

International Center for Public Policy
Working Paper 24-07
December 2024

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Extreme Events: Does Multilevel Governance
Matter?**

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Decentralization and the Management of Extreme Events: Does Multilevel Governance Matter?

Ana Herrero-Alcalde¹ and Santiago Lago-Peñas²

December 2024

Abstract

This paper explores the role of multilevel governance in managing extreme shocks such as economic crises, natural disasters, and pandemics—assessing the strengths and limitations of decentralization. Drawing on fiscal federalism literature, it highlights how decentralization can enhance policy innovation, tailor responses to local needs, and mitigate the risks of nationwide policy failures. However, it also identifies challenges, including inter-jurisdictional inequalities, externalities, and economies of scale, which may necessitate centralization. Using case studies from recent global crises, the paper examines the effectiveness of governance models, emphasizing the importance of well-designed intergovernmental frameworks and cooperative mechanisms. The findings suggest that while decentralization enables localized responsiveness, centralization is critical for addressing spillovers, mobilizing resources, and ensuring coordinated action in large-scale crises, offering insights into the resilience of multilevel systems amid growing global uncertainties.

Keywords: decentralization, multilevel governance, crisis management, institutional resilience

JEL Codes: H77, H12, H87

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1. Introduction

This paper offers a panoramic view of the literature that analyzes the relationship between multilevel government institutions and countries' management of extreme exogenous shocks such as large economic crises, natural disasters, and pandemics.

Examining the optimal vertical allocation of fiscal powers across the several levels of government, early fiscal federalism literature suggests that public policies should be crafted and executed by the lowest possible level of government if significant inequalities, inter-territorial spillovers, and economies of scale do not apply. By enabling the customization of fiscal packages (public services plus taxes), devolving fiscal powers to subnational governments can better align public service provision with citizens' needs and preferences (Oates, 1952; Musgrave, 1959; Buchanan, 1965), thereby enhancing overall social welfare. The advantages of decentralizing public policies can be even more pronounced in contexts with considerable heterogeneity in needs and preferences among regions and when citizens can move freely to those jurisdictions offering the fiscal package that best suits their preferences (Tiebout, 1956).

Additionally, a multilevel approach can foster greater innovation in public policies, as federalism can serve as a laboratory with multiple agents seeking the most efficient solution (Ayala et al., 2021; Besley & Case, 1995). In a decentralized setting, the most successful initiatives are likely replicated by other regions, making it more cost-effective to find optimal solutions. Moreover, the social and economic costs of public policy failures are minimized in a decentralized context, as poor policies are only implemented in part of the country, unlike centralized policies, which affect the entire nation (Kropp & Schnabel, 2021).

Despite these potential benefits of fiscal devolution, subnational units might not be the best public policy providers when the “if conditions” do not hold (Prud'homme, 1994). First, inter-jurisdictional inequalities might produce undesirable effects from decentralizing certain public policies, especially when devolution impacts the budget's revenue. Large disparities in jurisdictions' wealth and fiscal capacity—potential tax revenues—can lead to differences in public service provision, encouraging inefficient migration of citizens to wealthier areas (Buchanan, 1965; Boadway & Shah, 2009).

Second, when externalities are relevant, fiscal federalism literature recommends a centralized, or at least coordinated, provision of public policies to account for the total

benefits and costs across the country (King, 1984), enabling the internalization of spillovers. When public policies implemented by one jurisdiction have significant spillovers/externalities affecting other jurisdictions, it may result in inefficient public provision levels. The deciding government will only consider the benefits and costs of public policies for its citizens, ignoring any positive or negative externalities that affect non-citizens, leading to a suboptimal level of public output. Therefore, uncoordinated public measures can be less effective in the presence of spillovers due to the leakage of policy effects into other areas.

Third, in the presence of large economies of scale, the benefits of customizing public service provision would be outweighed by the cost savings of a uniform provision by the central government. A centralized and uniform provision is justified if the central government can deliver the same service at significantly lower costs (Oates, 1972).

Most of the systemic shocks experienced worldwide recently, such as the Great Recession, climate change-induced natural disasters, and the COVID-19 pandemic, fall into one or more of these situations and have challenged existing multilevel government institutions, suggesting the need to review the traditional vertical distribution of powers for a more effective and efficient public response to large crises. Public policies generate significant spillovers into neighboring areas when addressing the prevention and consequences of some of these crises. While the specific characteristics of these externalities vary depending on the type of shock, they consistently challenge policymakers because some effects inevitably spill into other regions or nations (Lago-Peñas et al., 2022; Cadaval-Sampedro et al., 2023). A coordinated or unified strategy to fight those crises would be optimal in this context. However, local governments are normally the front runners in providing essential public services during extreme events. Their proximity enables them to have more detailed information about the immediate needs of their territories and citizens (Oates, 1972; Musgrave, 1969), and therefore they have an important role during crisis management.

Moreover, uncertainty becomes an important challenge for public policy decisions during a major crisis. Innovation can be more successful within a decentralized system with uncertain information. Many agents will implement parallel strategies which can eventually be generalized once the best practices have been identified. In this line of thought, Aubrecht et al. (2022) highlight that in the absence of consensus about how to

deal with uncertain conditions, innovation can allow quicker detection of the best strategy to be followed. According to Chattopadhyay et al. (2022), the process of innovation and imitation can be fostered by sound vertical and horizontal forms of intergovernmental coordination. At the same time, Aubrecht et al. (2022) point out that in times of radical uncertainty, a centralized strategy might be needed if scarce resources need to be allocated to the most damaged locations.

Furthermore, sometimes, the policies implemented to prevent or address the consequences of crises have significant economies of scale, thus increasing the suitability of the central -or even supranational- level of government in dealing with those programs. A good example was the EU's centralized and coordinated strategy to purchase and distribute COVID-19 vaccines when they were first implemented.

Last, central authorities' greater capacity to mobilize the large flow of resources needed to face the consequences of a crisis further increases their role in dealing with it, even when the final public service providers are local governments. This is even more obvious when crises are highly asymmetric and affect low fiscal capacity territories, which lack the funds to address the shock.

To shed additional light on those issues, this paper reviews the most significant literature analyzing the relationship between multilevel government institutions and countries' management of external shocks such as large economic crises, natural disasters, or pandemics.

2. Decentralization and economic crises

Recent economic crises, such as the Great Recession and the pandemic, have shaken public finances worldwide. Most countries have experienced substantial drops in economic activity and tax collections, leading to large public deficits and debt, both at the national and subnational levels of government.

Some relevant questions arise when analyzing the relationship between economic cycles and fiscal decentralization. First, which level of government should lead stabilization policies? Should central institutions have a more significant role in fighting economic crises in increasingly more open economies? Or should subnational governments, closer to sudden changes in citizens' needs, have something to say in the design and funding of

stabilization instruments? Second, do decentralized countries perform differently during economic shocks? Can vertical imbalances and the design of intergovernmental institutions diminish countries' preparedness for dealing with a crisis? Moreover, do macroeconomic shocks shape countries' level of decentralization? The following lines try to summarize the most relevant answers to these questions found in the literature.

Which level of government should react to economic fluctuations?

The traditional view in public finance, articulated by Musgrave (1959) and Oates (1972), assigns the macro-stabilization function primarily to central governments. This orthodox perspective assumes central governments are better equipped to manage macroeconomic stability through monetary and fiscal policy. This view has been partially challenged over time (Gramlich, 1993; Shah, 1994), mainly based on the idea that sub-national governments would be better positioned to design and implement policies responding to regional economic fluctuations.

However, a crucial argument supporting the Musgrave-Oates standpoint is that fiscal multipliers tend to be much lower in the case of regional and local governments due to strong spillover effects across locations, which are indeed more substantial for local governments, as Auerbach et al. (2020) show using a dataset based on U.S. Department of Defense contracts. Furthermore, Lago-Peñas et al. (2019) offer empirical evidence about fiscal multipliers within decentralized settings, focusing on the Spanish case during the Great Recession. Spain, being highly decentralized, was among the OECD countries most severely impacted by the Great Recession in terms of GDP and public deficit. Using both time series econometrics and the Synthetic Control Method approach (SCM), their results show that openness and economic integration of regional economies imply that fiscal multipliers tend to fade. Then, the potentially adverse demand effects of a more assertive regional fiscal consolidation strategy would be partially exported to other regions.

Is decentralization relevant for macroeconomic stability?

A usual concern regarding the relationship between decentralization and macroeconomic stability is that sub-national governments might lack the discipline to maintain balanced budgets, leading to higher deficits and debt accumulation, which could, in turn, undermine national macroeconomic stability. Governments at all levels are exposed to different risk factors, both endogenous and exogenous. Subnational authorities are also

strongly constrained by the design of intergovernmental fiscal relations, including spending and taxing powers, intergovernmental transfers, and borrowing limits, to name only a few. The design of all those elements heavily conditions subnational governments' financial health in the medium and long term, and this will influence the financial position of these authorities and the whole public sector when a macroeconomic shock hits. Rodden (2002) and Rodden et al. (2003) provide examples where sub-national governments have disregarded budget constraints and exacerbated macroeconomic instability. For instance, Argentina and Brazil's large economic and financial crises during the turn of the century were driven to a reasonable extent by the unsustainable budgetary behavior of regional governments, which leaked to the rest of the public sector and the national economy. In this line of thought, Fornasari et al. (2000) found a strong correlation between increases in sub-national deficits and subsequent increases in central government deficits: fiscal mismanagement at the sub-national level can spill over to the national level.

In an extensive review of the effects of fiscal decentralization, Martínez-Vázquez et al. (2017) find that decentralized systems can be more vulnerable to the issue of soft budget constraints. Central authorities may struggle to uphold a firm stance against bailout policies, thus incentivizing unsustainable behavior at the subnational level. However, most of the evidence shows that the specific design, and not that much the level of decentralization, shapes the impact on public finance sustainability (Rodden, 2002; Neyapti, 2019; Eyraud & Lusinyau, 2014). For instance, maximizing tax autonomy and minimizing vertical gaps improves fiscal discipline.

Many countries have introduced fiscal rules and institutions to deal with these risks. The main aim is regulating sub-national borrowing and enhancing fiscal discipline. Fiscal Responsibility Laws (FRLs) and borrowing regulations have been implemented to prevent this scenario. Ter-Minassian (2007) pioneered the study of sub-national borrowing regulations. The effectiveness of these fiscal institutions depends on several factors, including the constitutional structure of vertical governance and the design of the decentralization process. Foremny (2014) found that local fiscal rules effectively reduced public deficits in European countries, but only in unitary states. This suggests that their impact may vary depending on the broader institutional context. In developing countries, the effectiveness of FRLs has also been mixed. Studies by De Mello (2005), Thornton (2009), and Cáceres et al. (2010) highlight that while FRLs can enhance fiscal discipline,

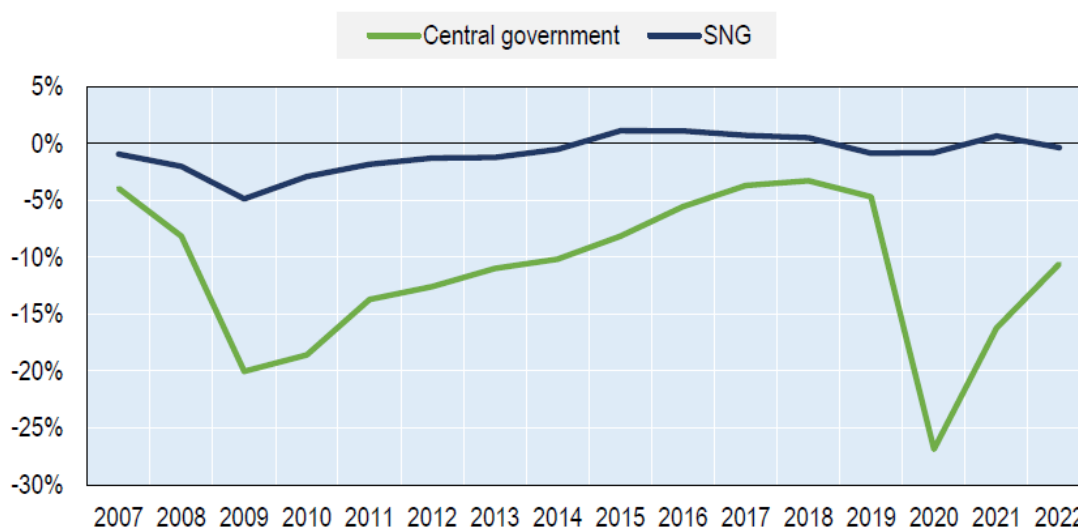
their success depends on the robustness of enforcement mechanisms and the broader fiscal environment.

Lago Peñas et al. (2020) examine the relationship between fiscal stability, fiscal rules, and decentralization using cross-sectional data from OECD countries between 1995 and 2014, encompassing periods of economic growth, the Great Recession, and the subsequent recovery years. They find that more decentralized countries registered better fiscal outcomes, particularly those with higher expenditure decentralization. Hence, with a sound institutional framework design, decentralization can promote fiscal discipline. These findings support the theory that greater tax revenue autonomy strengthens fiscal discipline among subnational governments. Furthermore, smaller vertical fiscal gaps are crucial in enhancing fiscal discipline, as large imbalances undermine the positive effects of expenditure decentralization. Additionally, these authors find that a sound implementation of borrowing rules and strict fiscal regulations effectively hardens subnational governments' budget constraints. Thus, the key policy implication is that well-designed fiscal decentralization, characterized by low vertical fiscal imbalances and binding fiscal and borrowing rules, can enhance government fiscal management rather than threaten it.

Despite this evidence, in the face of an extreme event that severely impacts public finances, the central government's decisions regarding the global response approach are a fundamental determinant of subcentral fiscal deficit. Figure 1 shows the evolution of the median public deficit in OECD countries since 2007. The period includes the two most significant global shocks of recent decades. The impact of the Great Recession and the COVID-19 pandemic on fiscal deficits is similar in total size, with the distinction of a longer normalization process in the first case. What seems to be different is the distribution among fiscal tiers. The deficit of subcentral governments is much lower in the second episode, while the opposite is true for the central government. The explanation lies in the extraordinary intergovernmental transfer programs approved in most countries during 2020-2022. Central government choices on grant programs are fundamental to understanding the balances of the different fiscal tiers, but they are also a source of financial risk for subnational governments. Volatile and unpredictable intergovernmental grants create significant fiscal risks to subnational governments (De Mello & Ter-Minassian, 2024). Although subnational fiscal rules, rainy-day-funds, or natural disasters funds are more than convenient tools for dealing with extreme events, the national

government has a very relevant role to play in the management of subnational financial risks, including events boosted by climate change, pandemics, or unforeseen macroeconomic developments.

Figure 1: Fiscal balances of central and subnational governments (SNG) as a share of revenues—median values for OECD countries.



Source: OECD (2024)

Do economic crises affect the vertical distribution of powers among levels of government?

Our final point delves into the crucial yet understudied area of the potential effects of extreme macroeconomic events on the decentralization framework. This research, undertaken by De Mello and Jalles (2020), is of significant importance as it sheds light on a topic that has been barely explored. Their analysis of a set of developed and developing countries from 1990 to 2015 reveals that the Great Recession sparked decentralization forces from both the expenditure and revenue sides of the budget, a finding that has profound implications for our understanding of macroeconomic events and decentralization.

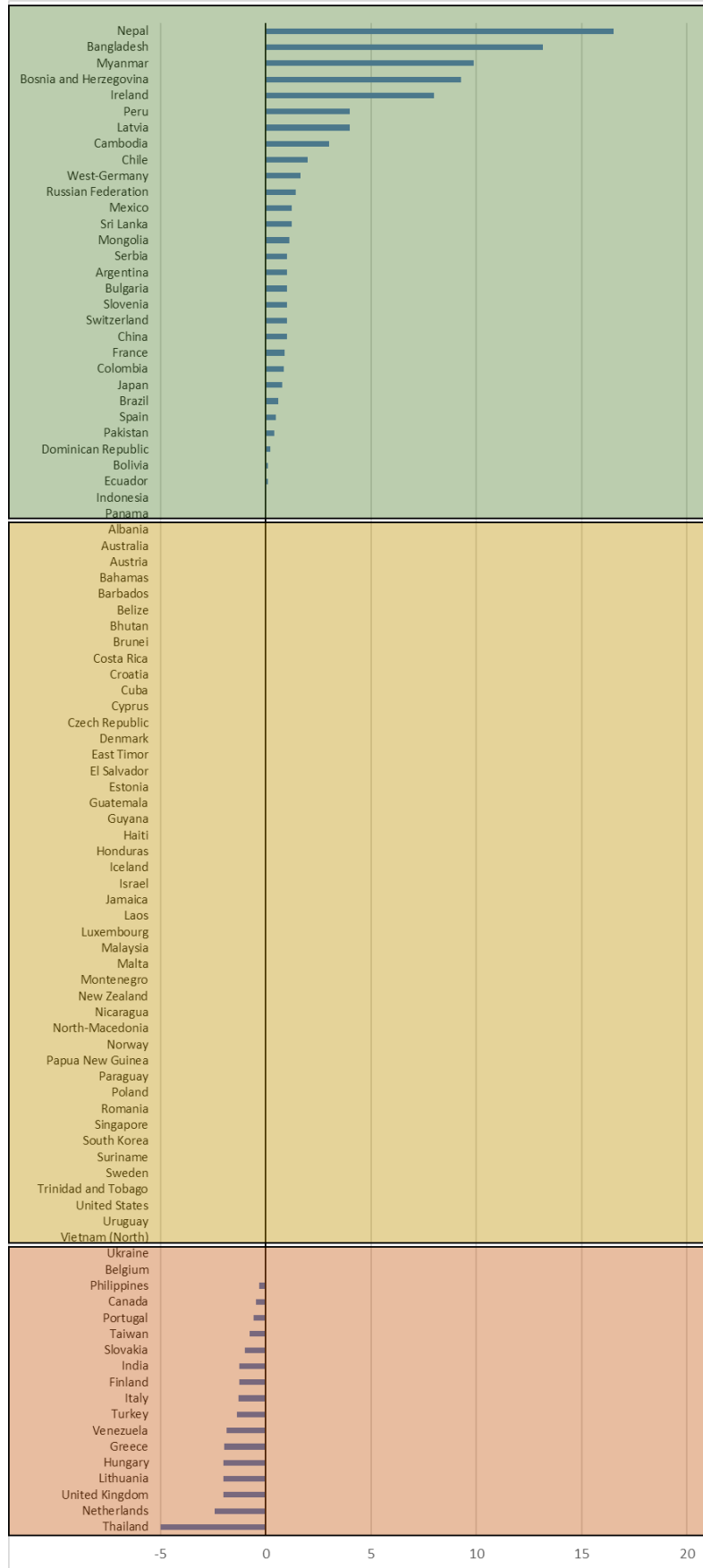
Opposite effects are found in Cadaval-Sampedro et al. (2023), who analyze how macroeconomic shocks have altered the vertical distribution of powers among public administrations and for how long in a set of developed and developing countries from 1960 to 2018. Measuring the level of fiscal decentralization with the Regional Authority Index (RAI, Shair-Rosenfield, et al., 2021) and the share of subcentral revenue and

expenditure ratios, their results show that large economic shocks are much less relevant than natural disasters or armed conflicts to explain the institutional change in the vertical governance system. Neither the RAI (and its two main components, Self-Rule and Shared-Rule) nor the level of tax decentralization seem to be sensitive to economic crises. In contrast, expenditure decentralization tends to shrink after a macroeconomic shock, although this effect only occurs in developed economies. When economic recessions hit, central governments tend to absorb a larger share of public spending, and this effect holds beyond the short run. This result is explained by a combination of the deployment of automatic stabilizers, which are stronger at the central tier, and primarily centralized discretionary actions on the public spending side.

Similarly, Canavire-Bacarreza et al. (2024) analyze the impact of economic crises on 75 countries' fiscal and political decentralization levels. They find that the effects are heterogeneous, depending on the kind of crisis. Specifically, their results suggest that while recessions tend to trigger centralizing forces, further fiscal devolution occurs in domestic borrowing crises. Moreover, they find that fiscal and political dimensions of centralizing/decentralizing forces tend to materialize simultaneously.

Focusing on the potential impact of the Great Recession on changes in global decentralization, Figure 2 ranks countries according to the change in RAI values from the year before the shock (2007) to the latest available year (2018). Most countries have not experienced changes, or these have been very small. When we focus on those cases with more considerable variations in absolute value, those that have increased the degree of decentralization outnumber the others. Analyzing the Self-Rule and Shared-Rule components of the RAI provides similar results. These data reject the hypothesis that the Great Recession generated a general and long-term recentralizing momentum.

Figure 2: Changes in the Regional Authority Index (RAI) from 2007 to 2018



Source: Authors' elaboration using the dataset by Shair-Rosenfield (2021)

3. Decentralization and natural disasters

Although the adverse effects of natural disasters have been constant in human history, increasing public attention has been paid to their consequences due to the growing amount and severity of events caused by climate change. Recently, the need to mitigate the size and effects of pollution has become a central issue for most developed and developing countries. Among many other things, the fight against climate change has raised many questions regarding which institutional framework works best. In the case of multilevel governments, which layer of administration should be responsible for designing and implementing policies earmarked for preventing or compensating the effects of natural disasters? Do decentralized countries perform better or worse than centralized nations in preparedness, mitigation, and recovery efforts? Furthermore, considering the existence of spillovers in many policies targeted at mitigating climate change and its adverse effects, another relevant question that needs to be answered is whether the increasing amount of large natural disasters has had any impact on the distribution of powers among levels of government.

As highlighted in Martinez-Vazquez (2021), both anti-climate change policies and the devolution of political and administrative power to subnational units have been salient reform topics in many countries' agendas. However, as he underscores, these two policy areas have not often been combined in the analysis. In what follows, we try to review the most important pieces of research that have studied the potential relationship between them, focusing on the questions mentioned above.

Who should do what regarding climate change and natural disasters?

When deciding which level of government should lead in mitigating the adverse effects of climate change and natural disasters, it's crucial to understand the complexity of these matters. As Dhar Chakrabarti (2012) aptly puts it, disaster management is “everybody’s business,” demanding the participation of all levels of government, international institutions, households, companies, and non-profit organizations. The complexity of climate change and natural disaster policy necessitates a multi-level approach with central, regional, and local governments working together.

However, it should also be remarked that addressing climate change and mitigating the effects of natural disasters includes several diverse aspects of public policy that might work better when assigned to one specific level of government. First, mitigation policies are designed to minimize the probability of a natural disaster (e.g., reducing greenhouse gas emissions). Second, the preparedness policy focuses on planning disaster response (e.g., evacuation plans for wildfires, hurricanes, floods, or earthquakes; constructing levees in zones with high flooding risks, etc.). Third, when an extreme event strikes, emergency assistance becomes the center of public

intervention (search and rescue of affected populations, medical facilities and supplies, food, and shelter). Moreover, when the disaster is over, the recovery policy tries to put affected regions back on track (De Biase & Dougherty, 2021). Each of these facets can be optimally achieved by some level of government, mainly depending on the size of three relevant elements: spillovers, economies of scale, and asymmetries in the distribution of risks.

As previous literature has unanimously claimed, some policies related to the management of natural resources, the fight against climate change, and mitigating natural disaster costs have large externalities. This means that decisions made by one territory -sometimes a local, but on many other occasions a regional or even national government- will only consider the effects those decisions have on its economy and its own citizens' welfare, ignoring the potential impact of those decisions on any surrounding areas. As a result, public choices will turn out to provide an inefficient level of public services or regulation. For those spillovers to be internalized, some financial compensation/cooperation arrangement should exist, or decisions should be made at a higher level of government.

As far as economies of scale are concerned, the distribution of powers among levels of government is also conditioned by the existence of sunk costs. Some elements of the environmental policy and the measures adopted to prevent or compensate for the costs of natural disasters may require large amounts of public investment that can be unaffordable for sub-national authorities. This highlights the vital role of central governments in funding such investments. On a smaller scale, while solid waste collection and management are well-suited to local authorities in small municipalities, some degree of cooperation or centralization of investment might be more effective, as Alm and Banzhaf (2012) suggested.

Another relevant factor regarding the vertical distribution of powers in the fight against natural disasters is that regional or local risks of suffering from specific natural disasters are not evenly distributed. Some regions and localities have higher risks than others. Therefore, when those events become large-scale, the policies needed to assist the damaged population and to promote social and economic recovery might require large amounts of resources that might not be within subnational governments' reach.

Considering all these theoretical arguments, the literature suggests that the role of subnational governments is especially crucial in those policies that do not generate significant spillovers (Martinez-Vazquez, 2021; Alm & Banzhaf, 2012), such as adaptation and preparation, for instance, through land and building regulation and zoning, and through the construction of preventive infrastructure. However, since preparation and adaptation imply, among other things, creating infrastructures, the benefits of which might not be visible in the pre-disaster scenario, it can be expected that subnational governments will not have enough incentives to divert scarce

resources to projects that may not provide enough electoral gains. Moreover, this effect will be more substantial if national governments are expected to implement after-disaster relief (Goodspeed & Haughwout, 2012; Goodspeed, 2013). In this line of thought, Miao et al. (2020) point out that natural disasters are low-probability events, leading subnational authorities to put hazard mitigation policies well below in the priorities list. On the contrary, subnational governments can have enormous incentives for passing lax building standards and relaxing urban zoning regulations since this will promote economic growth more rapidly. Therefore, for efficiency reasons, central governments are essential in funding subnational mitigation infrastructure and incentivizing regional/local authorities to harden their urban regulations.

Thanks to their proximity, subnational governments have more information regarding sudden emergent needs triggered by natural disasters. As a result, they can react faster. Therefore, they are essential in providing emergency assistance for the damaged population and the provisional reconstruction of critical infrastructures. Based on the same logic, they will be expected to be the best performers in implementing long-term reconstruction policies. Furthermore, a subnational approach to emergency assistance and reconstruction policy may promote novel strategies that, when effective, could be imitated by other territories (Martinez-Vazquez, 2021).

Central institutions should lead policies that generate significant externalities, such as regulating pollution limits and participating in international environmental agreements. A key example is imposing national limits on greenhouse gas emissions, which has clear long-term global impacts. Even if a country chooses to decentralize its environmental policies, strong intergovernmental cooperation is essential to address cross-border spillovers. Similarly, at the international level, establishing environmental standards and consensus on fundamental strategies will likely be more effective when all or most countries cooperate.

Another critical argument favoring central powers is the asymmetry in the geographical distribution of risks. As we said before, not all local/regional governments face the same dangers from the quantitative and the qualitative perspectives. Particularly in the case of the most extreme events, subnational authorities might be financially overwhelmed due to the high costs of emergency assistance and reconstruction activities. On the contrary, central governments tend to have a greater capacity to mobilize funds and redistribute them according to those costs, applying some interregional risk-sharing financial instruments. However, as Skidmore and Toya (2013) and Goodspeed and Haughwout (2012) suggest, introducing national risk-sharing instruments could disincentivize subnational governments in mitigation and preparation strategies.

In summary, federal leadership is crucial for establishing national standards and allocating financial resources. For their part, both regional and local administrations play a critical role in tailoring policies to local needs, on-the-ground implementation, and community engagement.

Nevertheless, as Martinez-Vazquez (2021) points out, even in the clearcut vertical distribution of powers among levels of government, intergovernmental cooperation becomes fundamental in environmental and natural disaster policies, which, as we highlighted above, are “everybody’s business.”

Is decentralization relevant in fighting climate change and natural disasters?

The literature that analyzes the impact of decentralization on the effectiveness of anti-climate change policies and the costs of natural disasters is scarce. Still, several papers have studied this issue, finding mixed results. From the theoretical perspective, some papers have predicted a “race-to-the-bottom” behavior when environmental policies are devolved, with subnational governments competing to attract external investors by lowering their environmental standards (Markusen et al. 1993 and 1995). For instance, Banzhaf and Chupp (2012) analyze air pollution at the regional level in the US, finding that the larger the externalities, the more inefficient subnational policies will be. However, some other papers predict a “race-to-the-top” kind of subnational behavior, in which regions and municipalities compete by tightening regulations, trying to export pollution onto other territories (Garcia-Valiñas, 2004 and 2005; Oates and Schwab 1988, 1991, 1996; List & Mason, 2001).

Consistent with those ambiguous effects predicted by the theory, the empirical evidence regarding the impact of decentralization on environmental results is also mixed. What seems to be clear is that when externalities are present, subnational governments tend to make more inefficient decisions regarding pollution. For instance, when specific natural resources (rivers, lakes, etc.) are shared between different political units, including countries, spillovers are usually ignored to a more considerable extent (Sigman, 2002 and 2005). The same logic leads subnational governments to implement less stringent rules about pollution in those areas close to their borders than in their interior land (Helland & Whitford, 2003).

Comparing pollution records in 47 countries, Sigman (2007) has shown that they tend to be more diverse within federal and decentralized nations, but she does not find evidence of a race to the bottom. This aligns with the idea that devolution enables a better matching public services to heterogeneous preferences.

Cheng et al. (2020) analyze the impact of devolution on CO² emissions in China at the provincial level. Their results suggest that this relationship is not linear, with the first stages of decentralization boosting pollution levels because local governments focus on economic growth to a greater extent, and higher levels of decentralized expenditure reduce them. Fang et al. (2023) find that local environmental protection expenditure reduces CO₂ emissions in Chinese cities and triggers a virtuous process of imitation among subnational governments.

Nevertheless, as Farzanegan and Menzel (2012) show, the effects of decentralization on environmental results might be heterogeneous depending on the institutional framework. Specifically, these authors show that the negative impact predicted by a part of the literature might only be present when institutions' quality is low.

Some papers have also analyzed the potential impact of decentralization on the number of affected populations or the economic costs when natural disasters strike. Escaleras and Register (2012) find a negative relationship between devolution and the number of deaths or damaged population during 1972-2000 in 79 countries, although with more robust results for developing countries. Similar results are obtained by Skidmore and Toya (2013), who analyzed 78 countries from 1970 to 2005, finding that more decentralized ones experience lower costs from natural disasters in terms of deceased. This relationship does not seem linear, with the gains of decentralization being much more significant within highly centralized countries.

Opposite results are found by Miao et al. (2020) in their analysis of flood economic damages within US states during 1982-2011. Those states that have decentralized expenditure on natural resources to the local level to a larger extent suffered from higher economic losses from floods and storms. They interpret these results as evidence that local protection against natural disasters will be underprovided in a decentralized context.

Another strand of literature relevant to our object of analysis focuses on the functioning of intergovernmental cooperation institutions during natural disasters. In this line, Birkland and Waterman (2008) observed a lack of coherence in different levels of government's goals regarding the management of Hurricane Katrina in the US, which led to more considerable human and economic losses. Similar conclusions apply regarding the management of two earthquakes recently occurring in Turkey, as Hermansson (2020) found.

Finally, some papers have also analyzed the political economy of federal transfers earmarked for natural disaster relief. Garrett and Sobel (2003) analyze the regional distribution of relief funds by the federal agency (FEMA) in the US, finding that those jurisdictions that might be critical in the electoral results receive relatively more significant amounts. With the opposite perspective, Healey and Maholtra (2009) show that those territories that have received larger emergency funds tend to vote for the incumbent president to a larger extent in the US.

Do natural disasters affect the vertical distribution of powers?

As remarked before, one of the most relevant characteristics of natural extreme events is that some public policies designed to fight them have enormous spillover effects. As a result, it can be expected that a decentralized approach can lead to inefficient decisions that ignore the positive/negative impacts of decisions made at one territorial unit on their neighboring

jurisdictions. Furthermore, the larger size of current and future natural disasters triggered by climate change is expected to increase the size of those externalities, augmenting the need to either centralize or coordinate public policies among levels of government to promote their effectiveness.

In this context, we could expect that countries that suffer from extreme natural disasters affecting a large part of their territories might react by changing the institutional framework, centralizing the management of (a part of) environmental and natural disaster policies, fostering the powers of intergovernmental institutions, or both. Following this line of thought, Dhar Chakrabarti (2022) highlights that there has been a paradigm shift in natural disaster management around the globe, transitioning from strategies mainly focused on post-disaster relief and reconstruction to approaches in which prevention and preparedness gain further attention. This paradigm change has transformed the roles played by the different levels of authority since prevention and preparedness, which now absorb larger shares of public expenditure, fit better at the subnational level.

Nevertheless, the impact of climate change and natural disasters on countries' levels of decentralization is somewhat mixed. Estimating impulse response functions to natural disasters, De Mello and Jalles (2024) offer some evidence of a decentralizing effect, more substantial during economic booms, that materializes in larger shares of subnational expenditure and revenue.

On the contrary, Cadaval-Sampedro et al. (2023), more focused on the long-term effects of natural disasters on countries' level of decentralization, show that there seems to be a long-lasting centralizing trend within developing countries, while developed nations appear to have a resilient institutional framework that does not change after disasters occur.

4. Decentralization and the pandemic

The outbreak of the COVID-19 pandemic caused an unparalleled health crisis in recent times, resulting in significant adverse social and economic impacts worldwide. In addition to its virulence, it produced substantial spillover effects, making it challenging to curb its spread among the population and cushion its socio-economic impact in the context of enormous uncertainty. Due to the characteristics of the public health crisis, no individual level of government had the power and resources to deal with it on its own (Chattopadhyay et al., 2022). Consequently, different forms of intergovernmental coordination were used to design and implement containment and relief measures in many countries (Lago-Peñas et al., 2022).

Regardless of the pandemic spread, not all countries had the same incidence of the virus, and regional asymmetry was also a general characteristic within countries. While some regions/countries saw their healthcare systems overwhelmed by the number of patients, others suffered from a more negligible impact of the virus.

Several relevant questions arise when analyzing the relationship between decentralization and the pandemic. The first one refers to the analysis of who did what: Which levels of administration oversaw the policies implemented to fight the pandemic? Does the answer to this question match what could be expected from the fiscal federalism theory? Second, did countries react to the health crisis by changing the vertical distribution of powers and intergovernmental institutions? Finally, another important question to be answered relates to the potential influence of decentralization on the size, characteristics, and effectiveness of the policies implemented to fight the effects of the pandemic: did centralized and decentralized countries perform differently when dealing with the crisis?

Who did what?

According to Chattopadhyay et al. (2022), no single level of government had the powers and the means to fight the pandemic on its own. Public policies designed to contain and alleviate the effects of the health crises were necessarily a mixture of decisions made at all levels of government. However, the general trend was that while the central (and supranational) authorities had a leading role in designing and funding containment measures, subnational units mainly focused on implementing them.

Analyzing the initial responses of countries to the outbreak of COVID-19 reveals several common patterns among most nations.¹ Following fiscal federalism theories, when isolated COVID-19 cases were detected in some countries between January and mid-March 2020, it was primarily subnational jurisdictions—regions, counties, or even municipalities—that managed these cases by implementing prevention and containment measures. These entities operated within their usual institutional frameworks, using their sometimes-limited powers to isolate the sick and those who had direct contact with them.

¹ According to Hale et al. (2023, p.530), “the data reveal a striking degree of commonality in government responses to COVID-19 in the first months of the pandemic”. Similarly, De Biase and Dougherty (2021) show that the connection between the size of the public response and the severity of the health crisis was rather small.

They also restricted citizens' movement by banning entry and exit from specific jurisdictions.

Once the WHO declared the pandemic and many countries observed an exponential increase in infections, most nations experienced a significant centralization of powers. This centralization is also aligned with fiscal federalism theory due to the substantial spillovers of containment measures, the massive amount of resources needed to deal with them, and their economic and social consequences.

This power concentration had two facets. First, most decisions were made at the central government level, sometimes with subnational jurisdictions becoming mere executors of central choices. Additionally, executive powers took a clear lead, with parliaments reducing their activities to a minimum. However, this effect was weaker within presidential federations, such as Argentina, Brazil, Mexico, and the United States, where parliaments had a greater role in making decisions (Chattopadhyay et al., 2022)

Many national governments declared a state of emergency, or its equivalent, which allowed significant limitations on citizens' fundamental rights. During the peak of the first pandemic wave, central governments, or even just parts of them—typically the prime minister and the heads of health, home affairs, and defense ministries—made most crisis management decisions.

During this phase, subnational governments implemented central measures, ensured lockdowns, and oversaw testing and tracing. However, even in this highly centralized context, some central governments consulted with or even agreed upon measures with subnational units, as seen in Germany, Norway, and Switzerland (Kuhlmann & Franze, 2022; Kropp & Schnabel, 2021; Belser, 2021; Askim & Bergström, 2022). Others merely informed subnational units without prior consultation, as in the Netherlands, the Czech Republic, the United Kingdom, and Belgium (Popelier & Bursens, 2021; Wayember et al., 2022; Cameron, 2021; Diamond & Laffin, 2022; Jüptner & Klimovský, 2022).

Despite the cases in which central governments did not consult or negotiate their decisions with subnational units, Chattopadhyay et al. (2022) highlight the “unprecedented levels of intergovernmental interaction and coordination” between levels of government,

especially within the largest countries. For this reason, Parrado and Galli (2021) emphasize the critical role of effective coordination mechanisms within this context.

During the pandemic's outbreak, veto players did not significantly influence national politics. Political parties, parliaments, citizens, and other public agents recognized the urgency and severity of the situation, allowing central governments to act almost with untidy hands. Within disaster management literature, this is what Greer et al (2022) call the “honeymoon (time to be a hero)” part of the crisis. However, once the first wave subsided, coinciding with a period of disillusion and resentment, veto powers began to influence central government decisions again.

A third phase was initiated when the contagion curve started to flatten by the end of April 2020. The concentration of power in central governments began to weaken, with subnational governments and parliaments asking to regain their usual roles in public policy. While many central exceptional measures remained in force for weeks or months, subnational jurisdictions demanded greater prominence in combating the crisis. Co-governance became the key characteristic at this point, although there was also a significant increase in court litigation in some federal and decentralized countries, such as Italy, Spain, Germany, Austria, Australia, Brazil, Ethiopia, India, Pakistan, and the United States (Palermo, 2021; Navarro & Velasco, 2022; Chattopadhyay et al., 2022). Despite most court decisions endorsing central decisions, some restrictions were overturned in Austria and the United States.

The first pandemic wave revealed the weakness of pre-existing cooperation mechanisms in many countries, including Italy, Spain, Belgium, and Switzerland (Alber et al., 2021; Navarro & Velasco, 2022; Cameron, 2021; Belser, 2021). In some cases, new forms of vertical coordination were created to avoid contradictory subnational strategies in fighting the virus (Hervada-Vidal et al., 2023).

Once central governments decided to step back and lift some extraordinary measures, such as the strictest version of the lockdown, regional and local governments resumed their usual roles as public policy providers, increasing diversity in the strategies to contain the virus and its socio-economic effects. Depending on the severity of health and economic impacts in each area, subnational governments either accelerated or slowed down the easing of containment measures. Regions heavily reliant on tourism and

hospitality were eager to return to normalcy quickly due to the significant economic impact, while areas still heavily affected by the health crisis preferred to maintain restrictions longer.

By the end of the summer of 2020, as infections began to rise again and the second wave started, centralization forces increased once more. In some countries, subnational governments requested renewed central leadership, perceiving that the lack of coordination was diminishing containment measures' effectiveness (and legitimacy) and increasing citizens' discontent. Most countries navigated a learning process, continually adapting the institutional framework to meet new demands from citizens and subnational governments (Navarro & Velasco, 2022). However, the general trend was a reduction in the extraordinary powers central governments had used during the initial pandemic stages.

Regarding implementing fiscal measures, Moreira et al. (2021) point out that each country was heavily constrained by its former fiscal position. Therefore, the most indebted countries had a smaller margin to compensate for the economic losses triggered by the lockdown. All in all, while the bulk of the financial costs of those measures were assumed by central governments, subnational authorities assumed a more significant part of the deficit/debt within federal countries such as Belgium, Germany, and Austria.

Did countries react to the health crisis by changing the vertical distribution of powers and intergovernmental institutions?

Despite the intense short-term centralization of powers that took place in most countries during the first wave of the pandemic, subnational governments regained most of their usual powers after the strictest version of the lockdown was lifted. However, the pandemic revealed that some multilevel government institutions were not properly designed to deal with a crisis of such characteristics, and therefore, some countries revised some of them, including the vertical distribution of powers among levels of administration and the design and powers exerted by intergovernmental authorities.

The evidence of the impact of epidemics/pandemics on countries' levels of decentralization is scarce. In an analysis of 24 federal and decentralized countries, Chattopadhyay et al. (2022) show that, despite the strong centralization forces that took place at the beginning of the pandemic, most subnational governments -in 16 out of 24-

did not lose any power in favor of the central government. De Mello and Jalles (2024) estimate impulse reaction functions after a natural disaster or an epidemic hits one country, finding that subnational shares of public spending tend to increase. However, this effect is more substantial when the economy navigates an expansive phase of the economic cycle. This effect does not occur on the revenue side of the budget.

As we have explained above, the pandemic outbreak revealed the weakness of intergovernmental mechanisms in many countries. Although the general trend was that multilevel institutions met more frequently than during normal times (Chattopadhyay et al., 2022), faulty designs, the lack of a cooperation culture, and political polarization impeded the implementation of measures in many cases. However, in some cases, like in Spain, some existing intergovernmental cooperation institutions were reformed to improve their effectiveness (Hervada-Vidal et al., 2023).

Another negative characteristic in managing the crisis was the competition between levels of government or territories in the race to purchase drugs, personal protection equipment, and other essential health inputs during the first wave of the pandemic (Aubrecht et al., 2022). Later, governments started to cooperate to avoid predatory competition and gain negotiating power with healthcare providers. A good example of this successful approach was the UE's strategy to purchase vaccines, once they were available.

Did centralized and decentralized countries perform differently in dealing with the crisis?

Although the management of national disasters and emergencies is usually assigned to the central government, health care policy is strongly decentralized in many countries, especially in federal ones (Chattopadhyay et al., 2022). Therefore, analyzing whether countries with devolved health systems performed differently than those managing health care services from the center seems pertinent. The literature on the effects of decentralization on the management of the pandemic is abundant. Many papers have analyzed the heterogeneity in countries' responses to the health crisis from both qualitative and quantitative points of view.

The most important conclusion of this literature is that the incidence of the pandemic did not seem to be significantly different between centralized and decentralized countries. The number of cases and deaths was not affected by the federal/non-federal nature of each country, and neither was the level of regional asymmetry in the spread of the virus (De Biase & Dougherty, 2021). Some federal and unitary countries performed relatively well,

while others had lousy health indicators within both groups. Other institutional characteristics, such as strong political leadership at the center and the extent of political polarization, appear to have played a more significant role in determining the severity of the crisis (Cameron, 2021).

Despite the level of decentralization not being relevant, there is wide evidence that the multilevel government design was critical in countries' performance during the crisis. The precise vertical distribution of powers among levels of government was necessary - although not sufficient- for an effective reaction during the pandemic outbreak. According to Caravita et al. (2021), it is not countries' level of decentralization but the complexity of its institutional framework that can pose a significant obstacle to effectively responding to a major crisis such as the pandemic. Some elements that seem to have been critical for each country to be successful in fighting the pandemic are intergovernmental institutions and their specific design. For instance, Cameron (2021) shows that the design of intergovernmental cooperation mechanisms and the existence of "federal diplomacy" were very relevant to the size of the health crisis. Furthermore, De Biase and Dougherty (2021) show that one of the main drivers of horizontal coordination was the existence of pre-pandemic bonds among subnational governments.

One illustrative example of the importance of multilevel institutions and a preexisting culture of intergovernmental cooperation was the sometimes-fierce competition between different levels of administration -and countries within the EU- to buy the scarce health supplies to deal with the virus. In many cases, this race led governments to purchase medical equipment at a higher cost. After the first weeks of the crisis were over, collective agreements -both horizontal and vertical- proved the suitability of a central or at least coordinated strategy in this specific area. In line with this idea, De Biase and Dougherty (2021) highlight that when it comes to public procurement, both centralized and decentralized formulas can work well if intergovernmental cooperation exists. For instance, as we have previously mentioned, the EU's centralized strategy to buy and distribute vaccines within member countries was successful in providing equal access to their citizens, regardless of their place of residence.

Concerning the impact of the institutional framework on health outcomes, Rodríguez-Pose and Burlina (2021) show that the quality and effectiveness of the government, as well as the level of subnational autonomy, hurt the excess of mortality during the first 6 months of the pandemic (better institutions implied lower levels of mortality). Similar

conclusions were found by Rodríguez-Pose and Vidal-Bover (2023), who also found that the initial positive correlation of excess mortality and fiscal decentralization fades away after controlling for unfunded mandates. These authors show that it is not how much fiscal power is decentralized but how well the system is designed that matters when it comes to explaining the health outcomes of the pandemic.

As highlighted by Caravita et al. (2021), the complexity of the institutional framework can become a strong obstacle when urgent measures need to be implemented. Similarly, De Biase and Dougherty (2021) point out that the early execution of measures during the outbreak of the pandemic was more effective in containing the spread of the virus than the imposition of more stringent measures. In this line of thought, Tselios (2024) analyzed the extent to which countries with complex multilevel structures might have been less efficient in implementing the first containment measures after the first COVID-19 case or deceased took place. He found that the more decentralized a country was, the later the measures were adopted, probably due to the larger number of agents involved in making public decisions or because subnational units did not have the skills, resources, and powers to implement containment measures.

Despite all the previous comments on the relevance of having good institutions for an effective response to the pandemic, Akim and Bergström (2022) highlight that countries with solid governance systems did not react so quickly, as confident as they were of their institutional framework.

The literature has also analyzed the heterogeneity of anti-COVID responses within decentralized countries. Capano and Lippi (2021) study three different Italian models of regional health care and strategies in Lombardy, Veneto, and Emilia-Romagna. According to their analysis, more coordinated and less competitive structures, in which decisions were made mainly following technical advice, were more successful in containing the spread of the virus (Veneto) than those in which too many agents were taking part in public decisions (Lombardy). Despite the success of some regions compared to others, the authors did not find evidence of imitation strategies. On the contrary, De Biase and Dougherty (2021) point out that horizontal coordination among subnational governments was strongly driven by the existence of previous processes of territorial policy diffusion.

5. Conclusions

This paper offers a panoramic review of the literature on the relationship between multilevel government design and extreme exogenous events such as large economic crises, natural disasters, and pandemics. First, we aim to address the issue of who should be responsible for what during these crises, considering their specific characteristics (local needs, spillovers, economies of scale, etc.). Second, we review the literature on the effectiveness of public policies in dealing with extreme events conditioned by the multilevel institutional framework. Moreover, we review the latest research assessing how extreme events affect countries' level of decentralization.

Although each extreme shock has unique characteristics that have challenged countries' multilevel institutions in various ways, some common conclusions can still be drawn. First, it appears that, due to their proximity, subnational authorities are better positioned to respond quickly to sudden changes in citizens' needs, as typically occurs during a crisis. Furthermore, they seem to be better equipped to implement most prevention strategies since they have more information about the singularities of their citizens and territories. Meanwhile, the role of central governments (and, in some cases, international institutions) mainly depends on the size of public policy spillovers: the larger the latter, the greater the need for some central/coordinated strategy to deal with the crisis. Finally, federal authorities have a greater capacity to mobilize the substantial funds often required to implement anti-crisis policies.

Second, when analyzing the relevance of multilevel government institutions in the effectiveness of public policies, the literature has shown that when dealing with crises, the extent of fiscal decentralization does not seem as relevant as the internal design of the multilevel government system. A precise vertical distribution of power was a necessary but not sufficient condition for an efficient public response. Decentralized countries have not consistently outperformed or underperformed compared to centralized ones in managing economic crises, natural disasters, or pandemics. However, a clear conclusion about multilevel government design can be drawn: effective intergovernmental cooperation and coordination mechanisms are crucial in managing shocks that create significant spillovers. A sound design of intergovernmental institutions that facilitates cooperation and coordination is essential as more than one level of government is usually involved in the policies to address the impact of big adverse events.

Third, given that external shocks' unique characteristics can challenge the vertical distribution of powers, a body of literature empirically examines whether these crises

have altered countries' levels of decentralization. Although evidence is limited, it suggests that the impact varies, primarily depending on the extent of public policy spillovers.

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