 ug/m^3 (EU target).
	Sulphur dioxide	Quantitative	20%	Annual daily mean of SO_2 emissions.	Scored against a lower benchmark of 40 ug/m^3 (EU target).
	Clean air policies	Qualitative	20%	An assessment of the extensiveness of policies to improve air quality.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
Environmental governance	Green action plan	Qualitative	33%	An assessment of the ambitiousness and comprehensiveness of strategies to improve and monitor environmental performance.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.

	Green management	Qualitative	33%	An assessment of the management of environmental issues and commitment to achieving international environmental standards.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.
	Public participation in green policy	Qualitative	33%	An assessment of the extent to which citizens may participate in environmental decision-making.	Scored by Economist intelligence Unit analysts on a scale of 0 to 10.

Graph A1: Cities' Cumulative Scores in the EGCI (Venkatesh, 2014: 319)

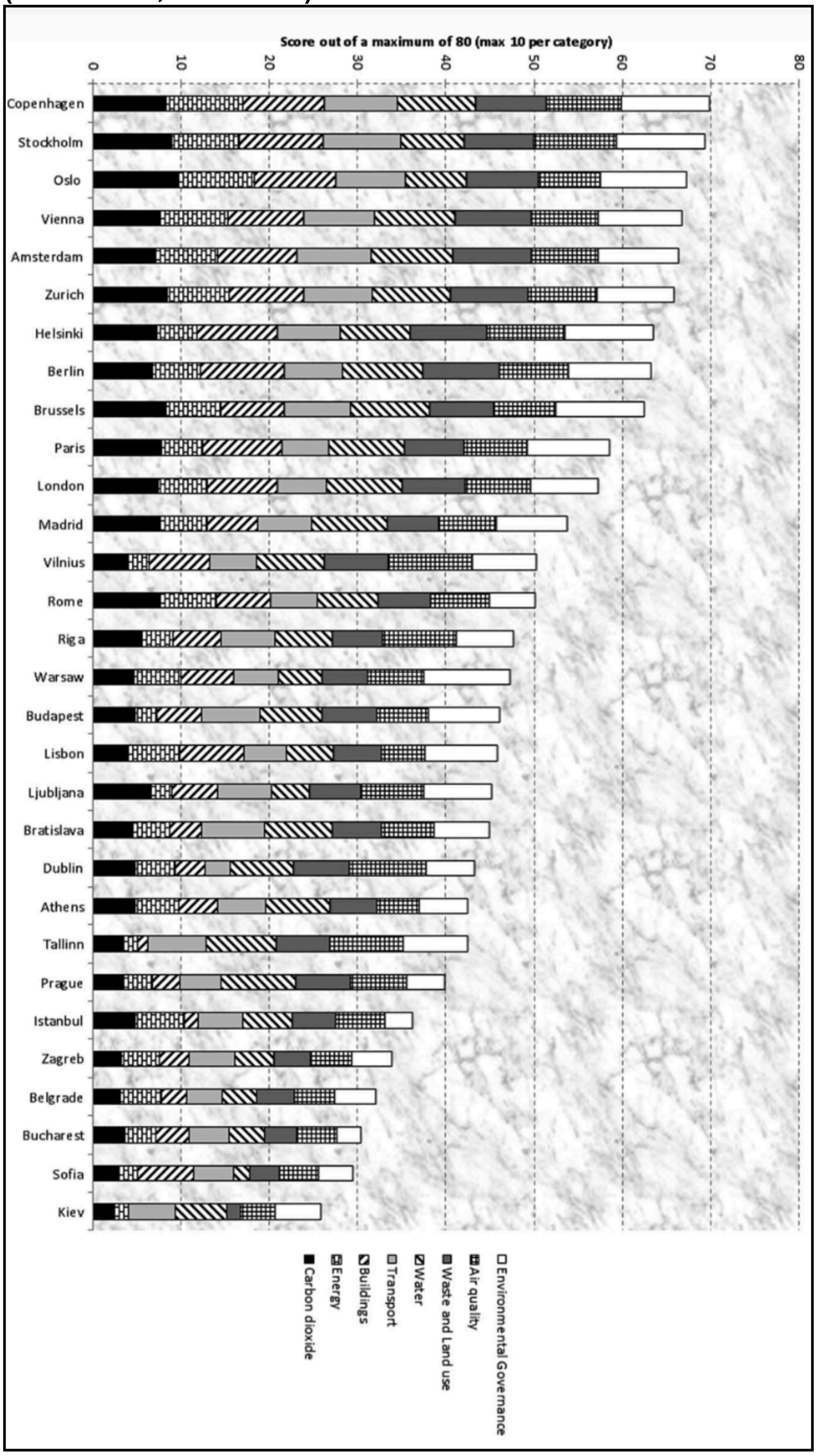


Table A3: Metropolitan-level GDP/Capita for 2008 (Eurostat, 2021a)

City	GDP/Capita (in Euros at 2020 Price Levels)	QCA Coding****
Brussels	46,600	1
Sofia	9,600	0
Prague	24,800	0
Copenhagen	50,800	1
Berlin	27,300	0
Tallinn	17,700	0
Dublin	51,900	1
Athens	28,900	0
Madrid	32,000	0
Paris	54,790*	1
Zagreb	15,200	0
Rome	39,600	1
Riga	15,400	0
Vilnius	15,300	0
Budapest	17,700	0
Vienna	40,400	1
Warsaw	20,500	0
Lisbon	24,300	0
Bucharest	17,100	0
Ljubljana	27,200	0
Bratislava	28,900	0
Helsinki	48,900	1
Stockholm	53,300	1
Oslo	65,800	1
Zurich	119,435**	1
London	45,985***	1

* *Data was taken from a different source and subsequently standardised: The original data (€47,797) provided by the French statistical office (INSEE, 2009 (Actualitix, 2012)) refers to the year 2008 and is expressed in Euros at 2009 price levels. The inflation rate in the eurozone between 2009 and 2020 was 14.63% (Inflation Tool, 2022). This means that, when expressed in million Euros at 2020 price levels, Paris had a GDP/capita of approx. €54,790 [€47,797 * 1.1463] in 2008.*

** *Data was taken from a different source and subsequently standardised: The original data (CHF 135,976) provided by the Swiss statistical office (Bundesamt für Statistik, 2021) refers to the year 2008 and is expressed in CHF at 2018 price levels. In 2018, one Euro was worth CHF 1.155 (Eurostat, 2022e). Thus, as expressed in Euros at 2018 price levels, Zurich had a GDP/capita of approx. €117,728 [CHF 135,976 / 1.155]. The inflation rate in the eurozone between 2018 and 2020 was 1.45% (Inflation Tool, 2022). Hence, as expressed in Euros at 2020 price levels, Zurich had a GDP/capita rate of €119,435*

*[€117,728 * 1.0145] in 2008.*

*** *Data was taken from a different source and subsequently standardised: The original data (GBP 42,335) provided by the British statistical office (Office for National Statistics, 2021) refers to the year 2008 and is expressed in GBP at 2021 price levels. In 2021, one Euro was worth GBP 0.8596 (Eurostat, 2022e). Thus, as expressed in Euros at 2021 price levels, London had a GDP/capita of approx. €49,250 [GBP 42,335 / 0.8596]. The inflation rate in the eurozone between 2020 and 2021 was 2.59% (Inflation Tool, 2022). Hence, as expressed in Euros at 2020 price levels, London had a GDP/capita rate of approx. €45,985 [€47,208 * 0.9741] in 2008.*

**** *The selected threshold is a GDP/capita rate of €35,000*

Table A4: Share of Manufacturing GVA[40] of All NACE[41] Activities in 2008 (Eurostat, 2021b)

CITY	GVA in Million € in Manufacturing	GVA in Million € in All NACE Activities	Share of Manufacturing GVA of All NACE Activities	QCA Coding*
Brussels	8,747.60	96,142.60	9.1 %	0
Sofia	1,322.82	13,179.67	10.04 %	0
Prague	8,637.78	54,934.10	15.72 %	1
Copenhagen	8,548.96	80,249.61	10.65 %	0
Berlin	13,303.57	118,978.32	11.18 %	0
Tallinn	1,094.30	8,710.30	12.56 %	1
Dublin	12,098.85	87,911.83	13.76 %	1
Athens	7,187.75	97,673.07	7.36 %	0
Madrid	14,001.80	185,458.50	7.55 %	0
Paris	—	—	—	0**
Zagreb	2,548.03	16,111.39	15.82 %	1
Rome	8,106.90	140,763.40	5.76 %	0
Riga	1,354.80	14,777.38	9.17 %	0
Vilnius	1,382.80	11,325.60	12.21 %	1
Budapest	6,549.46	44,244.21	14.80 %	1
Vienna	9,916.00	92,299.00	10.74 %	0
Warsaw	4,257.56	50,801.23	8.38 %	0
Lisbon	4,589.28	58,910.36	7.79 %	0
Bucharest	5,184.19	34,432.68	15.06 %	1
Ljubljana	1,590.91	11,933.57	13.33 %	1
Bratislava	2,205.07	15,964.51	13.81 %	1
Helsinki	11,229.34	64,244.06	17.48 %	1

[40] Gross value added

[41] Nomenclature of economic activities developed by the European Community

Stockholm	—	92,682.11	—	0***
Oslo	3,729.46	64,572.27	5.78 %	0
Zurich	—	—	—	0****
London	—	—	—	0*****

* *The selected threshold is 12%*

** *The share for the year 2015 is 7.14% (Eurostat, 2021b) and as this percentage does not change dramatically within such a short period of time, it is reasonable to believe that it was also below the chosen threshold in 2008.*

*** *In 2017, Stockholm's manufacturing sector accounted for roughly 8.3% of total GVA (OECD, 2020: 6). The source also indicates that since 2000, this percentage has decreased by >2% per year. With this information, it is possible to calculate that in 2008, the share of manufacturing was >9.92%. According to another source, the share of manufacturing GVA in the Stockholm region was 10.65% in 2011 (Knoema, 2022a). Together, these pieces of information suggest that in 2008, Stockholm's share of manufacturing GVA was about 11%.*

**** *Unfortunately, all available data for Zurich combines the GVA by the mining, manufacturing, and construction sectors so that it is not possible to see the individual contribution of the manufacturing sector. In 2010, these three industries accounted for approximately 13.95% of Zurich's total GVA (Knoema, 2022b). As it is unlikely that the construction sector only contributes a very small proportion of GVA, it is reasonable to believe that Zurich's share of manufacturing GVA was well below the selected threshold in 2008.*

***** *London's manufacturing sector currently accounts for slightly more than 2% of GVA (Cities of Making, 2022) and thus, the city was most likely below the threshold in 2008.*

Table A5: Standardisation* of Response Rates to the "Trust" Survey Item for 2009 (Eurostat, 2021c)**

CITY	Non-response Rate	Response Rate	"Strongly Agree"	"Somewhat Agree"	"Positive Response"	Standardised "Positive Response" Rate
Brussels	9.0 %	91.0 %	5.0 %	44.1 %	49.1 %	54.0 %
Sofia	7.9 %	92.1 %	5.0 %	15.5 %	20.5 %	22.3 %
Prague	10.1 %	89.9 %	4.6 %	30.4 %	35 %	38.9 %
Copenhagen	6.5 %	93.5 %	19.7 %	58.7 %	78.4 %	83.9 %
Berlin	4.9 %	95.1 %	13.0 %	59.7 %	72.7 %	76.4 %
Tallinn	12.9 %	87.1 %	10.8 %	36.3 %	47.1 %	54.1 %
Dublin	4.8 %	95.2 %	27.1 %	36.0 %	63.1 %	66.3 %
Athens	2.4 %	97.6 %	3.0 %	18.8 %	21.8 %	22.3 %
Madrid	2.7 %	97.3 %	11.6 %	57.5 %	69.1 %	71.0 %
Paris	5.9 %	94.1 %	4.6 %	40.6 %	45.2 %	48.0 %
Zagreb	3.6 %	96.4 %	15.1 %	21.9 %	37.0 %	38.4 %
Rome	4.6 %	95.4 %	8.1 %	40.3 %	48.4 %	50.7 %
Riga	6.9 %	93.1 %	6.5 %	24.4 %	30.9 %	33.2 %
Vilnius	10.2 %	89.8 %	8.9 %	32.1 %	41.0 %	45.7 %
Budapest	6.2 %	93.8 %	3.4 %	24.2 %	27.6 %	29.4 %

Vienna	3.8 %	96.2 %	16.8 %	56.9 %	73.7 %	76.6 %
Warsaw	8.1 %	91.9 %	7.6 %	32.6 %	40.2 %	43.7 %
Lisbon	4.0 %	96.0 %	5.6 %	49.0 %	54.6 %	56.9 %
Bucharest	4.7 %	95.3 %	5.6 %	19.5 %	25.1 %	26.3 %
Ljubljana	5.5 %	94.5 %	10.0 %	46.9 %	56.9 %	60.2 %
Bratislava	13.8 %	86.2 %	3.7 %	32.1 %	35.8 %	41.5 %
Helsinki	1.8 %	98.2 %	17.6 %	58.9 %	76.5 %	77.9 %
Stockholm	4.4 %	95.6 %	31.2 %	52.4 %	83.6 %	87.4 %
Oslo	—	—	—	—	—	—
Zurich	—	—	—	—	—	—
London	—	—	—	—	—	—

* *Exact calculations:*
1) 100% — Non-response Rate = Response Rate
2) "Strongly Agree" + "Mostly Agree" = "Positive Response"
*3) "Positive Response" * 100 / Response Rate = Standardised "Positive Response" Rate*

** *Answer options included in the original dataset: "Strongly Agree," "Somewhat Agree," "Somewhat Disagree," "Strongly Disagree," "Don't Know / No Answer"*

Table A6: Standardisation* of Response Rates to the "Trust" Survey Item for 2012 (Eurostat, 2021c)**

CITY	Non-response Rate	Response Rate	"Strongly Agree"	"Somewhat Agree"	"Positive Response"	Standardised "Positive Response" Rate
Brussels	4.0 %	96.0 %	5.0 %	37.0 %	42.0 %	43.8 %
Sofia	5.0 %	95.0 %	6.0 %	33.0 %	39.0 %	41.1 %
Prague	6.0 %	94.0 %	3.0 %	36.0 %	39.0 %	41.5 %
Copenhagen	3.0 %	97.0 %	29.0 %	57.0 %	86.0 %	88.7 %
Berlin	7.0 %	93.0 %	9.0 %	53.0 %	62.0 %	66.7 %
Tallinn	16.0 %	84.0 %	7.0 %	48.0 %	55.0 %	65.5 %
Dublin	2.0 %	98.0 %	18.0 %	50.0 %	68.0 %	69.4 %
Athens	2.0 %	98.0 %	3.0 %	17.0 %	20.0 %	20.4 %
Madrid	4.0 %	96.0 %	19.0 %	48.0 %	67.0 %	69.8 %
Paris	4.0 %	96.0 %	5.0 %	40.0 %	45.0 %	46.9 %
Zagreb	4.0 %	96.0 %	6.0 %	45.0 %	51.0 %	53.1 %
Rome	5.0 %	95.0 %	8.0 %	42.0 %	50.0 %	52.6 %
Riga	3.0 %	97.0 %	5.0 %	38.0 %	43.0 %	44.3 %
Vilnius	7.0 %	93.0 %	7.0 %	45.0 %	52.0 %	55.9 %
Budapest	3.0 %	97.0 %	3.0 %	29.0 %	32.0 %	33.0 %
Vienna	4.0 %	96.0 %	13.0 %	62.0 %	75.0 %	78.1 %

Warsaw	7.0 %	93.0 %	3.0 %	39.0 %	42.0 %	45.2 %
Lisbon	4.0 %	96.0 %	3.0 %	48.0 %	51.0 %	53.1 %
Bucharest	5.0 %	95.0 %	3.0 %	28.0 %	31.0 %	32.6 %
Ljubljana	5.0 %	95.0 %	20.0 %	43.0 %	63.0 %	66.3 %
Bratislava	5.0 %	95.0 %	3.0 %	32.0 %	35.0 %	36.8 %
Helsinki	1.0 %	99.0 %	26.0 %	60.0 %	86.0 %	86.9 %
Stockholm	2.0 %	98.0 %	27.0 %	54.0 %	81.0 %	82.7 %
Oslo	2.0 %	98.0 %	27.0 %	54.0 %	81.0 %	82.7 %
Zurich	4.0 %	96.0 %	20.0 %	58.0 %	78.0 %	81.3 %
London	6.0 %	94.0 %	9.0 %	46.0 %	55.0 %	58.5 %

* *Exact calculations:*
1) 100% — Non-response Rate = Response Rate
2) "Strongly Agree" + "Mostly Agree" = "Positive Response"
*3) "Positive Response" * 100 / Response Rate = Standardised "Positive Response" Rate*

** *Answer options included in the original dataset: "Strongly Agree," "Somewhat Agree," "Somewhat Disagree," "Strongly Disagree," "Don't Know / No Answer"*

Table A7: Standardised "Positive Response" Rates to the "Trust" Survey Item* (Eurostat, 2021c)

City	"Positive Response" Rate in 2009	"Positive Response" Rate in 2012	QCA Coding***
Brussels	54.0 %	43.8 %	1 [0]
Sofia	22.3 %	41.1 %	0
Prague	38.9 %	41.5 %	0
Copenhagen	83.9 %	88.7 %	2
Berlin	76.4 %	66.7 %	2 [1]
Tallinn	54.1 %	65.5 %	1
Dublin	66.3 %	69.4 %	1
Athens	22.3 %	20.4 %	0
Madrid	71.0 %	69.8 %	1
Paris	48.0 %	46.9 %	0
Zagreb	38.4 %	53.1 %	0 [1]
Rome	50.7 %	52.6 %	1
Riga	33.2 %	44.3 %	0
Vilnius	45.7 %	55.9 %	0 [1]
Budapest	29.4 %	33.0 %	0
Vienna	76.6 %	78.1 %	2
Warsaw	43.7 %	45.2 %	0

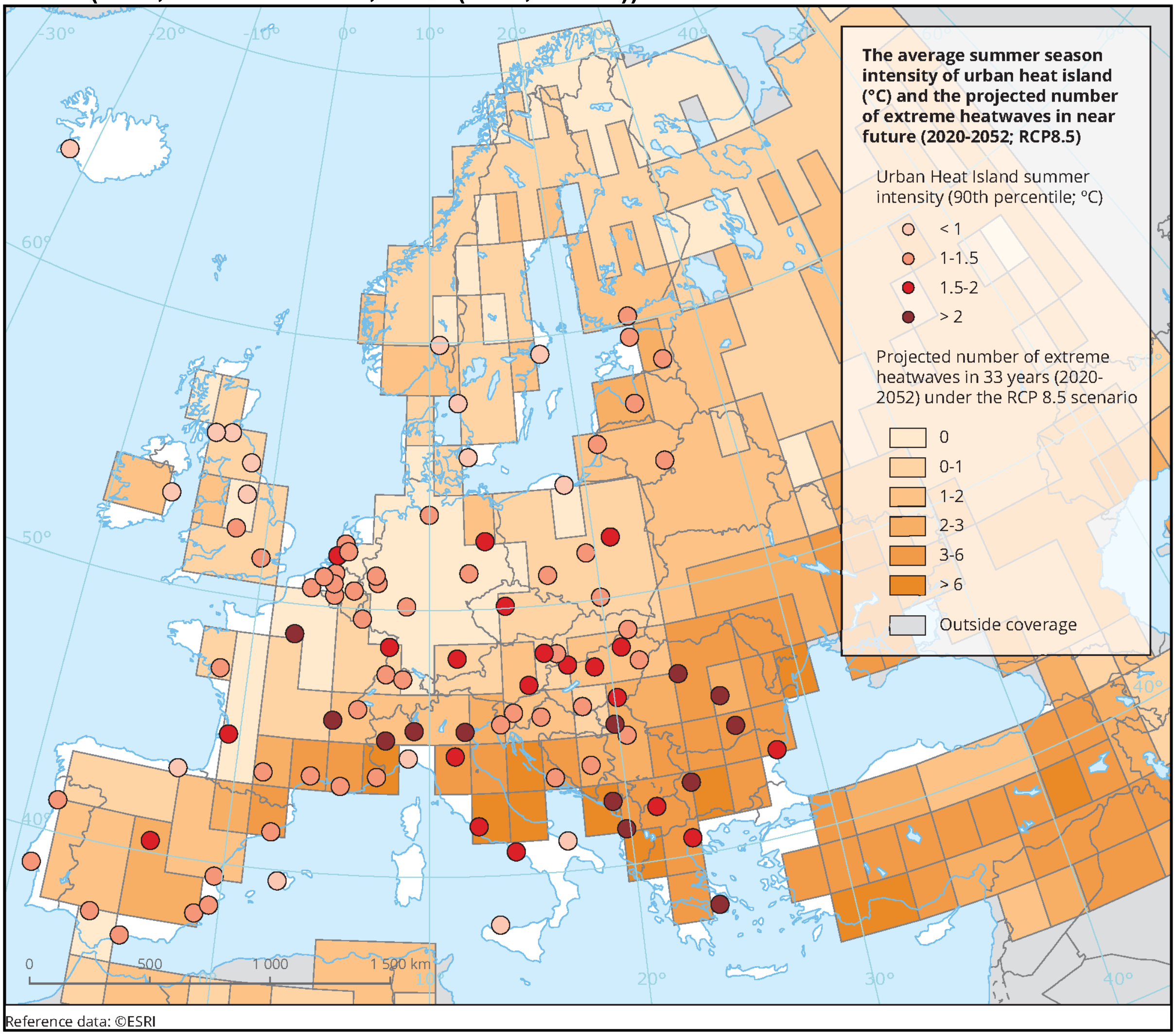
Lisbon	56.9 %	53.1 %	1
Bucharest	26.3 %	32.6 %	0
Ljubljana	60.2 %	66.3 %	1
Bratislava	41.5 %	36.8 %	0
Helsinki	77.9 %	86.9 %	2
Stockholm	87.4 %	82.7 %	2
Oslo	—	82.7 %	2
Zurich	—	81.3 %	2
London	—	58.5 %	1

* *Cities with >10% difference between 2009 and 2012 are highlighted in orange*
Cities whose QCA coding changes depending on whether data for 2009 or 2012 is used are highlighted in red [Light red = minor issue as tendency seems clear // Dark red = major issue as tendency is less clear]

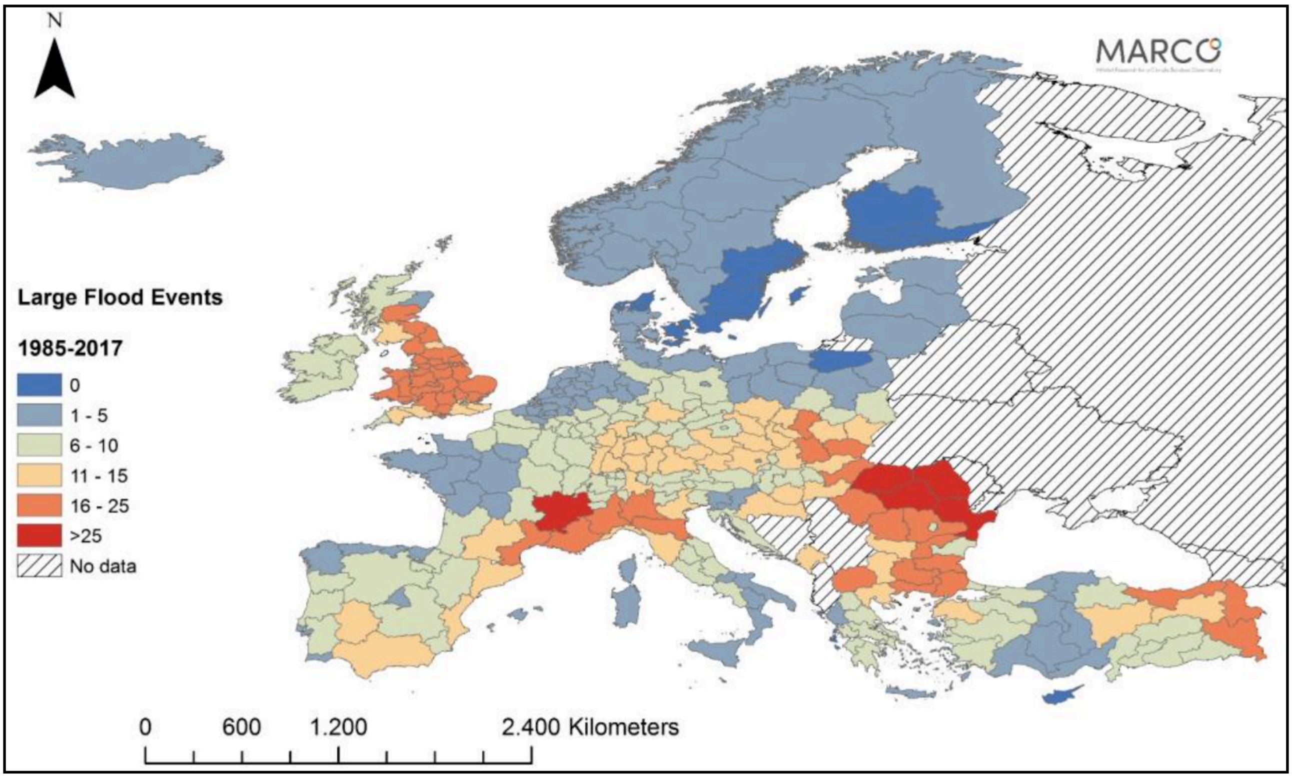
** *>75% = 2; 50%—75% = 1; <50% = 0*

Graph A2: Slight Differences between the 2009 and 2012 Survey Rounds (Eurostat, 2021c)

Graph A3: Average Intensity of Past and Expected Future Heatwaves for 100 European Cities (EEA, 2019 and VITO, 2019 (EEA, 2020b))



Graph A4: Spatial Distribution of Large Flood Events, NUTS 2 Regions, 1985-2017 (GAALFE, 2017 (Kaspersen et al., 2017: 16))



Graph A5: Trends in the Frequency of Meteorological Droughts, 1950-2012 (EEA, 2016)

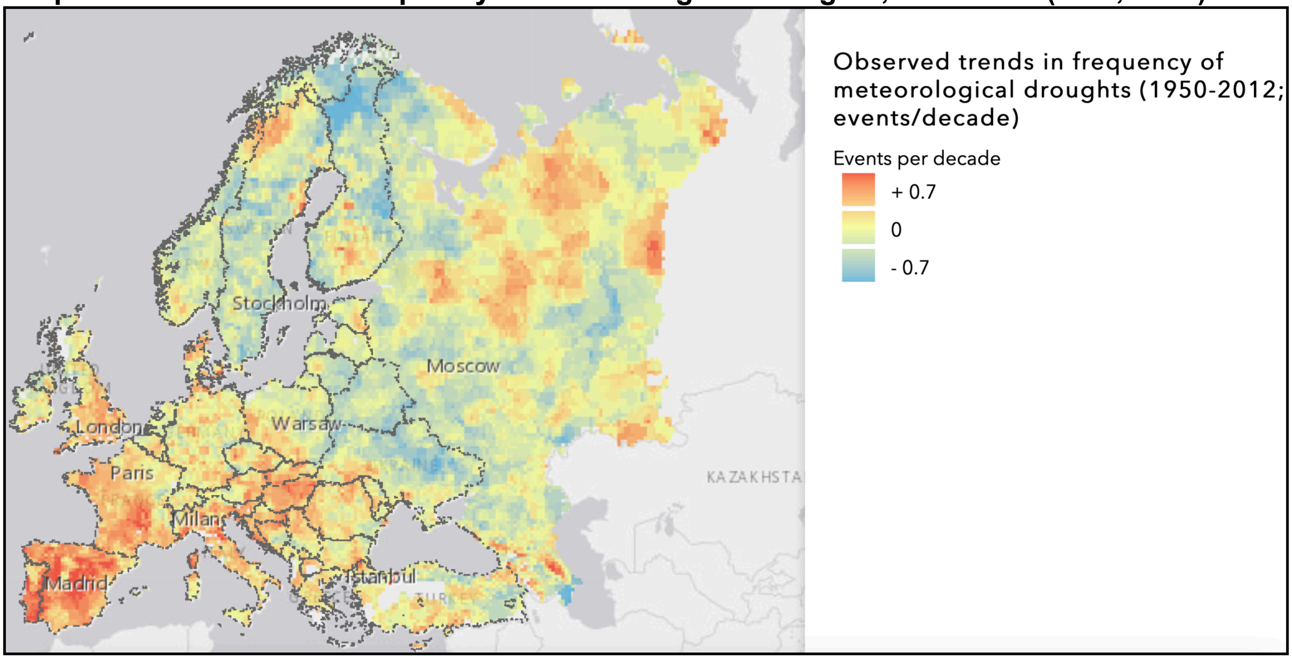


Table A8: Excerpt from the Extreme Wind Storms Catalogue (Met Office et al., 2022)

Storm	Date+	Insured loss (USD, indexed to 2012)**	Affected countries	U_{max}++(ms^{-1})	Lowest MSLP*** (hPa)	Maximum vorticity+++(10^{-5-1})	S_{ft}****
Nov 81	2/11/1981	NA	Denmark and Poland	36.01	979.49	9.42	32.07
Jan 83	18/1/1983	NA	Denmark, Poland and Sweden	34.53	959.83	9.72	17.94
Feb 83	1/2/1983	NA	Ireland and United Kingdom	32.29	952.87	10.79	24.16
13 Jan 84	13/1/1984	NA	Norway and United Kingdom	33.75	942.63	11.02	27.53
14 Jan 84	14/1/1984	NA	Netherlands	34.71	961.23	8.00	27.14
Nov 84	23/11/1984	NA	France	35.54	964.96	7.54	58.36
Jan 86	20/1/1986	NA	Denmark and Germany	31.86	971.06	9.44	29.77
Mar 86	25/3/1986	NA	Netherlands	30.77	955.76	9.21	16.40
Oct 86	20/10/1986	NA	Germany, Netherlands and Poland	35.80	966.33	7.73	26.79
Great Storm of 87	16/10/1987	6.3bn	France and United Kingdom	39.53	955.97	10.17	38.42
Feb 88	9/2/1988	NA	Ireland and United Kingdom	35.79	941.97	13.25	17.42
Nov 88	29/11/1988	NA	Belarus, Lithuania and Poland	30.84	967.04	10.04	18.33
Daria (Burns' Day storm)	25/1/1990	8.2bn	Belgium, France, Germany, Netherlands and United Kingdom	37.92	948.62	11.89	48.05
Herta	3/2/1990	1.5bn	Belgium, France, Germany, Netherlands and United Kingdom	33.16	944.78	13.36	15.94
8 Feb 90	8/2/1990	NA	Denmark, France and United Kingdom	35.02	974.35	8.78	15.90
11 Feb 90	11/2/1990	NA	France and United Kingdom	31.90	957.28	10.47	16.72
Vivian	26/2/1990	5.6bn	Belgium, France, Germany, Netherlands and United Kingdom	35.16	940.30	9.53	40.86
Wiebke	28/2/1990	1.4bn	Belgium, France, Germany, Netherlands, Switzerland and United Kingdom	32.24	944.18	7.77	25.16
5 Jan 91	5/1/1991	NA	Ireland and United Kingdom	38.52	948.01	11.61	25.67
8 Jan 91	8/1/1991	NA	Denmark, France and United Kingdom	35.97	963.40	7.59	18.94
Nov 92	25/11/1992	NA	France, Germany and Poland	39.07	985.13	6.72	24.93
13 Jan 93	13/1/1993	NA	Denmark, Germany, Lativa and Lithuania	40.48	970.74	8.45	48.70
23 Jan 93	23/1/1993	NA	Denmark, Germany, Ireland, Poland and United Kingdom	36.54	965.52	10.46	43.04
Dec 93	8/12/1993	NA	Ireland, Netherlands and United Kingdom	36.97	958.75	12.09	49.52
Lore	28/1/1994	NA	Denmark, Ireland and United Kingdom	31.60	961.29	12.53	13.82
Jan 95	22/1/1995	NA	France	36.33	983.03	5.29	17.07
Feb 96	7/2/1996	NA	France	33.66	975.97	8.08	15.94
Oct 96	28/10/1996	NA	Denmark, Ireland, Norway and United Kingdom	35.87	968.71	11.09	16.98
Nov 96	6/11/1996	NA	Demark and United Kingdom	36.19	959.39	10.36	18.26

Mar 97	28/3/1997	NA	Denmark, Germany and Poland	31.22	975.98	7.53	15.92
Yuma	24/12/1997	NA	United Kingdom	39.92	971.70	8.64	13.04
Fanny	4/1/1998	NA	United Kingdom	34.60	966.23	8.30	12.30
Xylia	28/10/1998	NA	Denmark, Germany and Netherlands	26.72	960.80	5.50	5.63
Stephen	26/12/1998	NA	Ireland and United Kingdom	39.53	946.73	11.67	19.58
Anatol	3/12/1999	2.6bn	Denmark, Germany and Sweden	39.86	956.05	10.98	47.01
Lothar	26/12/1999	8.0bn	France, Germany and Switzerland	36.72	973.16	6.43	18.82
Martin	27/12/1999	3.3bn	France, Italy and Switzerland	37.18	967.58	9.18	21.33
Oratia (Tora)	30/10/2000	NA	France, Germany, Netherlands and United Kingdom	38.45	948.01	9.62	36.67
Jan 02	28/1/2002	NA	Denmark and United Kingdom	34.23	951.37	11.50	22.10
Jeanette	27/10/2002	NA	Austria, Poland, Czech Republic, Denmark, France, Germany, Ireland, Netherlands, Sweden and United Kingdom	36.92	974.52	10.44	75.37
Erwin (Gudrun)	8/1/2005	2.2bn	Denmark, Ireland, Norway, Sweden and United Kingdom	39.22	959.89	9.82	36.08
Gero	11/1/2005	0.6bn	Ireland and United Kingdom	39.13	960.64	8.55	17.55
Kyrill	18/1/2007	6.7bn	Austria, Belgium, France, Germany, Ireland, Netherlands and United Kingdom	36.38	961.12	8.55	59.43
Emma	29/2/2008	1.4bn	Austria, Belgium, Czech Repubic, Germany, Netherlands, Poland and Switzerland	25.12	959.46	9.60	12.17

Table A9: Affected Cities according to the Gust Speed Animation for Each Wind Storm (Met Office et al., 2022) — Own Coding

Extreme Storm Event	Affected Cities (Experienced Gust Speed ≥ 25 m/s)
02 Nov 1981	Copenhagen + Warsaw
18 Jan 1983	Copenhagen
01 Feb 1983	None
13 Jan 1984	None
14 Jan 1984	None
23 Nov 1984	Berlin + Paris + Warsaw
20 Jan 1986	Berlin
25 Mar 1986	None
20 Oct 1986	Berlin + Warsaw
16 Oct 1987	London + Paris
09 Feb 1988	Dublin
29 Nov 1988	None

25 Jan 1990	Brussels + Copenhagen + London + Paris
03 Feb 1990	Brussels + Dublin + London + Paris
08 Feb 1990	Copenhagen + London
11 Feb 1990	London + Paris
26 Feb 1990	Brussels + Dublin + Paris
28 Feb 1990	Dublin
05 Jan 1991	Dublin
08 Jan 1991	Copenhagen + London
25 Nov 1992	None
13 Jan 1993	Copenhagen + Riga + Vilnius
23 Jan 1993	Copenhagen + Dublin
08 Dec 1993	Dublin + London
28 Jan 1994	None
22 Jan 1995	Paris
07 Feb 1996	None
28 Oct 1996	London
06 Nov 1996	Copenhagen
28 Mar 1997	Berlin + Copenhagen + Warsaw
24 Dec 1997	None
04 Jan 1998	None
28 Oct 1998	None
26 Dec 1998	None
03 Dec 1999	Copenhagen, Vilnius
26 Dec 1999	Paris
27 Dec 1999	None
30 Oct 2000	London + Paris
28 Jan 2002	Copenhagen
27 Oct 2002	Berlin + Copenhagen + Dublin + London + Warsaw
08 Jan 2005	Copenhagen + Riga
11 Jan 2005	None
18 Jan 2007	Berlin + London
29 Feb 2008	Berlin + Copenhagen + Warsaw

Table A10: QCA Coding* for Local Climate Vulnerability

CITY	Heatwaves (n/a-2019)	Floods (1985-2017)	Droughts (1950-2012)	Wind Storms (1981-2008)	Climate Vulnerability
Brussels	2	2	1	1	0
Sofia	4	4	3	1	1
Prague	3	3	3	1	1
Copenhagen	1	1	3	4	1
Berlin	3	2	2	3	0
Tallinn	2	2	1	1	0
Dublin	1	3	3	3	1
Athens	4	3	2	1	1
Madrid	3	2	4	1	1
Paris	4	2	3	3	1
Zagreb	2	2	3	1	0
Rome	3	3	3	1	1
Riga	2	2	1	1	0
Vilnius	2	2	1	1	0
Budapest	3	3	4	1	1
Vienna	3	4	3	1	1
Warsaw	3	2	1	2	0
Lisbon	2	2	4	1	1
Bucharest	4	3	2	1	1
Ljubljana	2	2	3	1	0
Bratislava	2	3	3	1	0
Helsinki	2	1	2	1	0
Stockholm	1	1	1	1	0
Oslo	1	2	1	1	0
Zurich	2	3	3	1	0
London	2	4	3	3	1

* *Coding for heatwaves:*
— Cf. Graph A3: apricot-coloured = 1; orange = 2; red = 3; dark red = 4
Coding for floods:
— Cf. Graph A4: dark blue = 1; light blue = 2; green = 3; apricot-coloured = 4 (the other colours are irrelevant for the sample)
Coding for droughts:
— Cf. Graph A5: blue/green = 1; yellow = 2; light orange = 3; dark orange/red = 4 (cities close to two different colours are coded as the average (e.g. 1+3 => 2) or as the higher category (1+2 => 2)
Coding for wind storms:
— Cf. Tables A8-A9:
≤ 3 (roughly one event per decade or fewer) = 1
4-6 (minimum one event every seven years) = 2

7-13 (minimum one event every four years) = 3
≥ 14 (minimum one event every two years) = 4
<u>Coding for overall climate vulnerability:</u>
— Minimum 1x score of 4 or minimum 3x score of 3 = 1 (High), the rest = 0 (Low)

Graph A6: The Relationship between Policy Stringency and Environmental Performance for 2007/8 (Based on OECD, 2017a and YCELP et al., 2008: 3)

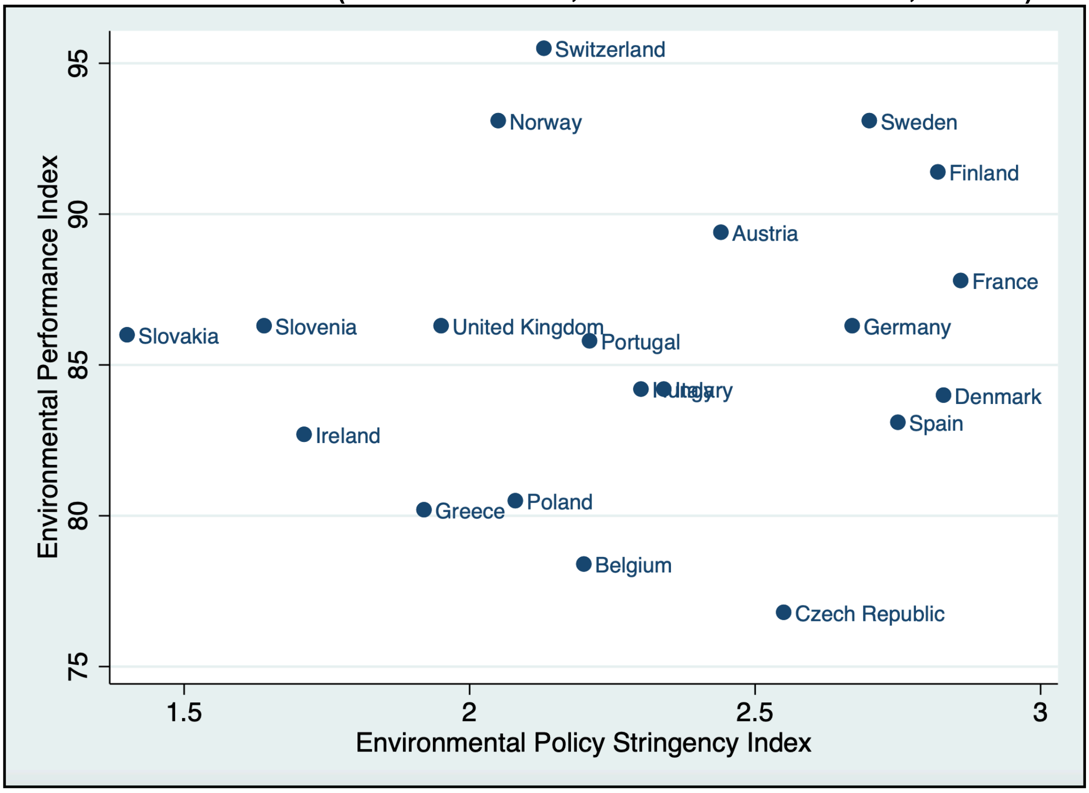


Table A11: Country-Level Score in the 2008 Environmental Performance Index (YCELP et al., 2008: 3)

City	Environmental Performance Index Score for 2008	QCA Coding*
Brussels	78.4	0
Sofia	78.5	0
Prague	76.8	0
Copenhagen	84	1
Berlin	86.3	1
Tallinn	85.2	1
Dublin	82.7	1
Athens	80.2	0
Madrid	83.1	1
Paris	87.8	2
Zagreb	84.6	1

Rome	84.2	1
Riga	88.8	2
Vilnius	86.2	1
Budapest	84.2	1
Vienna	89.4	2
Warsaw	80.5	0
Lisbon	85.8	1
Bucharest	71.9	0
Ljubljana	86.3	1
Bratislava	86	1
Helsinki	91.4	2
Stockholm	93.1	2
Oslo	93.1	2
Zurich	95.5	2
London	86.3	1

** >87 = 2 (High); 82-87 = 1 (Average); <82 = 0 (Low)*

Table A12: QCA Data as Shown in Cronqvist's (2019) Tosmana Software

CITY	WEALTH 35000	INDUSTRY 12	TRUST 50 ; 70	CLIMATE	COUNTRY 82 ; 87	OUTCOME 66
Brussels	1 (46600)	0 (9,1)	1 (53,96)	0	0 (78,4)	1 (78,01)
Sofia	0 (9600)	0 (10,04)	0 (22,26)	1	0 (78,5)	0 (36,85)
Prague	0 (24800)	1 (15,72)	0 (38,93)	1	0 (76,8)	0 (49,78)
Copenhagen	1 (50800)	0 (10,65)	2 (83,85)	1	1 (84)	1 (87,31)
Berlin	0 (27300)	0 (11,18)	2 (76,45)	0	1 (86,3)	1 (79,01)
Tallinn	0 (17700)	1 (12,56)	1 (54,08)	0	1 (85,2)	0 (52,98)
Dublin	1 (51900)	1 (13,76)	1 (66,28)	1	1 (82,7)	0 (53,98)
Athens	0 (28900)	0 (7,36)	0 (22,34)	1	0 (80,2)	0 (53,09)
Madrid	0 (32000)	0 (7,55)	2 (71,02)	1	1 (83,1)	1 (67,08)
Paris	1 (54790)	0 (9)	0 (48,03)	1	2 (87,8)	1 (73,21)
Zagreb	0 (15200)	1 (15,82)	0 (38,38)	0	1 (84,6)	0 (42,36)
Riga	0 (15400)	0 (9,17)	0 (33,19)	0	2 (88,8)	0 (59,57)
Vilnius	0 (15300)	1 (12,21)	0 (45,66)	0	1 (86,2)	0 (62,77)
Budapest	0 (17700)	1 (14,8)	0 (29,42)	1	1 (84,2)	0 (57,55)
Vienna	1 (40400)	0 (10,74)	2 (76,61)	1	2 (89,4)	1 (83,34)
Warsaw	0 (20500)	0 (8,38)	0 (43,74)	0	0 (80,5)	0 (59,04)
Lisbon	0 (24300)	0 (7,79)	1 (56,88)	1	1 (85,8)	0 (57,25)
Bucharest	0 (17100)	1 (15,06)	0 (26,34)	1	0 (71,9)	0 (39,14)
Ljubljana	0 (27200)	1 (13,33)	1 (60,21)	0	1 (86,3)	0 (56,39)
Bratislava	0 (28900)	1 (13,81)	0 (41,53)	0	1 (86)	0 (56,09)
Helsinki	1 (48900)	1 (17,48)	2 (77,9)	0	2 (91,4)	1 (79,29)
Stockholm	1 (53300)	0 (11)	2 (87,45)	0	2 (93,1)	1 (86,65)
Oslo	1 (65800)	0 (5,78)	2 (82,65)	0	2 (93,1)	1 (83,98)
Zurich	1 (119435)	0 (11)	2 (81,25)	0	2 (95,5)	1 (82,31)

Table A13: Cities' Total Population Number (Eurostat, 2021f) [Contradictory Cases in Green]

City	Total Population Number
Brussels	1,068,532
Sofia	1,162,898
Prague	1,249,026
Copenhagen	539,542
Berlin	3,431,675
Tallinn	403,930
Dublin	516,255
Athens	799,979
Madrid	3,255,944
Paris	2,233,906
Zagreb	791,946
Rome	2,576,803
Riga	713,016
Vilnius	558,165
Budapest	1,712,210
Vienna	1,687,271
Warsaw	1,714,446
Lisbon	479,884
Bucharest	1,944,451
Ljubljana	276,091
Bratislava	431,061
Helsinki	583,350
Stockholm	829,417
Oslo	575,475
Zurich	380,499
London	7,753,600

Table A14: City Residents' Education Level* Based on Eurostat, 2022b and Eurostat 2021f [Contradictory Cases in Green]

CITY	Number of 25-to-64-year-old residents with ISCED levels 5, 6, 7, 8	Total number of 25-to-64-year-old residents	Share of 25-to-64-year-old residents with ISCED levels 5, 6, 7, 8
Brussels	246,449	573,564	0.43
Sofia	342,158	698,644	0.49
Prague	287,214	739,331	0.39
Copenhagen	147,749	322,141	0.46
Berlin	731,400	2,004,835	0.36
Tallinn	109,140	222,604	0.49
Dublin	117,323	299,298	0.39
Athens	130,247	391,630	0.33
Madrid	900,149	1,853,043	0.49
Paris	2,261,078	5,248,427	0.43
Zagreb	158,242	450,764	0.35
Rome	415,766	1,460,467	0.28
Riga	140,000	371,469	0.38
Vilnius	168,383	299,958	0.56
Budapest	377,071	996,484	0.38
Vienna	232,009	959,846	0.24
Warsaw	460,742	1,012,504	0.46
Lisbon	122,249	285,760	0.43
Bucharest	n/a	ignored	n/a
Ljubljana	54,078	160,438	0.34
Bratislava	n/a	ignored	n/a
Helsinki	161,672	343,874	0.47
Stockholm	234,787	511,532	0.46
Oslo	181,947	353,223	0.52
Zurich	111,509	230,667	0.48
London	2,060,084	4,636,392	0.44

* *Using* the *International Standard Classification of Education (ISCED) levels 5 (associate college degree), 6 (undergraduate degree), 7 (postgraduate degree), 8 (doctoral degree) (cf. IQA, 2020)*

Table A15: List of Simplifying Assumptions for Outcome 1* — Original Version

Observed Configurations for Outcome 1	Respective Simplifying Assumption(s)
Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$	*Wealth$_1$* * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$ **_Wealth$_0$_ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$**
Wealth$_0$ * Industry$_0$ * Trust$_2$ * Country$_1$	Wealth$_1$ * Industry$_0$ * Trust$_2$ * *Climate$_1$* * Country$_1$ **Wealth$_1$ * Industry$_0$ * Trust$_2$ * _Climate$_0$_ * Country$_1$** Wealth$_0$ * Industry$_0$ * Trust$_2$ * *Climate$_1$* * Country$_2$ **Wealth$_0$ * Industry$_0$ * Trust$_2$ * _Climate$_0$_ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * *Climate$_1$* * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * *Climate$_0$* * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Country$_2$	No easy counterfactuals available
Wealth$_1$ * Trust$_2$ * Climate$_0$ * Country$_2$	Wealth$_1$ * *Industry$_0$* * Trust$_2$ * Climate$_1$ * Country$_2$ **Wealth$_1$ * _Industry$_1$_ * Trust$_2$ * Climate$_1$ * Country$_2$**
Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_2$** **Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_0$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_2$	Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$

* **Bold**: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A16: List of Simplifying Assumptions for Outcome 0* — Original Version

Observed Configurations for Outcome 0	Respective Simplifying Assumption(s)
Wealth$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$	**Wealth$_0$ * _Industry$_1$_ * Trust$_0$ * Climate$_0$ * Country$_0$** Wealth$_0$ * *Industry$_0$* * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Country$_0$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$
Wealth$_0$ * Industry$_1$ * Trust$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$

Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$	**Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$ **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$**
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_2$	**Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_2$** **Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$** Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$ **Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$ Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$ **Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$ Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$

* ***Bold***: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A17: List of Simplifying Assumptions for Outcome 1* — Robustness Check 1

Observed Configurations for Outcome 1	Respective Simplifying Assumption(s)
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$	Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Country$_2$	No easy counterfactuals available
Wealth$_1$ * Trust$_2$ * Climate$_0$ * Country$_2$	Wealth$_1$ * *Industry$_0$* * Trust$_2$ * Climate$_1$ * Country$_2$ **Wealth$_1$ * *Industry$_1$* * Trust$_2$ * Climate$_1$ * Country$_2$**
Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_2$** **Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_0$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_2$	Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$

* **Bold**: those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A18: List of Simplifying Assumptions for Outcome 0* — Robustness Check 1

Observed Configurations for Outcome 0	Respective Simplifying Assumption(s)
Wealth$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$	**Wealth$_0$ * *Industry$_1$* * Trust$_0$ * Climate$_0$ * Country$_0$** Wealth$_0$ * *Industry$_0$* * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Country$_0$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$
Wealth$_0$ * Industry$_1$ * Trust$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$

Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$	**Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$ **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$**
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_2$	**Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_2$** **Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$** Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$

* ***Bold***: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A19: Prime Implicants for Outcome 1 — Robustness Check 1

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Industry_0$ * $Trust_2$ * $Country_{1-2}$	Copenhagen, Berlin (SA1, SA2) [*$Country_1$*] ——— Vienna, Stockholm, Oslo, Zurich (SA3, SA4) [*$Country_2$*]	0.54	0.54
2	$Wealth_1$ * $Industry_0$ * $Trust_2$	Copenhagen, Vienna, Stockholm, Oslo, Zurich (SA1, SA6, SA10)	0.45	0
3	$Wealth_1$ * $Trust_2$ * $Country_2$	Vienna, Helsinki, Stockholm, Oslo, Zurich (SA5)	0.45	0.09
4	$Wealth_1$ * $Industry_0$ * $Trust_1$	Brussels (SA7, SA8, SA9, SA11, SA12)	0.09	0.09
6	$Wealth_1$ * $Industry_0$ * $Climate_1$ * $Country_2$	Paris, Vienna (SA12)	0.18	0.09

Table A20: Prime Implicants for Outcome 0 — Robustness Check 1

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Wealth_0$ * $Trust_0$ * $Country_0$	Sofia, Athens, Prague, Bucharest, Warsaw (SA13)	0.33	0.13
2	$Industry_1$ * $Trust_0$ * $Country_{0-1}$	Prague, Bucharest (SA13, SA21, SA23) [*$Country_0$*] ——— Zagreb, Vilnius, Bratislava, Budapest (SA16, SA20) [*$Country_1$*]	0.4	0.4
3	$Industry_1$ * $Trust_1$ * $Country_1$	Tallinn, Ljubljana, Dublin (SA15, SA17)	0.2	0.2
4	$Wealth_0$ * $Trust_0$ * $Climate_0$	Zagreb, Vilnius, Bratislava, Riga, Warsaw (SA13, SA24, SA25)	0.33	0.13

Table A21: Prime Implicants for Outcome 1 — Robustness Check 2*

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Industry_0$ * $Trust_2$ * $Country_{1-2}$	Copenhagen, Berlin, Madrid (SA2) *[$Country_1$]* Vienna, Stockholm, Oslo, Zurich (SA1, SA3) *[$Country_2$]*	0.64	0.64
2	$Wealth_1$ * $Industry_0$ * $Trust_2$	Copenhagen, Vienna, Stockholm, Oslo, Zurich (SA2, SA5, SA9)	0.45	0
3	$Wealth_1$ * $Trust_2$ * $Country_2$	Vienna, Helsinki, Stockholm, Oslo, Zurich (SA4)	0.45	0.09
4	$Wealth_1$ * $Industry_0$ * $Trust_1$ * $Country_0$	Brussels (SA6)	0.09	0.09
5	$Wealth_1$ * $Industry_0$ * $Trust_1$ * $Climate_0$	Brussels (SA7, SA8)	0.09	0
6	$Wealth_1$ * $Industry_0$ * $Climate_1$ * $Country_2$	Paris, Vienna (SA11)	0.18	0.09

** Using the same simplifying assumptions as in the original version (cf. Table A15)*

Table A22: Prime Implicants for Outcome 0 — Robustness Check 2*

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Wealth_0$ * $Trust_0$ * $Country_{0-1}$	Sofia, Athens, Prague, Bucharest, Warsaw (SA12) *[$Country_0$]* Zagreb, Vilnius, Bratislava, Budapest (SA24, SA25) *[$Country_1$]*	0.6	0.6
2	$Industry_1$ * $Trust_0$ * $Country_{0-1}$	Prague, Bucharest (SA12, SA20, SA22) *[$Country_0$]* Zagreb, Vilnius, Bratislava, Budapest (SA15, SA19) *[$Country_1$]*	0.4	0
3	$Industry_1$ * $Trust_1$ * $Climate_0$ * $Country_1$	Tallinn, Ljubljana (SA16)	0.13	0
4	$Wealth_0$ * $Trust_{0-1}$ * $Country_1$	Zagreb, Vilnius, Bratislava, Budapest (SA23, SA24) [*$Trust_0$*] Tallinn, Ljubljana, Lisbon (SA14, SA26) [*$Trust_1$*]	0.46	0.2
5	$Wealth_0$ * $Trust_0$ * $Climate_0$	Zagreb, Vilnius, Bratislava, Riga, Warsaw (SA12, SA23, SA24)	0.33	0.07
6	$Wealth_1$ * $Industry_1$ * $Trust_2$ * $Climate_1$ * $Country_1$	Dublin	0.07	0.07

** Using the same simplifying assumptions as in the original version (cf. Table A16)*

Table A23: List of Simplifying Assumptions for Outcome 1* — Robustness Check 3

Observed Configurations for Outcome 1	Respective Simplifying Assumption(s)
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$	Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Country$_2$	No easy counterfactuals available
Wealth$_1$ * Trust$_2$ * Climate$_0$ * Country$_2$	Wealth$_1$ * *Industry$_0$* * Trust$_2$ * Climate$_1$ * Country$_2$ **Wealth$_1$ * *Industry$_1$* * Trust$_2$ * Climate$_1$ * Country$_2$**
Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_2$** **Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_0$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_2$	Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$

* ***Bold**: those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A24: List of Simplifying Assumptions for Outcome 0* — Robustness Check 3

Observed Configurations for Outcome 0	Respective Simplifying Assumption(s)
Wealth$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$	**Wealth$_0$ * *Industry$_1$* * Trust$_0$ * Climate$_0$ * Country$_0$** Wealth$_0$ * *Industry$_0$* * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Country$_0$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$
Wealth$_0$ * Industry$_1$ * Trust$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$
	Wealth * Industry * Trust * Climate * Country

Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$	**Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$**
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$
	Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$
	Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_2$	**Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_2$**
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$

* ***Bold***: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A25: Prime Implicants for Outcome 1 — Robustness Check 3

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	Industry$_0$ * Trust$_2$ * Country$_{1-2}$	Copenhagen, Berlin (SA1, SA2) [*Country$_1$*] ——— Vienna, Stockholm, Oslo, Zurich (SA3, SA4) [*Country$_2$*]	0.6	0.6
2	Wealth$_1$ * Industry$_0$ * Trust$_2$	Copenhagen, Vienna, Stockholm, Oslo, Zurich (SA1, SA6, SA10)	0.5	0
3	Wealth$_1$ * Trust$_2$ * Country$_2$	Vienna, Helsinki, Stockholm, Oslo, Zurich (SA5)	0.5	0.1
4	Wealth$_1$ * Industry$_0$ * Trust$_1$	Brussels (SA7, SA8, SA9, SA11, SA12)	0.1	0.1
5	Wealth$_1$ * Industry$_0$ * Climate$_1$ * Country$_2$	Paris, Vienna (SA12)	0.2	0.1

Table A26: Prime Implicants for Outcome 0 — Robustness Check 3

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	Wealth$_0$ * Trust$_0$ * Country$_{0-1}$	Sofia, Athens, Prague, Bucharest, Warsaw (SA13) [*Country$_0$*] ——— Zagreb, Vilnius, Bratislava, Budapest (SA25, SA26) [*Country$_1$*]	0.56	0.56
2	Industry$_1$ * Trust$_0$ * Country$_{0-1}$	Prague, Bucharest (SA13, SA21, SA23) [*Country$_0$*] ——— Zagreb, Vilnius, Bratislava, Budapest (SA16, SA20) [*Country$_1$*]	0.38	0
3	Industry$_1$ * Trust$_{0-1}$ * Country$_1$	Zagreb, Vilnius, Bratislava, Budapest (SA16, SA20) [*Trust$_0$*] ——— Tallinn, Ljubljana, Dublin (SA15, SA17) [*Trust$_1$*]	0.44	0.19
4	Wealth$_0$ * Trust$_1$ * Country$_1$	Tallinn, Ljubljana, Madrid, Lisbon (SA15, SA27)	0.25	0.13
5	Wealth$_0$ * Trust$_0$ * Climate$_0$	Zagreb, Vilnius, Bratislava, Riga, Warsaw (SA13, SA24, SA25)	0.31	0.06

Table A27: List of Simplifying Assumptions for Outcome 1* — Robustness Check 4

Observed Configurations for Outcome 1	Respective Simplifying Assumption(s)
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$	Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ **Wealth$_0$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Country$_2$	No easy counterfactuals available
Wealth$_1$ * Trust$_2$ * Climate$_0$ * Country$_2$	Wealth$_1$ * *Industry$_0$* * Trust$_2$ * Climate$_1$ * Country$_2$ **Wealth$_1$ * *Industry$_1$* * Trust$_2$ * Climate$_1$ * Country$_2$**
Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_2$** **Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_0$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$ **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_2$	Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$	Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$

* ***Bold***: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A28: List of Simplifying Assumptions for Outcome 0* — Robustness Check 4

Observed Configurations for Outcome 0	Respective Simplifying Assumption(s)
Wealth$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$	**Wealth$_0$ * *Industry$_1$* * Trust$_0$ * Climate$_0$ * Country$_0$** Wealth$_0$ * *Industry$_0$* * Trust$_0$ * Climate$_0$ * Country$_0$

Wealth$_0$ * Industry$_0$ * Trust$_0$ * Country$_0$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$
Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$	**Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$ **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$**
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_2$	**Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_2$** **Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$** Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$

* ***Bold***: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A29: Prime Implicants for Outcome 1 — Robustness Check 4

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Industry_0$ * $Trust_2$ * $Country_{1\text{-}2}$	Copenhagen, Berlin (SA1, SA2) [*$Country_1$*] Vienna, Stockholm, Oslo, Zurich (SA3, SA4) [*$Country_2$*]	0.46	0.46
2	$Wealth_1$ * $Industry_0$ * $Trust_2$	Copenhagen, Vienna, Stockholm, Oslo, Zurich (SA1, SA6, SA10)	0.38	0
3	$Wealth_1$ * $Trust_2$ * $Country_2$	Vienna, Helsinki, Stockholm, Oslo, Zurich (SA5)	0.38	0.08
4	$Wealth_1$ * $Industry_0$ * $Trust_1$	Brussels, Rome, London (SA7, SA8, SA9, SA11)	0.23	0.23
6	$Wealth_1$ * $Industry_0$ * $Climate_1$ * $Country_2$	Paris, Vienna (SA11)	0.15	0.08

Table A30: Prime Implicants for Outcome 0 — Robustness Check 4

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Wealth_0$ * $Trust_0$ * $Country_0$	Sofia, Athens, Prague, Bucharest, Warsaw (SA12)	0.38	0.38
2	$Industry_1$ * $Trust_0$ * $Country_0$	Prague, Bucharest (SA12, SA20, SA22)	0.15	0
3	$Industry_1$ * $Trust_1$ * $Country_1$	Tallinn, Ljubljana, Dublin (SA14, SA16)	0.23	0.23
4	$Wealth_0$ * $Trust_0$ * $Climate_0$ * $Country_2$	Riga (SA23)	0.08	0.08
5	$Wealth_0$ * $Industry_0$ * $Trust_0$ * $Climate_0$	Riga, Warsaw (SA24)	0.15	0
6	$Industry_1$ * $Trust_0$ * $Climate_1$ * $Country_1$	Budapest (SA15)	0.08	0.08

Table A31: List of Simplifying Assumptions for Outcome 1* — Robustness Check 5

Observed Configurations for Outcome 1	Respective Simplifying Assumption(s)
Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$	*Wealth$_1$* * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$ ***Wealth$_0$*** *** Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$**
Wealth$_0$ * Industry$_0$ * Trust$_2$ * Country$_1$	Wealth$_1$ * Industry$_0$ * Trust$_2$ * *Climate$_1$* * Country$_1$ **Wealth$_1$ * Industry$_0$ * Trust$_2$ *** ***Climate$_0$*** *** Country$_1$** Wealth$_0$ * Industry$_0$ * Trust$_2$ * *Climate$_1$* * Country$_2$ **Wealth$_0$ * Industry$_0$ * Trust$_2$ *** ***Climate$_0$*** *** Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * *Climate$_1$* * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * *Climate$_0$* * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_2$ * Country$_2$	No easy counterfactuals available
Wealth$_1$ * Trust$_2$ * Climate$_0$ * Country$_2$	Wealth$_1$ * *Industry$_0$* * Trust$_2$ * Climate$_1$ * Country$_2$ **Wealth$_1$ *** ***Industry$_1$*** *** Trust$_2$ * Climate$_1$ * Country$_2$**
Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$	**Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_2$** **Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_0$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_0$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$ **Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$** Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_2$	Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$
Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$	Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_1$ Wealth$_1$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_2$ Wealth$_1$ * Industry$_0$ * Trust$_2$ * Climate$_1$ * Country$_2$

* ***Bold***: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the "upgraded" condition(s) in each simplifying assumption
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Table A32: List of Simplifying Assumptions for Outcome 0* — Robustness Check 5

Observed Configurations for Outcome 0	Respective Simplifying Assumption(s)
Wealth$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$	**Wealth$_0$ * *Industry$_1$* * Trust$_0$ * Climate$_0$ * Country$_0$** Wealth$_0$ * *Industry$_0$* * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Country$_0$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$
Wealth$_0$ * Industry$_1$ * Trust$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_0$* * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * *Climate$_1$* * Country$_0$
Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$	**Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$ **Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$** **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$** **Wealth$_1$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_0$ **Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$**
Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_2$	**Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_2$** **Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$** Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_1$ **Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_1$** **Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_0$** Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$ Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_0$ * Country$_1$

Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_1$ * Country$_1$	Wealth$_0$ * Industry$_1$ * Trust$_1$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_0$ * Trust$_1$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_1$	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_1$
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$
	Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_1$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_1$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_1$ * Country$_0$
	Wealth$_0$ * Industry$_0$ * Trust$_0$ * Climate$_0$ * Country$_0$
	Wealth$_1$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$
	Wealth$_0$ * Industry$_1$ * Trust$_0$ * Climate$_0$ * Country$_0$

* ***Bold***: *those simplifying assumptions that have actually been computed in Tosmana (the non-bold ones are all duplicates of the ones in bold or blue)*
Blue: configurations that already exist in the sample
Yellow: the “upgraded” condition(s) in each simplifying assumption
Italic: where appropriate, the added redundant condition(s) in simplifying assumptions (i.e. conditions that have already been eliminated during the conservative minimisation process); both options have been computed in Tosmana to reflect the already established (and presumably continued) redundancy

Table A33: Prime Implicants for Outcome 1 — Robustness Check 5

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Industry_0$ * $Trust_2$ * $Country_{1-2}$	Copenhagen, Berlin, Madrid (SA2) [*$Country_1$*] Vienna, Stockholm, Oslo, Zurich (SA1, SA3) [*$Country_2$*]	0.64	0.64
2	$Wealth_1$ * $Industry_0$ * $Trust_2$	Copenhagen, Vienna, Stockholm, Oslo, Zurich (SA2, SA5, SA9)	0.45	0
3	$Wealth_1$ * $Trust_2$ * $Country_2$	Vienna, Helsinki, Stockholm, Oslo, Zurich (SA4)	0.45	0.09
4	$Wealth_1$ * $Industry_0$ * $Trust_1$	Brussels, London (SA6, SA7, SA8, SA10)	0.18	0.18
5	$Wealth_1$ * $Industry_0$ * $Climate_1$ * $Country_2$	Paris, Vienna (SA10)	0.18	0.09

Table A34: Prime Implicants for Outcome 0 — Robustness Check 5

Row	Prime Implicant	Cases Covered by the Prime Implicant	Raw Coverage	Unique Coverage
1	$Trust_0$ * $Country_{0-1}$	Sofia, Athens, Prague, Bucharest, Warsaw (SA11, SA19, SA21, SA29, SA30) [*$Country_0$*] Zagreb, Vilnius, Bratislava, Rome, Budapest (SA14, SA18, SA23, SA24, SA28) [*$Country_1$*]	0.66	0.66
3	$Industry_1$ * $Trust_1$ * $Country_1$	Tallinn, Ljubljana, Dublin (SA13, SA15)	0.2	0.2
4	$Wealth_0$ * $Trust_1$ * $Country_1$	Tallinn, Ljubljana, Lisbon (SA13, SA25)	0.2	0.07
5	$Wealth_0$ * $Trust_0$ * $Climate_0$	Zagreb, Vilnius, Bratislava, Riga, Warsaw (SA11, SA22, SA23)	0.33	0.07

Table A35: Non-exhaustive List of Omitted Variables

	Omitted Variables	Relevant Literature	Potential Data Sources
Relevant but data not (readily) available	**Urban civic culture** (market-active, market-passive, bureaucratic, etc.)	cf. Reese and Rosenfeld, 2012: 33-35	n/a
	Hofstede's cultural dimensions (long-term orientation, power distance, individualism, etc.)	cf. Dan, 2019: 109 cf. Hofstede, 2011: 9-16	Hofstede (2022b) but only country level
	Strength of local civil society (e.g. number of environm. NGOs)	cf. Sharp et al., 2011: 448 cf. Zahran et al., 2008a: 556	n/a
	City dwellers' education level	cf. Krause, 2011b: 58 cf. Vasi, 2006: 453	Eurostat (2022b) but missing values hard to replace
	Public-private partnerships (e.g. number, extent)	cf. Cohen and Dong, 2021: 112 cf. Beatley, 2000: 369	n/a
	Perceived bureaucratic efficiency (also proxy for institutional trust)	cf. Kulin and Johansson Sevä, 2021: 746 cf. Povitkina and Matti, 2021: 409	Eurostat (2021d) but problematic fluctuations in survey responses
	Degree of local autonomy	cf. Eckersley, 2017: 161 cf. Lee, 2013: 116	n/a
	Type of local political organisation (e.g. strong mayor, strong council)	cf. Bae and Feiock, 2013: 786 cf. Opp and Saunders, 2012: 690	n/a
Deemed less important	**Local innovation capacity** (e.g. patent applications as proxy)	cf. Newton, 2014: 93-101	Eurostat, 2021e
	Local level of corruption	cf. Kulin and Johansson Sevä, 2021: 746 cf. Povitkina and Matti, 2021: 406	Charron et al., 2020: 27-38
	Positive influence of neighbouring jurisdictions	cf. Pitt, 2010: 862 cf. Vasi, 2006: 453	n/a
	City-dwellers' median age	cf. Portney, 2002: 375	Eurostat, 2022c
	Population size	cf. Hughes et al., 2018: 207 cf. Florida, 2012	Eurostat, 2021f
	Latitude	cf. Lee, 2013: 123	Maps
Rather part of the outcome	**Population density**	cf. Cohen and Dong, 2021: 246 cf. Kennedy et al., 2015: 5987f.	Eurostat, 2022d
	Sustainability director within the municipal administration (e.g. existence of position, leeway, influence)	cf. Aufochs Johnston et al., 2013: 11f. cf. Pitt, 2010: 862	n/a
	Political entrepreneurs (e.g. number, type, impact)	cf. Metzger and Rader Olsson, 2013: 3 cf. Krause, 2011b: 58	n/a
	Local political discourse (e.g. whether environm. problems are presented as solvable)	cf. Krause, 2013: 127	n/a
	Membership in transnational city networks	cf. Kemmerzell and Hofmeister, 2019: 117 cf. Lee and Koski, 2012: 613	Respective website of city networks