

# Systemic Dynamics of Policy Change: Overcoming Some Blind Spots of Punctuated Equilibrium Theory

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*In this article, we analyze dynamics of policy change from the perspective of Punctuated Equilibrium Theory (PET). In particular, we investigate how economic crises impact on patterns of policy change in policy areas that vary in terms of their proximity to economic matters: social, environmental, and morality policy. We make two contributions. First, we show that economic crises lead to more incrementalist patterns of policy change in crisis-remote policy subsystems and make policy punctuations in these areas less likely. However, if such punctuations do occur, they tend to be particularly extreme. Second, we argue that the empirical implications of PET are best tested by separately analyzing variance as an indicator for incrementalism and degrees of freedom as an indicator for punctuations. The empirical analysis builds on two data sets capturing policy output changes in 13 European countries over a period of 34 years (1980–2013).*

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**KEY WORD:** punctuated equilibrium theory

本文中，我们以间断平衡（PET）的视角分析政策变化的动态。特别地，我们研究了经济危机如何影响政策领域中的政策变化模式，这些政策领域分别是社会政策、环境政策、道德政策，它们就与经济事务的临近性存在差异。我们作出两个贡献。第一，我们表明，经济危机在远离危机的政策子系统中导致更为渐进式的政策变化模式，并且较为不可能在这些领域中创造政策间断。然而，如果这类间断确实出现，则往往尤为极端。第二，我们主张，通过将差异作为渐进主义的指示物，和将自由度作为间断的指示物，二者进行单独分析，能对间断平衡理论的实证意义进行最佳的检验。实证分析基于两个数据集，后者获取了34年里（1980年至2013年）13个欧洲国家的政策输出变化。

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关键词: 间断平衡理论,

En este artículo, analizamos la dinámica del cambio de políticas desde la perspectiva de la Teoría del Equilibrio Puntuado (PET). En particular, investigamos cómo las crisis económicas impactan en los patrones de cambio de políticas en áreas de políticas que varían en términos de su proximidad a los asuntos económicos: política social, ambiental y moral. Hacemos dos aportes. Primero, mostramos que las crisis económicas conducen a patrones más incrementales de cambio de políticas en subsistemas de políticas remotos de crisis y hacen que los cambios bruscos de políticas en estas áreas sean menos probables. Sin embargo, si ocurren tales cambios, tienden a ser particularmente extremos. En segundo lugar, sostenemos que las

implicaciones empíricas de PET se prueban mejor analizando por separado la varianza como un indicador de incrementalismo y los grados de libertad como un indicador de radicalidad. El análisis empírico se basa en dos conjuntos de datos que capturan cambios en la producción de políticas en 13 países europeos durante un período de 34 años (1980 a 2013).

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**PALABRAS CLAVE:** Teoría del Equilibrio Puntuado

## 1. Introduction

The policy subsystem is the central building block for most of the theoretical frameworks dealing with the analysis of policy change. Policy subsystems are defined by a substantive issue area (domain), a geographical scope, and a relatively stable set of actors that interact within well-defined institutional boundaries (Cairney & Weible, 2015, p. 93; Cashore & Howlett, 2007; McGee & Jones, 2019). The rationale behind this dominant focus on policy subsystems is that the typical mode of policymaking is generally considered to be driven by dynamics that are *endogenous* to the subsystem. The policy agenda is usually controlled by stable networks of politicians, bureaucrats, and interest group representatives operating in a given domain. As a result, policies display high stability over time and undergo only incremental changes. It is only rarely the case that the isolated everyday life of policy subsystems is distorted. Sometimes, external shocks entail that subsystem issues reach macro-level attention, implying that long periods of stability are interrupted by fundamental policy change (*policy punctuations*) due to changing institutional venues and problem perceptions (*policy image*) (Baumgartner et al., 2009; Baumgartner & Jones, 2010).

Yet, regardless of the prevalence of incrementalism or punctuations, the crucial point of reference in policy studies is and remains the subsystem level. Most importantly, this implies that policy change in subsystems is analyzed in isolation from the developments in other policy subsystems. Anything that happens in other subsystems is considered analytically irrelevant as long as there are no obvious spillovers from other policy subsystems that are functionally connected to the subsystem in question (Jochim & May, 2010). In short, the hardly challenged assumption in studies of policy change is that policy subsystems “live next to each other” and hardly meet and influence each other.

In this article, we challenge this assumption. In so doing, we contribute to the punctuated equilibrium theory (PET) in two essential ways. First, we provide a theoretical analysis of *systemic* linkages across different policy subsystems that emerge from trade-offs in (limited) system level attention. The more system level attention is absorbed by certain subsystem issues, the smaller is the attention space that can be potentially dedicated to other subsystems. Competition for limited macro-level agenda space hence implies that policy subsystems might indirectly affect patterns of policy change in other subsystems. As we will show, such dynamics have significant effects on the probability of incremental and fundamental policy change across

seemingly disconnected domains, such as economic policy and the regulation of same-sex marriage.

Our second—conceptual and methodological contribution—results from the need for more elaborate approaches in order to systematically test our theoretical arguments. For our purpose, the existing conceptual framework of PET for assessing distributional patterns of policy change magnitudes is of limited analytical precision and based upon partially inaccurate interpretations. Applications of PET typically rely on the measure of kurtosis as the “gold standard” indicating the extent to which observed change patterns deviate from the normal distribution. In this context, Baumgartner (2009) claims that, “[k]urtosis is a measure of the ‘peakedness’ of the distribution (...). By looking at the peakedness of the distribution, our attention is simultaneously drawn to the size of the ‘tails’—the number of extreme values” (p. 5). Yet, this statement contains two analytical errors that might cause misleading evaluations of hypotheses that can be derived from PET: First, kurtosis actually measures the tailedness rather than the peakedness of the distribution and, second, any assessment of tails does not allow us to make valid statements about the peaks (Westfall, 2014). In this paper, we thus develop innovative conceptual tools that allow for a separate analysis of both the tails and the peaks, and show that these tools allow for a much more valid measurement of policy change in line with the central claims of PET.

To demonstrate the relevance of our theoretical and conceptual arguments, we analyze dynamics of policy change during time periods in which the trade-offs and interlinkages between different policy subsystems outlined above should materialize most clearly: during economic crises. Specifically, we provide a systematic empirical assessment of the impacts of economic crises on the patterns of policy change in subsystems that are more or less remote from economic and fiscal policies, which are usually the main focus of governments’ attention when the economy is in decline. More precisely, we focus on environmental, social, and morality policies and show how the increasing attention to economic matters at the system level affects the distribution of change magnitudes in these more or less crisis-remote policy subsystems. We find strong support for redistributive effects: Economic crises lead to increasingly incrementalist patterns of policy change in crisis-remote policy subsystems and make policy punctuations in these areas less likely. Interestingly, however, if such punctuations do occur, they tend to be particularly extreme. Moreover, we show that these patterns can only be detected by separately analyzing the change distribution’s variance as an indicator for incrementalism and the degrees of freedom as an indicator of the extremeness of policy punctuations. Our empirical analysis builds on two large data sets covering social, environmental, and morality policy outputs in 13 Western European countries over three decades (1980–2010), assembled in two separate research projects.

We proceed in four steps. Following this introduction, we provide a theoretical discussion of systemic effects of subsystem punctuations and present our research hypotheses. In Section 3, we explain our research design, demonstrate the limitations of the conventional kurtosis measure and introduce our conceptual approach.

Finally, we present our results and a discussion of their implications for comparative public policy research.

## 2. Systemic Dynamics of Policy Change

We argue in this paper that (changes in) policy systems are not independent from one another but are interconnected. This requires shifting the focus from the subsystem level to “a thirty-thousand-foot view” (McGee & Jones, 2019, p. 144) on the policy process. Although this view is largely missing in the existing literature, there are some exceptions. May, Jochim, and Sapotichne (2011), for instance, adopt a boundary-spanning perspective when studying the policy reaction in the aftermath of the terrorist attacks of September 2001. The authors find that the 9/11 terrorist attacks constituted a focusing event that affected several policy systems simultaneously and led to a vanishing of traditional subsystem boundaries. Accordingly, they show that external shocks can force linkages between (formerly) unconnected policy subsystems.

In comparison, this paper departs from a different reasoning. In essence, we argue that policy subsystems are *organically* interlinked via the system level. The theoretical argument of the PET rests on the idea that while the segmentation of policies into policy subsystems promotes routine decision making and incrementalism, major policy changes require political attention at the level of the entire political system. Yet since the attention space at the system level and the cognitive capacities of policymakers to process incoming information are limited (Jones & Baumgartner, 2005), trade-offs in attention are an inevitable consequence (May, Sapotichne, & Workman, 2009a).

In view of these considerations, we argue that trade-offs in political attention at the system level should be most pronounced when an external shock hits the political system. Such external shocks can be of a rather short-term nature and come in the form of a single focusing event (Kingdon, 2003), or they can exert their impact over a longer period of time, like in the case of economic crises. In this contribution, we focus on the latter type of external shocks, treating economic crises as a crucial case in which we should be likely to observe the trade-offs predicted by PET reflected in the policy substance of the laws passed in different policy subsystems. May, Sapotichne, and Workman (2009b) argue that economic crises are particularly suitable to study attention shifts across different policy issues given that the salience and the social disruptions reach beyond the subsystem level (p. 809). If the assumptions of PET are valid, economic crises should hence amplify already existing imbalances in political attention and thereby exert a strong influence on patterns of policy change, depending on how remote or proximate a given policy subsystem is to the economy.

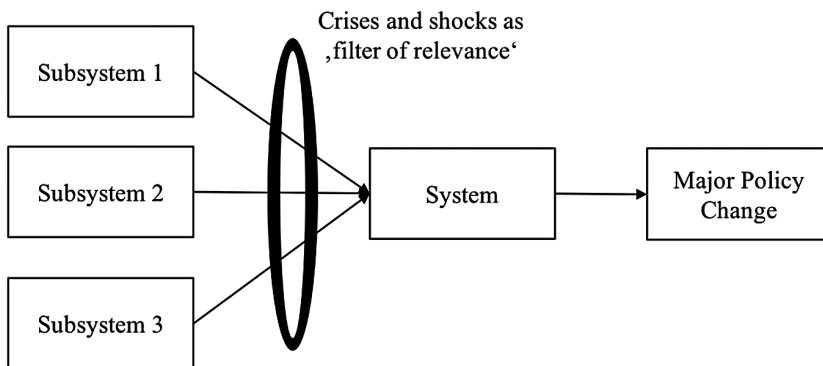
More specifically, we expect external shocks to affect the relative position of subsystem demands in the competition for political attention at the system level. When an external shock hits a political system, the system should react by channeling its resources into the fight against the causes of the shock or at least into the alleviation of its most severe consequences. This entails that political systems experience pressure to redirect their focus of attention toward those policy subsystems that are

closely associated with the shock at the expense of other policy subsystems that are regarded as more remote. Accordingly, policy subsystems directly affected or relevant for the design of policy responses to the external shock experience a higher probability of receiving attention at the system level. While political systems hardly ever devote the same amount of attention to all policy subsystems even without the presence of an external shock, these external shocks should incentivize a pronounced redistribution of political attention at the system level and thereby lead to distinct patterns of policy change across different policy subsystems.

As [Figure 1](#) illustrates, an external shock functions as a “filter of relevance,” which forces policymakers to scan demands from different policy subsystems for their crisis implications. As a result, we should expect policy demands that have no direct relevance for the crisis at hand to be sidelined on the governmental agenda after the shock hits the system. Following Workman, Jones, and Jochim’s (2009) argument on the information flows in the policy process, this implies that some issues are kept in “parallel processing” at the subsystem level, while crisis-relevant ones are transferred to and handled in a “serial, one-at-a-time mode” (p. 79) at the system level.

Accordingly, crises have a profound impact on the national political agenda, in particular on the priorities of national governments (Jennings et al., 2011). Most importantly, governments are expected to provide solutions to address crisis developments. For economic crises, this implies that governments need to focus their attention more significantly on the economy during times of economic hardship, implying that the attention to other political issues is crowded out from the system level. However, these other political issues arguably vary quite significantly in terms of their proximity or remoteness to the crisis at hand.

Here, we assume that the degree of crisis proximity or remoteness is defined by the extent to which crises trigger changes of objective problem parameters in a given policy subsystem and hence redistribute the political opportunity structures of the actors involved (Boin, ’t Hart, & McConnell, 2009, p. 98). Policy subsystems display different characteristics that affect the opportunities of subsystem actors to present policy issues as being crisis-relevant. This neither means that such framing always



**Figure 1.** The Policy Subsystem–System Relationship.

takes place in crisis-proximate subsystems nor do we claim that every policy punctuation is the result of a crisis frame. We rather emphasize that different subsystems display different potentials to frame domain-specific issues as being relevant for managing and coping with the crisis.

Yet, how exactly can we distinguish rather crisis-proximate from rather crisis-remote policy subsystems? Obviously, economic crises first and foremost matter for the economy and should accordingly have the most pronounced implications for economic policymaking. In times of economic hardship, political actors dealing with economic matters will have a powerful position from which to promote their issue to the systemic agenda. In this sense, economic policy subsystems (including tax policies and macro-economic policies) should be the most proximate hotspots when economic crises unfold. To some extent, this increased attention to economic issues among policymakers can be seen as a reaction to the fact that economic voting increases during economic downturns (Singer, 2013). In a similar vein, Borghetto and Russo (2018) have shown that parliamentary parties become particularly responsive to voter preferences when economic crises hit. Accordingly, since economic crises affect the attention distribution of voters, political parties, and governments simultaneously, it is hardly surprising that most applications of PET that study the linkage between economic crises and policy change have primarily centered their analytical focus on the financial and economic policy subsystems (e.g., Burns, Clifton, & Quaglia, 2018; Moschella, 2011). However, there are various other policy subsystems that vary in the extent to which their issues can be framed in economic terms and hence presented as crisis-relevant. In this contribution, we compare social, environmental, and morality policy. While both social and environmental policy entail clear economic implications to varying degrees, morality policy entails, if at all, only very minor economic consequences.<sup>1</sup>

For environmental policy, measures directed at the regulation of product characteristics or production processes have the potential to affect the competitiveness of a country's industries and its attractiveness for foreign direct investment, with implications for the prospects of the national economy. This means that during economic crises, when attention is strongly focused on economic recovery at the system level, business actors will find it easier to advance an economic frame to environmental issues than during times of economic growth (Hanschmann, 2017; Knill, Steinebach, & Fernández-i-Marín, 2018). When businesses suffer from unfavorable economic scope conditions, they have a natural incentive to exploit the economic crisis by pushing back environmental regulations. This implies that while environmental policy is not necessarily directly affected by economic crises, the policy content dealt with within the environmental policy subsystem has the clear potential to be framed in economic terms and thus to gain access to the systemic agenda, even (and maybe especially) during times of economic hardship (Bauer, Jordan, Green-Pedersen, & Héritier, 2014; Bauer & Knill, 2014; Jordan, Bauer, & Green-Pedersen, 2013; Skovgaard, 2014; Tienhaara, 2014).

The same applies to social policies, such as pension policies or unemployment regulation, which might have ramifications for the production costs of national

companies. When economic crises consume the attention of decision makers, welfare state arrangements often come under political scrutiny and access the system level (Farnsworth & Irving, 2012; Vis, Van Kersbergen, & Hylands, 2011). Compared to environmental policy, social policy invites even more economic framing because both sides of the policy debate are affected by economic crises: those who pay for social transfers and those who receive them. Therefore, social policy and economic policy are not antipodes but are rather two sides of the same coin. Thus, there are considerable overlaps between economic affairs and the subsystems of environmental and social policy, and the two policy subsystems can be characterized as crisis-proximate policy subsystems.

Quite the opposite is the case for morality policies, which can be considered largely decoupled, and therefore remote, from economic issues. While some argue that any political issue has the potential to be framed in moral terms (Mucciaroni, 2011), this does not necessarily imply that any moral issue also entails a relevant economic dimension. In fact, as Tatalovich, Smith, and Bobic (1994) correctly note, “issues of moral conflict are not easily assimilated into theories and models based upon economic and class interests” (p. 2). Instead, the distinctive feature of morality policies is that politics is shaped by conflicts over first principles. The regulation of abortion, euthanasia, pornography, or prostitution entails decisions about “right” and “wrong” and hence the “validation of a particular set of basic values” (Mooney, 1999, p. 675). While one might argue that some morality policies do have economic implications (e.g., tax revenue in prostitution policy), these are comparably minor when compared to those we find in environmental and social policy. Moreover, it is quite unlikely that these minor economic matters we find in some morality policies have the potential to be framed as relevant to address a system-wide economic crisis. As a consequence, crisis-induced shifts toward incremental patterns of policy change as a result of crowding-out effects at the system-agenda level should be most pronounced for morality policies. Such effects might also be visible for environmental and social policies, but due to the connectivity of these issues to economic concerns, increases in incrementalism should materialize to a lesser extent. Given these theoretical considerations, we put forward our research hypothesis:

*Hypothesis 1: During crises, political attention to crisis-remote policy subsystems is crowded out from the system level, leading to more incremental patterns of policymaking in these subsystems. The strength of this effect increases with the crisis-remoteness of the subsystem.*

Our expectation that the crowding out of political attention reduces the probability of more radical policy changes in crisis-remote subsystems does not imply that policy punctuations will be prevented completely. While in such constellations subsystem actors promoting fundamental departures of the status quo will find it much harder to get system level attention, this possibility cannot be fully excluded. Rather, this depends on the extent to which these actors are able to decisively influence the framing of crisis-remote issues as crisis-relevant. If, for instance, changes in unemployment schemes are framed as crucial for stimulating the job market and

economic growth, such issues might gain strong support on the system level because they are perceived of immediate relevance for effectively responding to the crisis a government is facing. In view of these considerations, one can even argue that if—and only if—a subsystem issue makes it on the system level agenda during crisis times, policy punctuations might be even more radical than during normal times. The magnitude of policy change should increase with the extent of perceived problem pressure; i.e., the perceived size, urgency, novelty, or proximity of a problem (Rocheffort & Cobb, 1994). It lies in the very nature of crises that they strongly boost the perception of challenges along these lines. Yet, the chance of defining subsystem issues as crisis-relevant might vary across subsystems. The more a subsystem is generally remote from economic matters (as is the case for morality policy in our case), the lower are the chances for successfully framing the respective issues as crucial for addressing a prevalent economic downturn. For less remote areas (environmental and social policy in our case), the prospects for such developments are generally higher.

*Hypothesis 2: During crises, policy punctuations become more extreme and the strength of this effect decreases with the crisis-remoteness of the subsystem.*

### 3. Research Design

Before we turn to the empirical test of the research hypotheses, the following paragraphs introduce and justify our research design. First, we briefly introduce our case selection and the unit of analysis. We then turn to a conceptualization of our dependent and independent variable and an account of our control variables. Finally, we explain our model and approach of inference.

#### 3.1. Case Selection and Unit of Analysis

The country sample includes 12 European Union member states (Austria, Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom) and Switzerland. Thus, within the broader sample of European countries, we employ a “diverse case” selection strategy (Gerring, 2008). This ensures a high degree of representativeness while at the same time allowing for the exploitation of the variation in theoretically relevant variables for systematic comparison. More specifically, the sample includes countries with considerable variation regarding regulatory approaches in the three policy subsystems under scrutiny. It includes both “leaders” and “laggards” in environmental policy, different welfare state arrangements in social policy, and varying degrees of permissiveness regarding the regulation of moral issues. Moreover, the selected countries also vary in terms of the complexity of their institutional environments, economic power, and government ideology. Most importantly, all countries in the sample have experienced economic downturns, but not all of them to the same extent.



### 3.2. *The Dependent Variable: Assessing the Size and Change of Policy Portfolios*

Empirical applications of the punctuated equilibrium framework either measure changes in government activity at the agenda-setting stage or, if they consider policy outputs, look at changes of budget appropriations (Baumgartner, Green-Pedersen, & Jones, 2006). Focusing only at the agenda-setting stage is beneficial if we are interested in the change of government priorities, but such a perspective does not necessarily inform us about what governments actually achieve at the end of the legislative process. Likewise, focusing on budgets helps us to understand variation in the distribution of government funds, but it has obvious limitations if we are also interested in subsystems with no or only very limited budget relevance. For instance, granting equal rights to homosexual couples presents a clearly marked change in policy but has only minor, if any, budgetary consequences. Likewise, banning certain pollutants does not directly impact budgets. In social policy, budgetary changes are often the result of prior regulatory decisions, like changes in eligibility requirements for social benefits. Accordingly, policy change often materializes in alterations of regulatory approaches, and given the widely acknowledged “rise of the regulatory state” (Levi-Faur, 2014; Majone, 1994) in recent years, adopting a content-based perspective on policy change might prove highly informative if we aim to understand cross-temporal variations in government activity (Knill, Schulze, & Tosun, 2012). Moreover, another potential downside of focusing on budget changes is that they are (qua definition) intrinsically linked. Given that budgets cannot be increased ad infinitum and that some countries even operate under strict rules against deficit spending (Adolph, Breunig, & Koski, 2018), there are natural and often inevitable trade-offs regarding changes across different budget categories. These trade-offs, however, do not (necessarily) result from the limited attention span and processing capacities of policymakers, but from the very nature of government budgets. We therefore suggest that if we conceive of (i) policy change as a change in policy content and (ii) want to test PET’s key assumptions rigorously, we should assess the variability and the extremeness of government activity as expressed in the changing sizes of national policy portfolios.

Yet how can we usefully conceptualize policy portfolios for our analytical purposes? We consider the size of policy portfolios to be determined by (i) the number of policy targets regulated at any given point in time (“what is the government doing?”) and (ii) the number of policy instruments or rules used to address the respective policy targets (“how does the government intend to achieve its targets?”). By implication, we are not interested in the restrictiveness or generosity of a certain policy (i.e., the setting of the policy instruments), as changes in instrument settings do not contribute to the size of the policy portfolio. Instead, we focus on the introduction and dismantling of policy instruments as well as the widening and restriction of the scope of existing policy instruments to policy targets.

A key challenge that arises from comparing different policy subsystems is that the number of relevant policy targets and instruments might vary strongly across the sectors under scrutiny. In consequence, any nominal or count measure would fail to capture different sectoral propensities to grow and would hence create

biased cross-sectoral measures of both the absolute policy portfolio size and its relative change over time. To deal with this challenge, we refer to the total available space as the product of the number of policy targets and instruments relevant in a specific sector and assess which proportion of the space is filled. Employing such a spatial or two-dimensional approach to policy portfolio size effectively rules out any cross-sectional baseline difference in the total number of policy targets or instruments that can potentially be regulated (Adam, Knill, & Fernandez-i-Marín, 2017).

A maximal policy portfolio addresses all the possible policy targets with a combination of all available policy instruments. Let us imagine a hypothetical world in which everything that a given government has to worry about are two environmental issues: carbon monoxide (CO) emissions from cars and CO emissions from industrial plants. In this rather easy and under-complex world, the government is restricted to the use of only two means to reduce CO emissions: green taxation and obligatory emission limits. When this hypothetical government does *everything* it can to reduce environmental harm, it addresses the CO emissions from cars *and* the CO emissions from industrial plants, each time using its entire policy toolkit, namely a tax *and* an obligatory emission limit. In this case, we record a policy portfolio size of 1. If the government addresses all possible policy targets, i.e., CO emissions from cars *and* from industrial plants, with only one of the two available instruments, we would record a policy portfolio size of 0.5 given that only half of the possible combinations are covered. We would indicate the exact same values if the government addresses only either CO emissions from cars *or* from industrial plant but does so with its full set of (two) policy instruments. In terms of policy portfolio growth, in turn, a change from 50 percent (0.5) of the total space occupied to 100 percent (1.0) indicates that the portfolio grew by 50 percentage points (0.5) within the given time frame. Our final measure of policy change is thus *the annual change rate in the size of national policy portfolios in different policy sectors*.

Unfortunately, in the real world, governments have to deal with a much larger amount of policy issues, but also possess more different policy instruments to address them. To illustrate our approach more explicitly, Figure 2 thus presents the French social policy portfolio at two points in time. It illustrates how the size of the French policy portfolio in the area of social policy has increased from about 12 percent of total space occupied in 1980 to about 16.5 percent in 2005. In other words, the French policy portfolio grew by 4.5 percentage points within the given time period

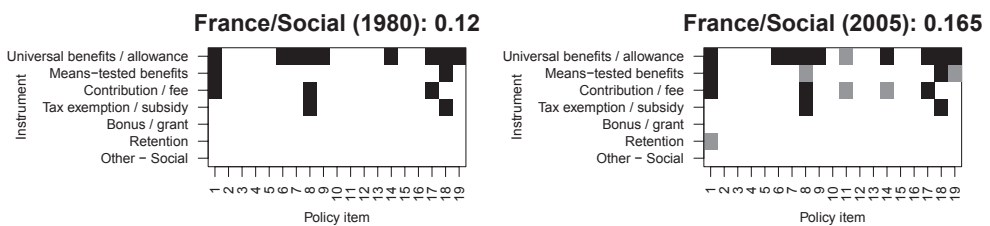


Figure 2. Exemplary Policy Portfolio.

and was about one third larger in 2005 than it was in 1980. The boxes marked in gray represent the new social policy instruments added to the portfolio.

We apply this novel measurement scheme to data collected in two broader research projects, which both have in common that they focus exclusively on policy outputs in the respective policy areas. In the CONSENSUS project, we collected data on social and environmental policies. In the MORAPOL project, in turn, we collected data on several morality policies and in this contribution, we focus on the ones that we consider least connected to economic matters: abortion, euthanasia, pornography, and prostitution policy. Abortion and euthanasia are widely regarded as pure morality policies as they affect fundamental matters of life and death (Engeli, Green-Pedersen, & Larsen, 2012; Mooney, 2001). Pornography and prostitution do entail some economic elements, but the literature strongly suggests that the clash of moral values continues to dominate the policy process in these areas (see, e.g., Smith, 1999, for pornography and Wagenaar & Altink, 2012, for prostitution). Our assessment of environmental, social, and morality policy changes relies on a comprehensive data collection of all relevant national legal documents—laws, decrees, and regulations—in the specific issue area under review. The relevant pieces of legislation were collected through country experts, national legal repositories, secondary literature, and scholarly analyses.

In environmental policy, the policy targets mostly represent pollutants like ozone, carbon dioxide, or sulfur dioxide in the air, but also comprise other substances like lead content in gasoline, sulfur content in diesel, nitrates, and phosphates in continental surface water, as well as environmental objects like native forests, endangered plants, or endangered species. Environmental policy instruments include, among others, bans, technological prescription, obligatory standards, prohibitions, and taxation.

For social policy, we distinguish a total of 19 policy targets spread across the three subfields of unemployment, retirement, and children. Policy targets include regular unemployment, temporary unemployment due to bad weather, regular retirement for individuals, retirement of married couples, and retirement of unmarried couples. Furthermore, policy targets might be birth, children, and juveniles. Again, these targets can be addressed by different policy instruments. These are, *inter alia*, continuous allowances, one-time bonuses, tax exemptions, retention periods, contributions, and other instruments.

By combining targets and instruments, the theoretically maximal portfolio space in social policy consists of 114 combinations (27 targets addressed by a maximum of 7 instruments each). The theoretically maximal portfolio space in environmental policy comprises 624 combinations (48 targets addressed by a maximum of 13 instruments).

In the context of morality policy, we broadly distinguish between policy measures addressing the supply- and the demand-side of abortion, active euthanasia, passive euthanasia, assisted suicide, prostitution, and pornography (policy targets; Adam, Hurka, Knill, & Steinebach, 2019; Hurka, Adam, & Knill, 2017). Abortion policy instruments include, among others, counseling and consent requirements, the indications under which abortions are legal, payment schemes, qualification

requirements for physicians and hospitals, conscious rejection clauses, advertising restrictions, as well as documentation and licensing requirements. For all the different euthanasia types, policy instruments range from special regulations for minors, personal requirements like a person's state of health, consent requirements, time lag requirements between request and execution of euthanasia to advice-seeking requirements. In prostitution policy, instruments represent age restrictions, locational restrictions, regulations on taxation, social security regulations, and advertising restrictions. Pornography policy instruments cover the legality of different distribution channels, possession restrictions, locational restrictions, as well as restrictions on trade and the hours of operation. In total, we identified 151 different rules in the four morality policies under scrutiny (abortion, euthanasia, pornography, and prostitution). For an encompassing list of all policy targets and instruments, please consult the supporting information Appendix.

While we are not claiming that the identified policy targets and instruments are exhaustive, they present the most common means and objectives of governmental actions in the respective policy areas. A focus on these policy targets and instruments thus ensures a certain relevance of the measures taken as well as their comparability over time.

### 3.3. *The Independent Variable: Identifying Economic Crises*

Following Boin et al. (2009), economic crises can be conceived of as the perception of urgent threats that are triggered by developments in the financial system or the market and are accompanied by a high degree of uncertainty over causes and consequences. In economics, these features are specified as an abrupt and severe deterioration of key macroeconomic indicators. From this conception, it follows that recessions, typically defined as two consecutive quarterly declines in the gross domestic product (GDP), can hardly be considered crises but are rather normal parts of the business cycle. To speak of a crisis event that combines the features of threat, urgency, and uncertainty, we need to adopt a perspective that goes beyond the description of more periodic economic downturns. We thus assess only every full year with negative growth rates in real GDP as a period of economic stress (Organization for Economic Co-operation and Development, 2017).

The combination of cross-national comparison and temporal sequencing places a total number of 45 economic crisis events under scrutiny. These events are mainly clustered around the three most recent "transboundary crises" (Boin et al., 2009), namely the oil shock of the early 1980s, the cumulated crises of the early 1990s, and the global economic depression of the late 2000s. What is common to most of the cases is thus that they are exogenous in nature. This excludes the possibility that the direction of causality is potentially reversed, i.e., that governments that are generally unable to update their policy portfolios create serious domestic problems that trigger economic crises. Overall, economic crises occur in about 12 percent of all country-year observations under study. Figure 3 presents the policy portfolios' changes over time as well as the crisis years under scrutiny. The crisis years are indicated by the gray bands.

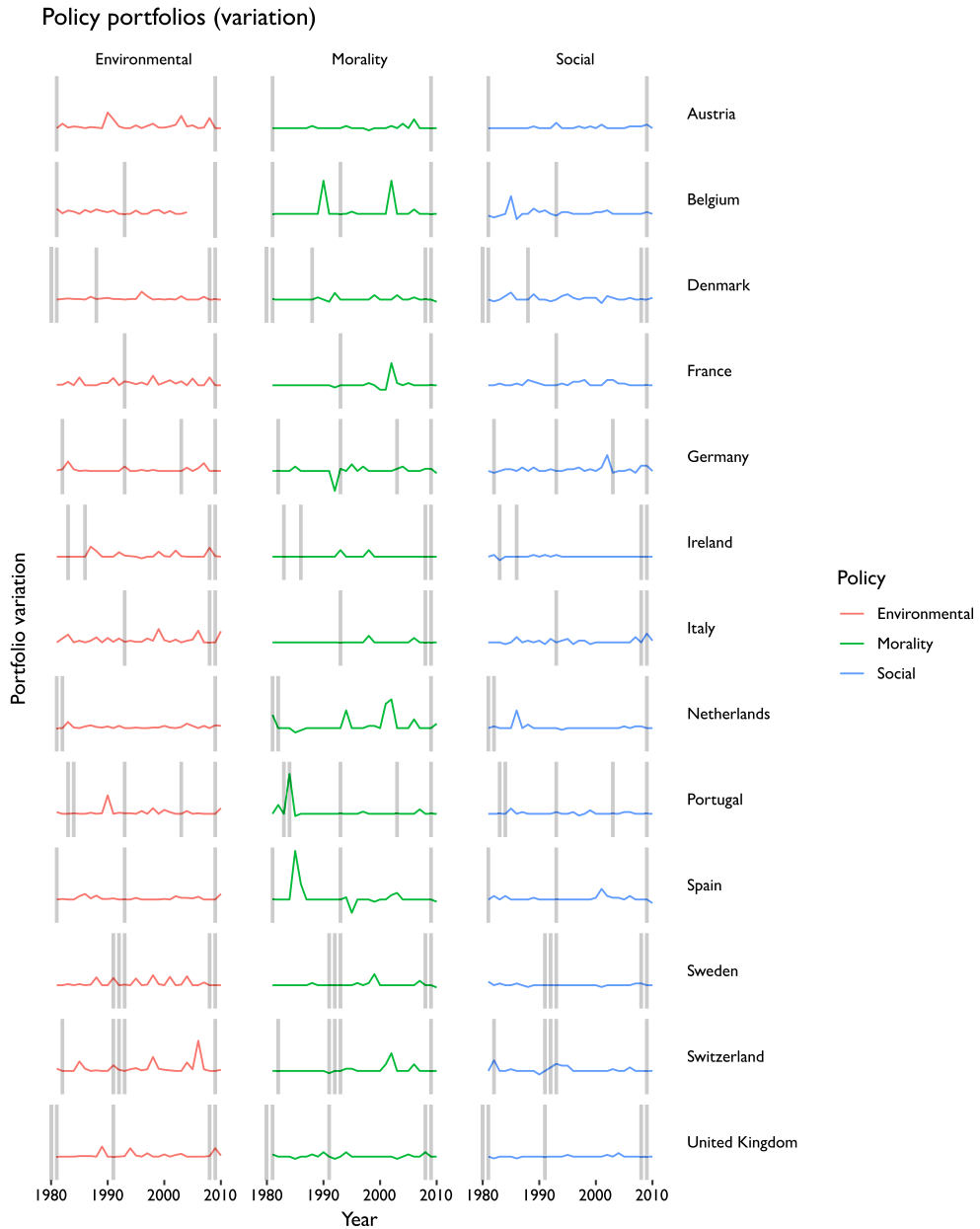


Figure 3. Annual Policy Portfolio Change Rates over Time for 13 Countries (1980–2010).

### 3.4. Control Variables

We include a set of control variables in our analysis. Given that our main analytical interest is in the patterns and *not* in the direction of policy change, we primarily focus on institutional and structural determinants, i.e., factors that curb or extend the scope of action for policymakers. While a government’s party position might

be important to control for the direction of policy change—e.g., more or less social protection—there is no good reason to assume that the left-right continuum tells us anything about the *extent* to which policymakers deviate from the status quo ante (Baumgartner, Jones, & Wilkerson, 2011, p. 947; Breunig, 2011). In this regard, the extent to which policymakers face institutional constraints merging from consensus requirements in the political process can be expected to strongly affect the probability and degree of policy change. To capture institutional constraints, we rely on Lijphart's (2012) first (executives-parties) dimension that classifies political systems along a continuum ranging from majoritarian to consensus democracies. Also, we include in the analysis a country's per capita GDP and level of debt. These two control variables capture the financial resources and flexibility that governments possess to alter their policy portfolios. A fourth control variable is the initial size of the policy portfolio. The rationale for including this control variable in the analysis is that the maturity of the policy sector may determine how strongly governments can deviate from the status quo. Finally, we control for the public debt levels (as percentage of GDP) to capture the extent to which subsystem dynamics might be affected by governmental spending capabilities. Controlling for debt is crucial as less money available might have the very same implications for crisis-remote policy areas as an absorption of political attention.

### 3.5. *Model and Inference: From Multiple Calculations to a Comparative Estimation*

The dominant approach to capture the patterns of policy change in the existing literature is to compare L-kurtosis values across change distributions (e.g., Baumgartner et al., 2009, p. 611; see also Jensen, 2009, p. 295; Breunig, 2006, p. 1077). L-kurtosis, however, comes with three major shortcomings. First, L-kurtosis values are primarily a measure for policy punctuations (the tails) but are not a measure for incrementalism (the peaks). A high kurtosis value indicates that a given change distribution includes more radical policy changes than we would expect under a normal distribution, but it does not tell us anything about whether or not policy change is simultaneously also more incremental than under the normal distribution (Westfall, 2014). Second, kurtosis values are the result of an algebraic calculation; they are not based on an estimation. Accordingly, the comparison of two L-kurtosis values might tell us which distribution is more punctuated, but we do not gain any information about the extent of uncertainty involved and thus about whether or not the observed differences are also significant. Third, while the L-kurtosis is standardized and allows for comparing distributions with different ranges, we cannot properly test which exact influences cause distributions to differ from one another. The approach of creating different subsets of data might help to test for the effect of a single variable but has limits if we must deal with a broader set of control variables. Accordingly, we would not be able to rigorously assess the influence of economic crises on distributions of policy change based on kurtosis values.

Given these considerations, we fundamentally depart from existing methodological approaches. Rather than calculating kurtosis values, we suggest that

estimating (not calculating) the (i) *degrees of freedom* for punctuations and (ii) the *variance* for incrementalism provides a more fruitful approach to testing the empirical implications of the punctuated equilibrium framework. Drawing on the annual changes in policy portfolio size presented above, we generate data that come closest to the actual change distributions of our observational data. In other words, our goal is to move from our set of observations (1,287 observations<sup>2</sup>) to a full model that contains all information necessary to create data with the exact same traits as our observational data.

Contrary to the classical approach that calculates kurtosis as deviation from the normal distribution, our estimation approach uses the *t*-distribution as the reference model because of its more flexible functional form and its ability to capture distributions with extreme cases. The *t*-distribution is a generalization of the normal distribution; i.e., a *t*-distribution with infinite degrees of freedom has virtually the same functional form as the normal distribution. The lower the degrees of freedom parameter, the more the distribution is punctuated. By contrast, a default model relying on the normal distribution would only capture incrementalism, but not punctuations, as its functional form does not allow for extreme cases to occur. If we still try to fit a normal model to constellations of extreme changes, this would bias our results.

To illustrate that moving from calculation to estimation and from normal distribution to *t*-distribution indeed makes a big difference for our assessment, let us consider an example. As indicated by the distribution marked in black on the right side of Figure 4, the lower the degrees of freedom, the more a *t*-distribution differs from the normal one (distribution marked in red). The key difference between the *t*-distribution and the normal distribution is that the *t*-distribution has longer “tails,” i.e., more values that are highly distanced from the mean. As a result, lower values for the degrees of freedom indicate the presence of more radical policy changes. When comparing the L-kurtosis values indicated on the left side of Figure 4, it becomes apparent that despite substantial differences in the variance of the different

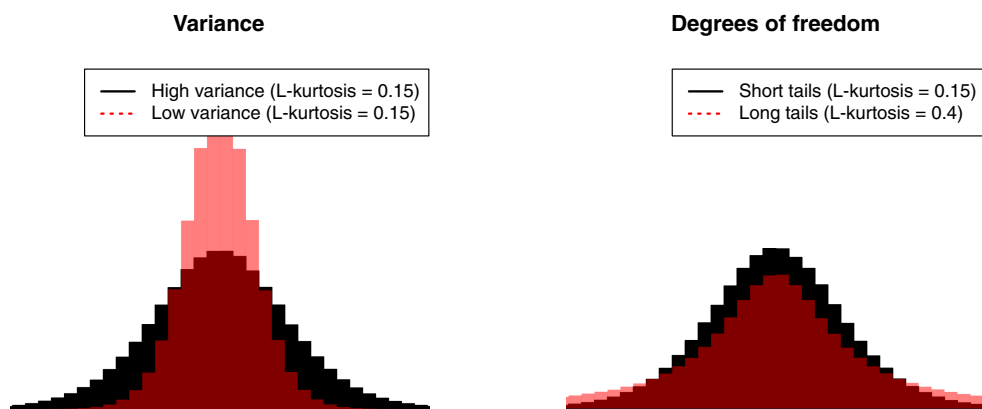


Figure 4. The Relationship Between L-Kurtosis, Variance, and Degrees of Freedom.

distributions, the kurtosis values are in fact identical. By contrast, the L-kurtosis values presented on the right side of Figure 4 strongly vary by the degrees of freedom. This observation demonstrates that referring exclusively to the L-kurtosis cannot tell us anything about the peakedness of the distribution and thus about the patterns of incrementalist policymaking. In fact, it is only by an assessment of (i) the *degrees of freedom* for punctuations and (ii) the *variance* that we are able to gather a comprehensive picture of the story told by the punctuated equilibrium framework, namely that policymaking in modern democracies is characterized by both incrementalism and radical policy turnovers. A more detailed illustration of the advantages provided by relying on the *t*-distribution is provided in the supporting information Appendix (Section 4, Probability distributions). In this illustration, we also demonstrate that relying on the *t*-distribution provides us with a much better fit between the calculated and the estimated mean of a kurtotic distribution than is the case for models based on the normal distribution.

Instead of analyzing groups of observations and *calculating* summaries of interest such as the L-kurtosis, we thus employ a full statistical model that *estimates* the parameters of interest that we deem relevant in shaping and defining the data generation process. This model (i) is based on the *t*-distribution and includes both the variance and the degrees of freedom to precisely assess the shape of the distribution, (ii) incorporates time dynamics using an auto-regressive error component, (iii) employs a hierarchical/multilevel approach to allow unobserved country effects to be shared across the three policy sectors, and (iv) controls for the effects of exogenous covariates.

The explanatory model can be described as a hierarchical robust autoregressive linear model. It is a linear model because change rates are expected to come from a linear combination of the explanatory variables. It is robust because it takes into account heteroscedasticity in the variance of two variables and attributes less importance to outliers by using the *t*-distribution. It is hierarchical since it shares some parameters between the three different policy subsystems, namely the parameters that account for the fact that change rates in countries may be naturally different from one another (unobserved variance at the unit level shared by the three policies). And finally, it is autoregressive because it incorporates a time dynamic component of order one.

$Y_{y,c,p} \sim$	$\mathcal{T}(\mu_{y,c,p}, \sigma_{y,c,p}, \nu_p, C)$	Data component
$\nu_p =$	$1 + (-1 * \log(v_{d,pre}))$	Degrees of freedom
$v_{y,pre} \sim$	$\mathcal{U}(0,1)$	
$\sigma_{y,c,p} =$	$\exp(\lambda_{1,y} + \lambda_{2,p}IPP + \lambda_{3,p}C + \lambda_{4,7,p}CVC)$	Error component (EC)
$\lambda p \sim$	$\mathcal{N}(0,0.5)$	Priors for the EC
$\mu_{y,c,p} =$	$\alpha_p * \phi_c + \delta_p IPP + \theta_p C + \beta_p CVC + \gamma_p CVP + \rho_p * (Y_{y-1,c,p} - \mu_{y-1,c,p})$	Systematic component
$\alpha_p, \delta_p, \gamma_p, \beta_p, \theta_p, \log(\phi_p) \sim$	$\mathcal{N}(0,1)$	
$\rho_p \sim$	$\mathcal{N}(0,1)T(-1,1)$	Truncated normal prior for AR(1)

The model used to explain the variation in the policy portfolio change rates is described in the equation above. It can be read as follows: the change rate of



a policy portfolio ( $p$ ) in a given country ( $c$ ) and a given year ( $y$ ) is distributed with a  $t$ -distribution centered at  $\mu$ , with dispersion parameter  $\sigma$  and degrees of freedom  $\nu$ . The systematic component is a linear combination of a global rate growth ( $\alpha$ ) times a country-specific multiplier ( $\varphi$ ), the (lagged) effect of crisis ( $C$ ,  $\theta$ ), the initial state of the policy portfolio (IPP,  $\delta$ ), the control variables ( $\beta$  for country covariates CVC and  $\gamma$  for political parties in government CVP), and an autoregressive component ( $\rho$ ). The  $\alpha p$  represents the policy portfolio growth rate under economic growth, and the  $\theta p$  represents the decrease in the growth rate when under crisis.

The parameters of interest, however, are in the error component and in the degrees of freedom. In other words, we are mostly interested in whether the variance of the time series changes and whether strong policy turnovers become either more or less likely under crisis conditions. For the first aspect, the variance of the time series, we are interested in the  $\lambda$  parameters that control for the heteroscedasticity in the data.

The model has been assessed using Bayesian inference. Bayesian inference provides maximum model flexibility to model the main parameters of interest. It also allows for a systematic way to incorporate missing data points such as the GDP per capita in Switzerland for some years. Likewise, the model does not require the assumption that the data come from a sample of possible realizations of countries and years, and thus must rely on the null hypothesis testing framework.<sup>3</sup>

In order to account for potential issues of reverse causality, we introduce a one-year lag on the crisis variable. While the crises we analyze are mostly exogenously driven, reducing the threat for reverse causality (see Section 4.3), this lag structure further ensures that the patterns of policy change we observe unfold in response to crises and do not drive the occurrence of crises themselves. We present robustness checks for different lag structures in the supporting information Appendix (Section 3). All our key findings remain unchanged.

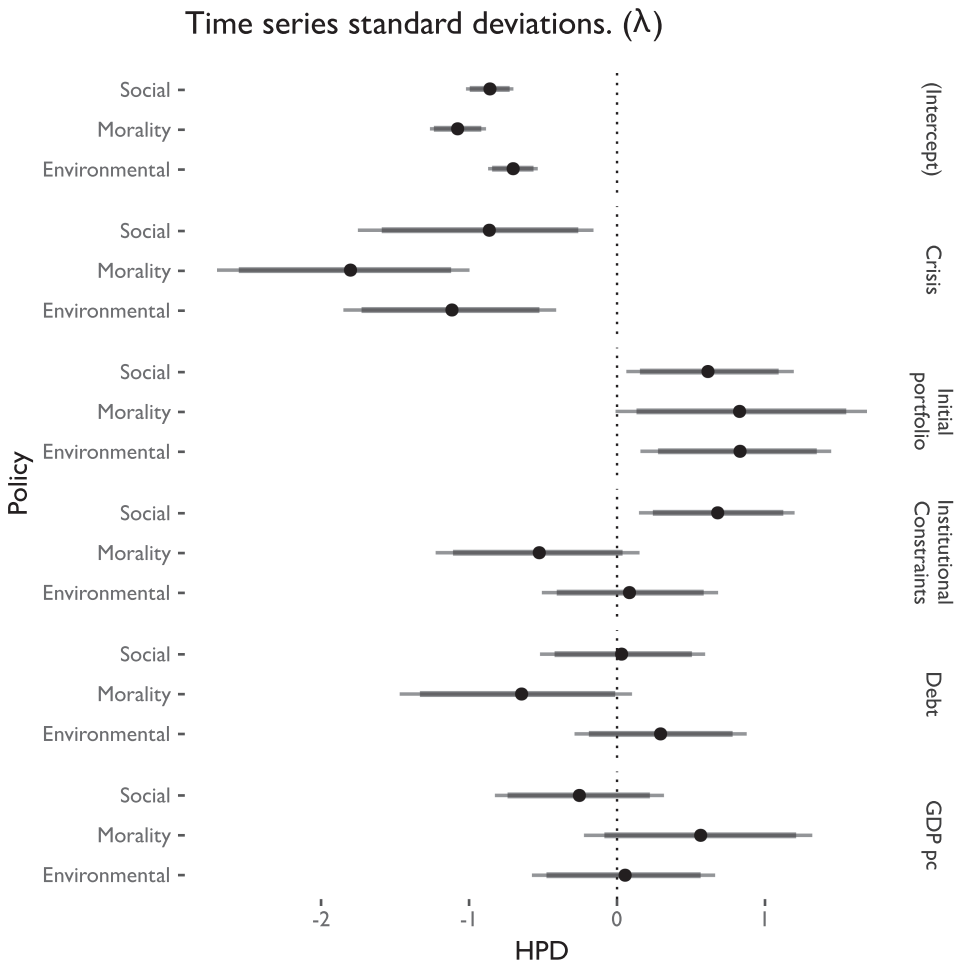
#### 4. Empirical Analysis and Results

We now turn to the key question guiding this article, namely how economic crises impact patterns of policy change in social, environmental, and morality policy. Our key theoretical expectation is that economic crises crowd out attention and thereby raise the hurdles for crisis-remote policy subsystems to access the agenda at the system level. As a result, we generally expect more incremental patterns of policymaking in times of economic hardship in crisis-remote policy subsystems, and that the degree of crisis-remoteness should condition the size of the effect. To test this hypothesis, we focus on the *variance* of policy portfolio change rates across different macroeconomic conditions. A lower variance implies a higher number of percentage-point changes that are close to zero and thus more incremental policy changes. Moreover, to complement our analysis, we also assess the *degrees of freedom*. The degrees of freedom can range from 1 to infinity. While the variance indicates if the occurrence of strong policy changes is more (or less) likely, the degrees of

freedom provide a measure of whether or not the policy changes observed are more (or less) radical, i.e., deviant from the status quo ante.

4.1. Crisis-Induced Incrementalism in Crisis-Remote Policy Subsystems

Given these clarifications, Figure 5 presents the distributions of the parameters that are used to explain the variance of policy portfolio change rates. The results show that the overall variance of the time series is strongly reduced in times of crisis. As indicated by the uncertainty bands, we can claim with a 99.9 percent certainty (subjective probability) that the patterns of policymaking are significantly different in times of crisis than in non-crisis times. This essentially implies that economic crises affect the rates of policy portfolio changes by decreasing their variance and thus



**Figure 5.** Relationship between Economic Crises and Incrementalism.  
 Note: Highest posterior densities (HPD) of the parameters that control the time series variation. Negative values for crisis imply that the variation of policy portfolio change rates under crisis is lower than under economic growth.

making extreme changes from year to year less likely. As a result, policy portfolio changes become more linear and predictable in times of crisis than under more benevolent economic conditions.

Yet while the variance of the change distribution decreases for all policy subsystems as predicted by hypothesis 1, we can still observe substantial differences across the three policy sectors under scrutiny. While the variance of changes in social policy during crisis periods is reduced by about 58 percent, respective effects amount to 67 percent for environmental policy and 83 percent for morality policy. Recall from the equation that the effects on the variance are inside an exponential, in order to force the variance to be positive. Therefore, it is possible to obtain a value that represents the percentage increase or decrease over the base variance by taking the exponential of the parameters. This results in, for instance, a value of  $\exp(-0.86) = 0.42$  for the effect of crisis on the variance of social policies. This value implies that during an economic crisis, the variance in the social sector is multiplied by 0.42, which corresponds to a decrease of  $1 - 0.42 = 58$  percent.

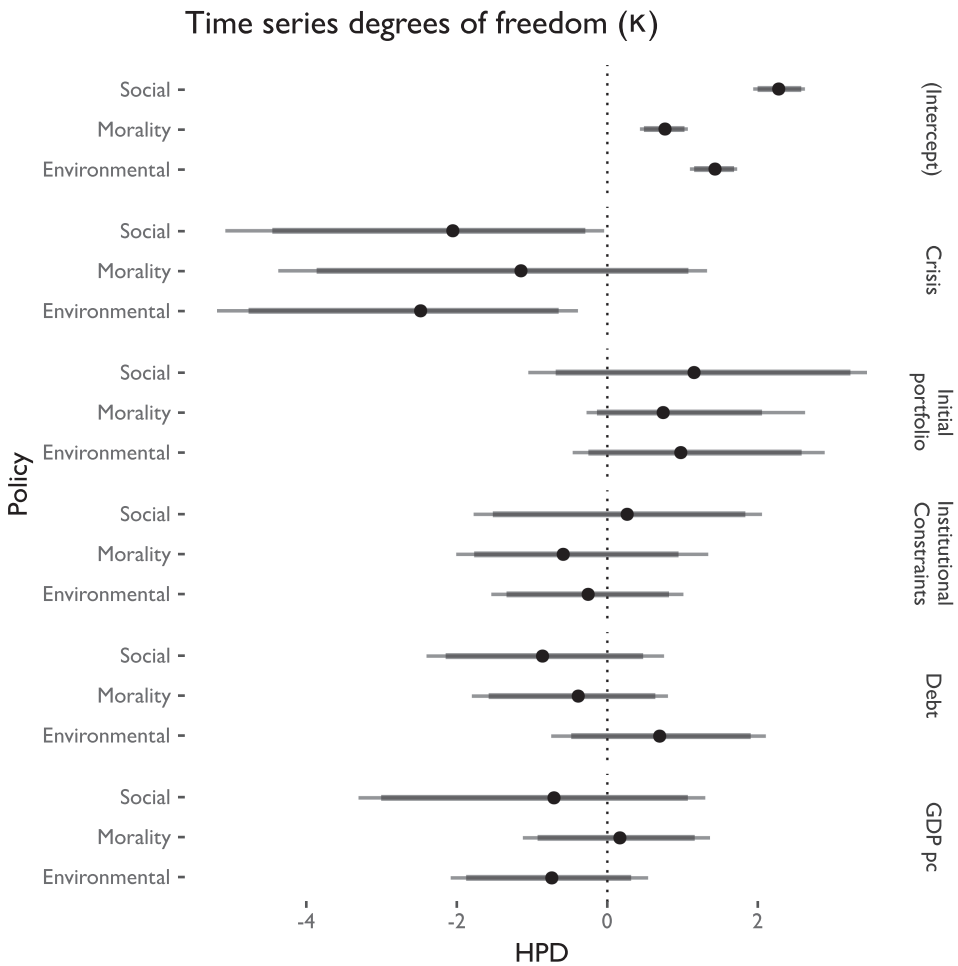
These findings suggest that the variance of morality policy is most strongly affected in times of crisis. The respective numbers indicate that the distribution of morality policy change becomes more peaked, reflecting more incremental patterns of policy change. By contrast, there are almost no differences for changes in the variance between environmental and social issues. This confirms that economic crises do not affect all policy subsystems equally, but that crisis-induced shifts toward incremental patterns of policy change are more pronounced for the policy subsystem that is most remote from economic matters.

When it comes to the alternative explanations, there are only two control variables that make a significant difference for the variance of policy portfolio change rates. First, starting from a more mature policy portfolio generally increases the variation in change rates. This ecological dynamic is well in line with Max Weber's notion that "rules breed rules," i.e., that the creation of a new rule sets in motion a self-reinforcing process of rule accumulation (Weber, 1972). Moreover, states with more sizable policy portfolios also have more policies they can potentially dismantle, which might also contribute to an enhanced variance of the change distribution.

In addition, institutional constraints seem to matter for the extent to which policy changes follow a more or less incremental pattern. For morality policy, this relationship is straightforward. Given the fundamental value conflicts shaping morality politics, the chances for accommodating diverse interests are significantly reduced by institutional constraints. For social policy, by contrast, we find a different scenario with institutional constraints coming along with a higher variance of policy changes. This result, which at first glance might seem rather puzzling, can be explained in light of the redistributive nature of social policies, implying that the adoption of policy reforms often requires the compensation of potential losers. Yet such compensation requirements will not only increase with institutional consensus requirements but will also require the adoption of additional policies (complementing the reform package) and hence lead to more pronounced changes in policy portfolios (Jensen, Knill, Schulze, & Tosun, 2014).

4.2. Crisis-Induced Punctuations in Crisis-Remote Policy Subsystems

In the previous section, we showed that economic crises lead to more incremental patterns of policymaking in crisis-remote policy subsystems. This, however, does not tell us anything about what happens at the “tails” of the distribution curve, i.e., whether the few(er) policy punctuations observed are more or less radical than those captured under more benign economic conditions. With regard to the effect of economic crises on the extremeness of policy changes, Figure 6 shows the variables that assess the degrees of freedom of the *t*-distribution used to model the change rates. Higher values in the degrees of freedom imply that the *t*-distribution has shorter tails and behaves more like the normal distribution. In other words, lower values in the degrees of freedom imply that it becomes easier to observe extreme cases of policy change. This is exactly what the results show when comparing periods



**Figure 6.** Relationship between Economic Conditions and Extremeness of Policy Changes. *Note:* Highest posterior densities (HPD) of the degrees of freedom of the distribution of change rates. Low values imply that the tails of the distribution are longer and, therefore, that more extreme cases of policy change can happen.

of economic crisis to periods of economic growth—especially for the social policy portfolio. In this policy subsystem, it is significantly more likely to observe extreme cases of portfolio change under crisis conditions.

The degrees of freedom for the social policy portfolio are reduced by about 93 percent in times of economic hardship compared to more benign economic conditions. A similar, although not as strong, effect can also be observed for environmental policies. As for the morality sector, there is an even lower difference, with the 90 percent confidence bands overlapping zero. In combination with the findings made above, this essentially implies that economic crises make strong policy changes in social and environmental policy subsystems simultaneously less likely and more radical. In morality policy, by contrast, strong policy changes are certainly rarer than under benign economic conditions but do *not* significantly differ with regard to the degree of deviation from the status quo. This confirms our second hypothesis (hypothesis 2).

While we do not have a definite answer to these overall rather puzzling findings, they very well resonate with one of the key insights of Kingdon's (2003) multiple streams model, namely that in the policy process more or less everything can become a problem or a solution if framed in the right way. If issues in remote policy subsystems can be presented as crisis relevant or linked to a crisis, there is some chance that these issues will ultimately make it onto the system agenda during times of crisis and thus undergo fundamental policy change. In this context, the German Hartz IV reforms may serve as a valid example. Here, the then chancellor Schröder successfully managed to present drastic social policy reforms as inevitable and key to economic recovery ('t Hart & Tindall, 2009). The fact that changes in morality policy have become less likely but *not* more radical perfectly supports this reasoning. The very substance and character of morality policy makes it much more difficult if not impossible to showcase morality policy issues as crucial to economic crisis response.

An alternative explanation for our findings could be that it is not so much attention shifts but austerity and consolidation that triggers trade-offs between different policy areas in times of economic hardship. For our country sample and the time period under scrutiny, there are three countries, namely Denmark (1998–2008), Sweden (1998–2008), and Switzerland (2006–10), in which governments had to operate under strict fiscal rules. We thus controlled for an interaction effect between economic crises and these so-called “surplus regimes” (Haffert, 2016, see also IMF). As presented in Section 6.2 in the supporting information Appendix, the analysis reveals that, in crisis times, surplus regimes tend to be associated with lower variation and more policy punctuations in the area of social and environmental policy. Accordingly, governments operating under tight fiscal rules tend to do overall less but, if they do take actions, the observed changes are more radical. This is most probably the case as any change in a country's policy portfolio must be offset by the reform of another policy measure. Testing for the moderating effect of surplus regimes, however, does *not* affect any of our results with regard to the general effect of economic crises on the three policy subsystems under scrutiny. We can hence conclude that economic crises (i) decrease the variation of the year-to-year changes and

**Table 1.** Summary of Key Findings

Policy Subsystem	Incrementalism of Policy Changes	Extremeness of Policy Punctuations
Environmental policy	+	+
Social policy	+	+
Morality policy	++	0

(ii) increase the tails of year-to-year changes (but to varying degrees depending on the policy subsystem's crisis proximity). On top, the crisis' effect is even stronger for countries operating under austerity.

**Table 1** summarizes our key findings. During economic crises, an increase of incrementalism becomes more likely across all three policy sectors, and this effect is most pronounced in the policy subsystem that is most remote from economic concerns, namely morality policy. With regard to the extremeness of the policy changes, we found that the degrees of freedom have significantly decreased for both environmental and social policy, implying that if social and environmental issues make it to the systemic agenda during times of crisis, subsequent policy changes tend to be more extreme than under good economic conditions. In morality policy, in turn, we do not find significant differences across crisis and non-crisis times regarding policy punctuations.

## 5. Conclusion

We started this article with the observation that the PET literature suffers from two shortcomings. First, we argued that although PET clearly recognizes that changes in different subsystems might be interlinked via the system level, scholars have kept focusing their analysis on single policy subsystems. Second, we highlighted that relying exclusively on kurtosis values can lead to analytical mistakes and misleading evaluations of the theoretical expectations that can be derived from PET. To underpin the relevance of arguments, we analyzed the dynamics of policy change during times of economic hardship in three subsystems that differ with regard to the proximity or remoteness to the crisis matters.

We found clear evidence that economic crises have strong redistributive effects leading to more incrementalist patterns of policy change in crisis-remote policy subsystems. Remarkably, these effects are not the same for all three subsystems but are most pronounced for morality policy, i.e., the policy subsystem that is most remote from the economic sphere. Interestingly, we also find that if policy punctuations do occur during economic crises in social and environmental policy, they tend to be more radical than when they occur during non-crisis times. This observation can only be made through a separate analysis of the change distribution's variance as an indicator for incrementalism (peaks) and its degrees of freedom as an indicator for policy punctuations (tails). A mere reference to the L-kurtosis is blind to such nuanced findings given that this value is essentially only a measure of the tailedness but *not* the peakedness (Westfall, 2014).

On a general level, our findings will hopefully encourage other researchers to test the extent to which our argument can be transferred to other types of crises and policy subsystems. For example, we might wonder how migration crises leave their imprint not only on migration policies but also on more crisis-remote policy subsystems. Likewise, while we have ample evidence of the effects of terrorist attacks on security policies, we do not know whether the dynamics of political attention shifts described in this article also have implications for policy subsystems unrelated to security issues. A similar argument could be made about the Brexit negotiations that seem to completely block the agenda and thus vital domestic policy reforms in Britain. While we provided an aggregate study on the relationship between crisis and policy change, future research might also aim to examine the causal mechanisms driving these empirical patterns more thoroughly.

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## Notes

1. Unfortunately, there is no comparable data on economic policy outputs available. Yet, this does not present a particular challenge to our theoretical reasoning and analysis as long as the policy sectors under scrutiny do sufficiently vary with regard to their proximity/remoteness to economic matters. In addition, there are already plenty of studies that demonstrate that economic crises strongly affect the amount of attention devoted to the economy by voters, parties, and governments (see, inter alia, Blyth, 2002; Gourevitch, 1986; Breunig, 2017). Existing studies on the linkage between economic crises and economic policy change thus strongly support the baseline assumption we make.
2. The repeated observation of policy changes in 13 countries, 34 years and the three policy sectors.
3. The model uses mainly noninformative priors. Likewise, it uses a truncated normal prior for the autoregressive component. The software Just Another Gibbs Sampler (JAGS) has been employed to sample from the posterior distributions of the parameters of interest. The model does not show evidence of nonconvergence. Summaries of the posteriors are reported by having discarded the first 2,000 interactions and having gathered 1,000 iterations of a series of 5,000 thinned by every 5th interaction.

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