



# Comparing apples and oranges: The dependent variable problem in comparing and evaluating climate change adaptation policies



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## ABSTRACT

An increasing number of studies have compared climate change adaptation policies within and between different countries. In this paper we show that these comparative studies suffer from what is known as the “dependent variable problem” – the indistinctness of the phenomenon that is being measured, and disagreement on its scope and boundaries. This problem has been signaled in other scientific fields where it proved to hamper meaningful comparisons and policy evaluations, transnational learning, and policy transfer. This paper aims to raise consciousness of the dependent variable problem in comparative studies on climate change adaptation policy by exploring its origins and proposes ways to deal with it. Three main sources of the problem are discussed: (1) conceptual indistinctness of adaptation policy and the heterogeneity and lack of consistency of what is being compared between cases. (2) Inadequate research designs to compare cases. (3) Unclear indicators and explanatory variables to compare across cases. We propose a way to operationalize the concept of adaptation policy, provide a narrower description of the research designs for policy change or outcomes analysis, and finally discuss possible measurements concepts.

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## 1. Introduction

For almost two decades, scientists have argued that the rate, magnitude, and irreversibility of current and projected climate change represents a new and unprecedented societal challenge that needs to be managed at all levels of governance (Füssel, 2007b; Pielke et al., 2007). Since the early 1990s, the need for climate change adaptation policies has been stressed in scientific literature and debated at international climate change negotiations where it was solidified in international agreements (Oberthür and Ott, 1999; Schipper, 2006). This created legitimacy to advance the development of adaptation policies at (supra) national levels (Rayner and Jordan, 2013).

The placement of adaptation on political agendas and the recent blooming of policy activities throughout the UNFCCC Member States is an on-going process from which two fundamental questions arise. First, what are the concrete policy changes that have been introduced to address the need for climate change

adaptation, and what explains varying patterns of policy change? And second, what are the likely outcomes of these policies in terms of their capacity to reduce climate change impacts, and what can be learned from current State practices?

In response to the increased policy activities across countries, several studies have begun to compare adaptation policy across countries at national (CIRCLE, 2008; EUROSAT, 2012; Gagnon-Lebrun and Agrawala, 2006; Keskitalo, 2010; Massey and Bergsma, 2008; Swart et al., 2009) and subnational levels (Craft and Howlett, 2013; Ford and Berrang-Ford, 2011; Puppim de Oliveira, 2009). These first generation of explorative adaptation studies aim to distil lessons learned and identify challenges of successful adaptation to climate change across countries (Ford et al., 2011).

As will be discussed in this paper, we have observed that current comparative studies on adaptation policy have hardly succeeded in producing answers to the two questions posed above. We argue that these studies suffer from the so-called *dependent variable problem*. As the term suggests, the dependent variable problem refers to the indistinctness of the phenomenon that is being measured and the fuzziness of its scope and boundaries, which leads to contradictory results and difficult comparisons between studies (Howlett and Cashore, 2007, 2009). We do not refer to the “dependent variable” in the technical or statistical sense, but rather to the challenge of conceptualizing and

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measuring adaptation policy within and across cases. The dependent variable problem is certainly not unique to adaptation policy; even after thirty years of research the dependent variable problem remains a concern in many comparative policy studies, most prominently debated in studies on welfare state reform (Green-Pedersen, 2004; Kühner, 2007).

Drawing from these experiences, we postulate that if comparative research on adaptation policy is to evolve toward more explanatory ambitions, the dependent variable problem should be considered and addressed. This is mainly a theoretical and conceptual question of how to operationalize and measure adaptation policy. The aim of this paper is therefore (1) to demonstrate the existence of the dependent variable problem in comparative studies on adaptation, (2) explore its origin and provide conceptual ideas on how to address this problem by operationalizing adaptation policy, (3) illustrate how the dependent variable can be considered in comparative policy research designs, (4) and discuss plausible concepts for measuring and comparing adaptation policy across cases. It would be presumptuous to assume that this paper resolves the dependent variable problem, but we hope to start intellectual debates as to what can be compared, measured and evaluated meaningfully across cases and national contexts. Such engagement can make researchers more conscious of the challenge of researching adaptation policy and contribute to constructive theoretical debates.

## 2. Comparative policy studies on adaptation: a review of the literature

Policy analysis is the study of the contents, processes and impacts of public policies (Hoppe, 2005). In the study of public policy, one could make the classical distinction between single-*n* case studies that aim for configurative analysis and deep contextual understanding of the policy process at the cost of generalizability (Gerring, 2006), and comparative studies which parallel several policies across contexts in order to explain variation (Lijphart, 1971), but at the cost of contextual understanding (see Ragin, 2008 for an alternative approach).

Among comparative studies, two types can be further distinguished. First, variance can be observed in a single country by comparing sub-national variation among administrative units, which is sometimes referred to as within-country comparative studies. The value of this approach is to allow for a stricter control of the many contextual and macro factors that cause the “too few cases, too many variables problem” (Anckar, 2008; Goggin, 1986) of cross-national studies, which, in turn, increases the probability of obtaining valid causal inferences. There has been some debate whether this type of research should be considered comparative, but as Sartori argues, these studies certainly have comparative merit (Sartori, 1991). To date, the majority of comparative adaptation policy studies follow this research design, perhaps because of the growing understanding that adaptation is predominantly a local challenge. For example, Burch (2010) compares three Canadian municipalities in order to gain insight in their ability to transform toward adaptive action. van den Berg and Coenen (2012) analyze the role of three explanatory variables in how adaptation was mainstreamed in the existing policies of five local municipalities in the Netherlands. Others have used comparisons to assess the progress of adaptation by counting the number of adaptation measures within one country (e.g. Bierbaum et al., 2012; Tompkins et al., 2010).

Secondly, cross-national comparisons in policy studies are generally conducted for slightly different reasons, such as to learn how different national policy contexts address global challenges (Greiving and Fleischhauer, 2012), to learn if and why policy transfer between countries fails or succeeds, to avoid reaching

culturally determined generalizations, or to understand ideological differences between countries regarding the governance of adaptation (Rose, 1973). The aim of these studies is to explore patterns, processes, and regularities among political systems (Lijphart, 1999). Cross-national comparative policy studies are abundant in political science literature, particularly since many possible explanatory variables are defined at the level of the nation-state, allowing statistical methods to engage in quantitative theory controlled comparisons.

To date, only a limited number of cross-national comparative studies on adaptation policies exist, most likely because of the limited progress of nation-states on national adaptation policies and the limited data available that would allow meaningful comparisons across cases (Ford et al., 2011). Understandably, existing comparative studies are therefore mainly inductive and qualitative, aiming to describe and learn rather than to test hypotheses. The European CIRCLE project (2008), for example, examines progress on adaptation by comparing National Research Programs in 22 European countries. Krysanova et al. (2010) draw from the opinions of policymakers and water management experts from six river basins to compare progress on adaptation to climate change and identify commonly found drivers and barriers to implementation. In a conjoint effort, nine European Supreme Audit Institutions (EUROSAI, 2012) assessed their governments' preparedness for climate change and actions to adapt by evaluating, inter alia, the presence of risk and vulnerability assessments, strategic policy documents, coordination mechanisms, and potential results of adaptation policies and measures.

In addition to these studies, four studies compare the national adaptation policies of more or less the same developed European countries, see Table 1a. We use these four studies as way to illustrate the dependent variable problem in current comparative adaptation policy studies. One of the first cross-national comparative studies was conducted by Gagnon-Lebrun and Agrawala (2006) who use the second and third UNFCCC national communications (NC) of developed countries to examine “. . .the attention given to, and progress on, adaptation. . .” (p. 13) in 41 developed countries. The aim of the analysis was to collect experiences about adaptation from which other developed and developing countries can learn. Also using the NC as data source, Massey and Bergsma (2008) aimed to measure the adaptation level, objectives, and aims across 29 European countries. Like Gagnon-Lebrun and Agrawala, they observed that progress on adaptation has been limited, differing from country to country. In similar vein, the study by (Swart et al., 2009, p. 27) aims to “. . .provide insight into the various approaches taken in different countries [. . .] to facilitate an exchange of information on how to tackle adaptation across Europe” by analyzing their national adaptation strategies. Rather than exploring the NC, they investigated the policies and measures at national government level to manage the impacts of climate change (p. 26). Finally, in their book on multi-level governance of adaptation in 14 developed countries, Keskitalo (2010, p. 28) mean to “. . .illustrate and analyze the broad range of factors that may have supported or limited the development of adaptation policy and practices. . .” by using in-depth nested cases analysis.

All four studies aimed to “measure progress” on climate change adaptation policy, but used different frameworks and indicators for comparison. To assess their level of agreement on the level of progress, we analyzed the empirical material and conclusions of each of the four studies. The three studies that used qualitative descriptions were recoded into a measurement scale, see Table 1a. The authors of these studies were invited to check our recoding. Finally, we used correlational testing (Spearman's rho) to assess the level of agreement on policy progress in the four comparative studies on adaptation policy, see Table 1b.

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