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THE EFFECT OF DECENTRALIZATION OF GOVERNMENT POWER ON THE CHARACTER OF PUBLIC GOODS PROVISION

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The effect of decentralization of government power on the character of public goods provision

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Abstract: What are the institutional drivers of public goods provision? What do we know about the impact of concentration of power on their distribution? The current literature proves the relevance of the allocation of public goods, mostly in the context of economic and social progress. A growing number of empirical studies is focused primarily on public policies that may matter in this context. However, we still know relatively little about institutional factors that may affect public goods provision. In this article we apply econometric and machine learning tools to verify the importance of governmental power decentralization for distribution of public goods. The obtained output implies that indeed concentration of power impacts public goods provision and the results are robust across various quantitative methods. Our conclusions may be of practical relevance also for policymakers.

Keywords: public goods; power decentralization; politics; institutional economics; political economy

JEL codes: B52; H41; H72; P48

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1. Introduction

What institutions affect public goods provision? What are the essential factors in this context? The current literature emphasizes the economic and social relevance of the allocation of public goods (Benerjee et al., 2005; Jongh 2020; Kallhoff, 2014). It contributes to sustainable development of countries (Belletti et al., 2017; Rigall-I-Torrent 2007) and advancement of democracies (DeAngelo et al., 2020). Deliberation regarding the relationships between public goods and democracy is even extended to global level of concern (Burnell, 2008). However, with respect to distribution of public goods, by so far, we have relatively little knowledge about their institutional underpinnings. In particular, it still remains unclear whether the balance of regional vs. national political powers matters for the way public or particularistic goods are delivered.

To determine what impact do institutional choices make on public goods provision it is worth stating first, what precisely is meant by the concept of goods' publicity or particularity. In the following article they refer to the extent to which national budget expenditures for social and infrastructural needs have public or particularistic character. An expense is considered as allocated for public goods if it reaches all subgroups of a society with no distinguishment between any social or economic characteristic. The only exception is that it can be means-tested. On the contrary, expenditures are classified as particularistic if they advantage only a segment of a society denoted differently than by the income level. For example, particularistic good can favor a selected sector of the economy, be territory dependent or intend to support specific social minority.

Taking this into consideration, the essential goal of the article is to investigate the relevance of governmental power decentralization for public goods provision. In this paper we pose the following three research hypotheses:

H1: Relatively stronger empowerment of local and regional government structures favors distribution of public goods provided from the national budget, in the sense that the only criteria that can be applied on supplied goods is means test, rather than particularistic;

H2: Reinforcement of citizens' ability for accounting government officials ensures relatively more publicly oriented budgeting;

H3: Political party unification over executive and legislative powers at the national level promotes delivering public goods as compared to particularistic goods.

The empirical part of our research covers a global sample of 181 countries for the period 1980-2020. In the study we primarily focus on the importance of the distribution of political power across national and regional levels. Our methodology is based on panel data econometrics (fixed-effects and dynamic models), clustering (k-means algorithm) and principal components analysis, assuring robustness and credibility of the results. The output of our empirical investigation confirms that decentralization of governmental power matters for public goods provision. We also present interesting implications regarding other political and institutional factors.

The value-added of our research is multifold. First, we extend the current literature on the significance of decentralization of power for the effectiveness of public policies. We also broaden the view on the institutional underpinnings of distribution of public goods. In addition, we shed a new light on the impact of the society and its engagement in politics on public goods provision. Last, but not least, the novelty of our research lies in the set applied of quantitative tools, which appears as unique when compared to the available empirical literature.

The remainder of the article is as follows: in Section 2 we provide the literature review on public goods provision and its potential drivers, including decentralization of power. Section 3 covers description of the dataset, empirical design, empirical results and model extensions. Then, Section 4 provides the discussion of the results. The last section concludes the article.

2. Theory and literature review

The main point of the study is the question whether authorities in a country where decentralization is present will more willingly realize particularistic interest of selective groups or rather attempt to provide goods accessible for everybody from national funds. Throughout the article the second option is regarded as public goods provision or public oriented budgeting and these should not be misinterpreted as resource type, as they stand for the practiced manner of budgeting.

To make the analyzed interactions more comprehensible, it is worth precisising that the relationship between expenses on public and particularistic goods, taken as they are defined in the introductory section, usually has substitutive nature. It is assumed that national expenditures can be allocated either on public or particularistic goods provision. Eventually, some goods can

be more complex and concatenate subservices of both of these characteristics, for example when specific sections of funded program have different destiny. Some exceptional cases when an increment of a given type of budget expense entails a raise in the opposite type of expenditures could possibly occur, if one type of service needs to be supplemented with another, but in the majority of cases the two types of budgeting goals are mutually exclusive. Such relationship remains as long as the amount of funds to distribute does not change, as if budget size alternates, income effect may take place and proportions of expenses intended on specific types of goods can change.

Decentralization itself is assumed to be able to improve the quality of governing outputs due to various dependencies. Firstly, if the political power is decentralized, it is transferred from central authorities to local ones and the latter are recognized to have the same or better information about citizens' problems and preferences than the first. Especially if needs of a particular administrative unit are different from the rest, it will be easier for the lower tiers of government to be capable of providing specific services than it would be for the national government to precisely differentiate and suit the policies applied for all subregions (Oates, 2005). A phenomenon called 'decentralization theorem' claims that if social policy outcomes are adjusted to local demands and constraints, social welfare is expected to outperform the one that would be obtained by unified provision of public goods to all jurisdictions (Oates, 1972).

Secondly, in the case of decentralized governing, if horizontal accountability is applied, incumbents are responsible not only to superior authorities but also directly to citizens, who are personally affected by outcomes of their decisions, whereas the central power is not. Regional officials are then accounted for the undertaken actions in elections or through institutions of political engagement like local non-governmental organizations (NGOs), media or the general discourse of public opinion. In contrary to vertical accountability, the rise of efficiency is expected when the power is transferred downward, because as long as central power is able to detect the incompetence of local authorities, their attempts to keep the local incumbents' decisions reactive to society's preferences can occur unavailing (Bahl & Martinez-Vazquez, 2006).

Moreover, it has been noticed that if the style of service provision is various across specific jurisdictions, their residents have an appearing opportunity to 'vote with their feet'. It means that if they are not satisfied with governance in one unit, they can move to another where the manner is different. An increased mobility of citizens and recognition of their preferences by local governments should optimize the budget spending decisions in an analogous way that

private sector allocation of resources benefits from information and mobility of labor. This happens because competition among administrative units is raised, as voters hold their accounting function not only in the threat of not supporting authorities in elections, but also of moving the tax payments to another region (Tiebout, 1956). What is more, due to flows directed by citizens' satisfaction with local rulings, residents can cumulate in more homogenous societies. This should simplify the assortment of public services and rise the effectiveness of local budget spending (Wallis & Oates, 1988).

There are various types of decentralization that can be implemented, but in the literature mostly the effect of fiscal decentralization is explored in the context of public services provision. Spilling the political power, including both the decisiveness and responsibility, from higher to lower tiers of government modifies the already achieved consensus of power division and can positively, as well as negatively, influence the outcome of public services provision.

As most of researchers concentrate on fiscal decentralization or at least involve its aspects into the analysis, some positions referring directly to the political kind and its consequences for public goods provision are worth mentioning. The effect of political decentralization on social services accessibility has been examined through the example of transferring downward educational decisiveness, that in contrary to fiscal decentralization, resulted disappointing in improving the quality of the delivered education (Diaz-Serrano & Meix-Llop, 2019). Similarly, political decentralization has been identified to lower citizens' satisfaction of public services delivery when in case of education it has been entirely moved from national to subnational governments, and provided jointly on two tiers of government in the case of health care. Lack of real power to actually implement new policies, when political decentralization is not accompanied by fiscal changes, has proposed as a reason for negative perception of services distribution (Diaz-Serrano & Rodriguez-Pose, 2015). Followingly, it has been tested on child immunization programs how political decentralization determines their effectiveness. The results of the study are depended on whether country is classified as low or middle income, as in the first group the effect has been more propitious. The obtained discrepancy in the results drew the attention firstly to the fact that decentralization might not have universal effect on provision of all social services, because more reliable information and stronger citizens' engagement will not always overweight the shortcomings of local governing and because societies simply may want to have only some services delivered. Secondly, the need for proper rearrangement of central government role, instead of its exclusion, in improving decentralization outcomes was highlighted. The two abovementioned factors may vary between

different levels of development (Khaleghian, 2004). A bit different sight is put on the decentralization if instead of what is delivered we consider how effectively and in a noncorrupted way it is done, as these are indicators of the quality of ruling. Neither positive nor negative relationship was found between the depth of decentralization and aggregated quality of governing in a country. It also did not affect the within country variation of governing quality amid specific regions. The second statement is reasonable, as apart from decentralized policymaking, differences of policy implementation practices can occur even in theoretically centralized countries (Charron et al., 2014). It was shown that results of solely political decentralization are mixed.

School enrolment is the first of analyzed characteristics regarding to social capital owned by a society. Quality, amount and equality of knowledge received among children and youth, that are meant to attend school according to their age, is a core component of forming a society that is well educated and prepared for satisfying occupational needs. This is especially meaningful in the context of government decentralization effectiveness, as local civil servants and employees need adequate practical and supervision skills to provide public services of appropriate quality (Bello-Gomez, 2021; Biriescu & Babaita, 2013). Building local administrative capacity is a significant factor in de facto separation of local responsibilities and decisiveness from the realization of state ones. If local authorities originate from national government surrounding or are closely connected to its members, the actual independence of lower tiers of government might be questioned (Ahmad et al., 2005). Strengthening local capacity is also seen as a complementary factor for the implementation of monitoring procedures which together support the effective spending allocation of decentralized governments. Education enrolment also plays a key role in forming local capacity together with population size of an administrative unit and accessibility of skilled personnel (Loayza et al., 2014).

The occurrence of corruption in local administrative and political structures is another factor that can strongly affect the effectiveness of governmental decentralization implemented in a country. If corruption levels are excessively high, it might disturb good governance practices, as decisions can become biased and unjust, and trust to local authorities can diminish. It was shown that high corruption levels not only reduce country's economic growth but also impede the positive impact of fiscal decentralization on it (Huynh & Tran, 2021). Additionally, assuring that corruption will not exceed too high levels was found important for effective service provision in decentralized administration (Wolf, 2007). Other studies suggest, that

corruption recognized at local and subnational levels of administration can negatively influence private sector development and decrease income per capita measures (Dang, 2016). Moreover, when perception of corruption among local or national authorities rises, citizens' evaluation of rulings decreases not only on the same tier of government, but due to indirect effects, also on the upper or lower tiers. This effect is especially visible if the level of corruption observed in a country is relatively low (Moldogaziev & Liu, 2021). Additionally, corruption perception determines the support for government decentralization in a society, as repeatable corrupt behaviors observed among central power representatives both directly and indirectly, due to increased citizens' disappointment of ruling outputs, increase the willingness to decentralize the power. Inversely, the support for centralization of power when high corruption levels are recognized for subnational governments, depends on relative quality of ruling effectiveness in a given administrative unit in comparison to country's average rate (Kuhn & Pardos-Prado, 2021). Corruption, similarly to the lack of public services providers and to the relative underperformance of public providers in comparison to private, can be seen as a factor that impedes the transformation of benefits from public services provision into accumulation of human capital and economic development (Khemani, 2020). As it was proved, corrupt society is less likely to fully benefit from government decentralization outcomes.

Freedom of press and media, and broadly political, cultural and academic speech liberty can be recognized as subsequent factors determining the potential of a country for successful implementation of governmental decentralization process. Delivery of high quality information through media channels, that are not only related to national issues but also ones reporting situation of local communities, is a powerful tool of broadening citizens' awareness about duties, prerogatives and range of power held by subnational authorities. This way members of domestic societies can also be encouraged to vote in local elections (Ahmad et al., 2005). The effectiveness of decentralization in the context of providing services or dealing with institutional problems is also considered to depend on how well authorities are monitored by independent institutions (Wolf, 2007). On the example of corruption limitation it was shown, that if supervision approximated by the recognized levels of press freedom is too weak, the lessening effect of decentralization on corruption occurrence can diminish or even become opposite, due to lowered probability of detection of a bribe in the absence of media control (Lessmann & Markwardt, 2010; Warf, 2016). Conclusions from the literature on whether voters are more scrupulous in evaluation of local or national incumbents are mixed. On the one hand, there is evidence that voters take into account whole term of office when local power is judged,

while concentrate on the just before elections period for evaluation of national governments (Khemani, 2001). Nevertheless, the more interested in local politics residents are, the better outcomes can be brought, so media supply is welcome.

Unification of party control constitutes the next potential factor that can have impact on how goods are distributed, but the direction of its effect is not evident. Both on the national and the subnational levels different division of seats in a parliament or number of offices kept by a single party in a government can shape citizens voting decisions, as they might take into account eventual dependencies between different tiers of government, when searching for a party that will realize their interests most versatilely. For example, de facto decisiveness of lower tiers of government might be endangered if on the national level the most of power is kept by parties from the opposite side of political scene (Schneider, 2020). Additionally, the number and relative size of parties present in country's politics might affect how decisive ruling bodies will be, as in very fractionalized party system or when many parties are sharing the power, more political actors will be involved in a decision process and this can negatively affect the pace of policy changes implementation (Hicken, 2002; Ashworth et al., 2014). On the other hand, if the power is concentrated among one or very few political actors, such authorities may fail to provide an appropriate distribution of public goods, as particularistic interest of small groups can be overrepresented (Hicken, 2002). The literature regarding the impact of political competition on the quality of governing gives twofold implications. Some positions prove that when electoral competition at municipal level rises, it enhances government effectiveness, as politicians feel more supervised and less certain about their reelection (Ashworth et al., 2014). Others say that increased political competition combined with political polarization is beneficial, but as long as voters evaluate government performance and are not ideologically devoted to parties, as then electorate can handle higher underperformance of authorities to stay ideologically consistent (Sørensen, 2014). Contrary, another literature findings show that competition of at best two large parties can help to avoid the creation of policies as a response to tight interests, as then political actors need to gratify larger and more differentiated electorate than on more fragmented political scene. Thereat, they are more likely to prepare policies aimed at provision of public rather than club goods (Chhibber & Nooruddin, 2004). Moreover, unification of party control over national politics may have serious implications for the advocacy of government decentralization implementation. Some political organizations can condition their attitudes spilling the power downward, depending on how much power their

actually hold on national level, as it was shown on disparities between dynamics of Democrats' and Republicans' preferences (Dinan & Heckelman, 2020).

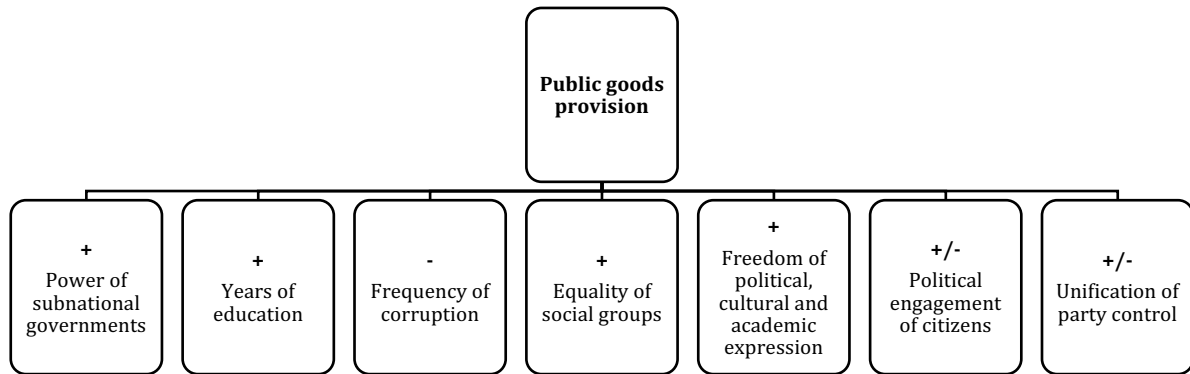
Political engagement of a society is the subsequent factor that can determine the effectiveness of decentralized governing structure. It is partially related to the previous one, as it also refers to shape of political scene in a country but concentrates on the collective action of citizens. On the example of Bangladesh it was shown, that the more developed is the net of civil society organizations, with an emphasis on NGOs, the stronger is the feeling of agency among citizens and the more eased is the dissemination of socially engaged attitudes. Followingly, those effects are expected to result in increased human capital accumulation and more reactive local governments' politics that provide better social services (Faguet, 2017). Moreover, political engagement is often viewed as an indicator of how well accountability is demanded from local authorities (Martell, 2007; Nyawo, 2017), which is considered as an even more important factor in providing satisfactory outcomes of local policies and sufficient exploit of resources owned by a municipality than the amount of resources itself (Dauda, 2006). Nevertheless, not all studies agree with those findings and contest the effect of public participation on government accountability (Crawford, 2009), or show that even if political participation should rise accountability, it is not always present in the sufficient intensity in local communities to really help the public (Martell, 2007). In the context of human rights protection as a potential output of government decentralization, NGOs' activity is viewed as a facilitator of claims for respect of primary human/social rights, like the right for education or health care. Unfortunately, their de facto presence is often reduced to educational action and spreading awareness, rarely to empowering solidarity among citizens in the struggle for rights protection (Crawford, 2009). NGOs apart from accounting authorities or shaping civil societies through popularization of participation and collective action, can also constitute a mean of cooperation between a society and local government. Firstly, NGOs often have possibility to improve policies' results by extending range of disposal local resources, that authorities might not have access to. An essential condition for this to work, is that organizations stay independent from governments (Hu & Zhu, 2021). Secondly, NGOs can strengthen this cooperation by supporting citizens engagement with disposal of governments' funds. Again, such a cooperation works as long as there is no overabundance of NGOs and they do not displace governments with undertaken actions (Nelson-Nuñez, 2019). The discussed aspects of political engagement show that, similarly to political unification, its effect on local governing outputs is not unilateral.

Equal treatment of social groups in a country constitutes the last analysed factor that can have an impact on results of governmental decentralisation. If access to civil liberties is somehow differentiated between various social groups, the governing of an administrative unit might be impeded, as horizontal inequalities, defined as differences in treatment of groups characterised by distinctive ethnicity, religion, country of origin, gender or other attribute, can complicate the intergroup cooperation (Whitt, 2021). There is empirical evidence, that ethnic minorities can be less convinced to participate in public goods provision, as when they pay taxes or contribute otherwise to some common objectives, they are not certain if the majority will ensure their needs with the same solicitude as others' (Whitt, 2021). Moreover, there are studies pointing out that in ethnically fragmented societies the provision of public goods is visibly poorer than in more unified communities (Alesina & La Ferrara, 2005; Das & Kar, 2016). Conclusions regarding the connection between ethnic fragmentation, public goods provision and inequalities are quite complex. In some studies ethnic fragmentation is considered as a factor able to rise the overall inequalities observed, but not specifically the horizontal ones, i.a. through a negative impact they exert on public goods provision (Chadha & Nandwani, 2018). Contrary, in other positions, ethnic and cultural diversity itself is considered as neutral for public goods provision, but income inequalities between social groups are recognized as having significant negative impact on public services distribution (Baldwin & Huber, 2010). As presented, the equality across social groups has a compound effect on conducting public goods oriented policies, but the findings rather suggest that this process should be facilitated in more unified societies.

The abovementioned characteristics are assumed to influence the quality of governmental decentralization outputs and the effectiveness of subnational governing. It is worth remembering that decentralizing process is sophisticated and vulnerable to multiple factors. The factors presented in the literature review are most commonly discussed, but as some drivers may be omitted, we address this possibility in our empirical strategy. In our static panel models the lack of potentially missing explanatory variables is compensated with use of the fixed effects estimator, which enables to control for the effect of omitted variables by accounting for the inter group variation. Dependencies between characteristics considered in the literature review constitute a starting point for the empirical analysis presented in the following sections. The expected effect of each variable on public goods provision is summarized on Figure 1. Firstly, the effect of variables will be verified in two types of panel models. Later, the knowledge about the dependencies between all variables will be deepened

and depicted using selected unsupervised machine learning methods. Finally, econometric outputs will be confronted with the conclusions drawn from the discussed literature.

Fig. 1. Expected effects of decentralization-related phenomena on the character of goods distribution as a summary of literature findings



Source: Own elaboration.

3. Empirical analysis

3.1. Data

The data used in the research was taken from the Varieties of Democracy Dataset v11.1 (V-DEM; Coppedge et al., 2021), which contains a range of indicators referring to regime types, freedom of inhabitants, separation of executive, legislative and judicial powers, characteristics of political scenes and other variables politically describing countries. Data that can be found in V-DEM database has been gathered through specially coded surveys filled up by country experts and partially supplemented by data from the already existing sources of different types, that have been additionally evaluated by country specialists. A part of created variables has been later combined into more complex indices available in the dataset.

For the purpose of preparing the following empirical study, observations from year 1980 up to 2020 were used. By selecting this range of years from V-Dem, which is a global dataset, information for 181 countries was extracted. In order to possibly broadly compare how factors connected with decentralization terms affect the character of goods delivered from budget spending, all of countries that had a full range of observations for all of the selected variables were included in the study. The number of them depending on the level of analysis was equal to 114 or 132. A list of those countries is provided in Table 14a of the Appendix.

By selecting a range of 41 years stretching from 1980 to 2020, the dilemma between gathering information for as broad period as possible and putting an emphasis on rather new periods was attempted to be solved. It is worth mentioning that especially the times of 1980s and early 1990s, which stand on the beginning of the analyzed period, were plentiful of regime transition and political changes. They were particularly visible in European and Asian countries. On the one hand, it was the dissolution of the Soviet Union, followed by the transformations in central-eastern European countries and the fall of the Berlin Wall. On the other, it was the establishment of the Maastricht Treaty and further development of the European Union. With high probability, such regime changes can at least slightly affect the relationship between the analyzed variables and the quality of public goods delivered in such countries. Therefore, in the section 3.4 a comparison of clustering outputs in different decades of period 1980-2020 is included.

While adapting countries and time selection as described above, the authors were aware of a potential selection bias that has to be confronted in this kind of research. In the case of territorial assortment, it may be more evident, as countries are not selected in accordance with any continental adhesion nor population criteria, but representatives from all over the world, for which the required data is accessible, were included in the study. Contrary, when referring to our time range, it may not seem that clear, as the researched period needs to be somehow limited. As it was explained, selecting range of over 40 last years meets both the need of up-to-date information and a broad, but not overextended, timeline, as too old data could not genuinely reflect the actual dependencies between variables. Basing on the presented considerations, it is assumed that selection bias should not undermine the adequacy of our data choice and records ought to representatively depict the analyzed phenomenon.

The main goal of the study is to verify how the extent to which the decentralization of government is applied in a country, affects the character of national budget spending – if it indicates more particularistic budgeting or should be considered as expended for public goods. Therefore, the variable describing the character of spending in a country (*public_goods*) was chosen as the dependent one. In order to describe the impact of decentralization degree noted in a specific country on the character of national spending, two variables referring to the relative power of subnational tiers of government were applied. The relative power in those variables is defined as the strength of officials that were elected in comparison to non-elected ones at a certain level of administration. These two variables were treated as proxies of decentralization since they contain observations only if the corresponding level of government in a country

exists. Additionally, they deliver information about the importance of officials that can be elected by citizens, namely authorities chosen in a democratic process. The first of these two variables refers to the regional level of government (*regional_power*) and the second to the local level (*local_power*), but both of them describe a similar phenomenon. They were not included in our models simultaneously, but in all econometric tools two adequate models referring to each of them were developed.

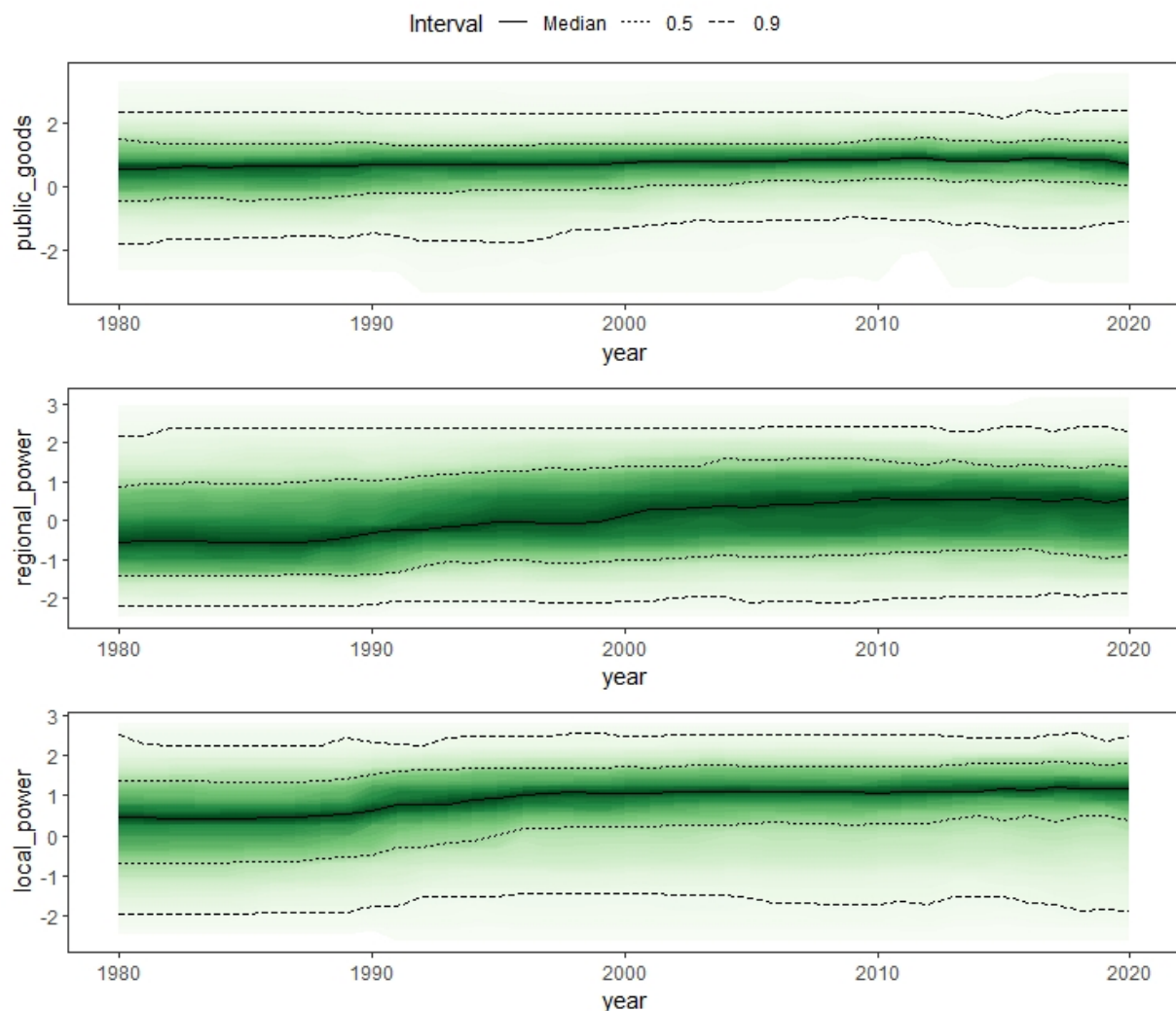
The abovementioned variables constitute just proxies of the analyzed phenomena meaning that potentially some problems with data assortment might occur. Suspicion of endogeneity seems to be a reasonable doubt, especially in the context of simultaneity, as one could suppose that not only decentralization influences the budget spending decisions and the character of delivered goods distribution in the aftermath, but that the public goods accessibility can affect the decentralization process as well. The latter dependency could appear due to the assessment of rulings made by inhabitants that could shape citizens' attitudes towards decentralization. Furthermore, country's officials might more or less willingly enter decentralizing process depending on how approachable is the delivery of high quality public services or generally, how feasible is country's management, in the current institutional setting. Although slight endogeneity can potentially occur in the analysed research problem, the impact of institutional changes on budget decisions seems more profound and explicit. Followingly, a reverse causal relationship, which is a related issue but goes one step further, as it implies opposite instead of bilateral affect between variables, is all the more unlikely.

Subsequently, a question whether any confounding factors are present in the commented problem, should be posed. It could be suspected that both a probability of national ruling structures' decentralization and quality of public goods' provision could be entailed by country's GDP levels. Another example could be that country's area combined with its population density might affect both of these variables as well, as in more densely populated countries public services allocation can be eased due to the effects of scale. Simultaneously, they could determine the potential profitability of decentralization's implementation, as in more sparsely populated countries the differences between subregions can be more vivid, but conversely, creating government departments for very small communities can become problematic. In line with the mentioned examples, potential confounding factors to the analysed variables exist, but the way they affect the interactions is far from unambiguous. Even if another factors could be found, the focal point of the study was on the relationships that seem to have the strongest impact on public goods provision. Additionally, the eventual omitted variables

problem is taken into account in our econometric approach and is addressed by the use of fixed effect estimator in our panel models.

On Figures 2-4 presenting centile plots for the three described variables, it can be seen how the distribution of each of them changed throughout the analyzed decades. As long as *public_goods* and *local_power* variables are visibly more condensed, especially in the recent years, the distribution of *regional_power* is wider and more diversified throughout the whole period. Moreover, in case of variables describing the relative power of local and regional governments there is a shift starting around 1990 and continuing in the following years towards obtaining higher values. This indicates that in the last three decades the gradual reinforcement of elected subnational governments took place.

Fig. 2-4. Centile plots for *public_goods*, *regional_power* and *local_power* variables in years 1980-2020



Source: Own elaboration.

Apart from the variables directly referring to the extent of decentralization in a country, supplementary characteristics influencing the quality of the decentralization outputs were exploited. The first of the variables additionally included in the models is the average number of years of education noted in a country (*education_years*), as the lack of adequately educated citizens can negatively influence the quality of decentralization's outputs. This variable is defined as the number of years of education that citizens aged 15 or more received throughout their life starting from primary education.

Another variable imputed into the models is the one describing how unified is the national executive and legislative power (*party_control*). Precisely, it counts how many political parties control executive and legislative offices, but only those that are characterized by real power. The distribution of seats between parties at national level can affect electoral choices of citizens on lower tiers of government and the decisiveness of local officials, as some investments cannot be solely made by lower level authorities (Schneider, 2020). Finally, it can modify the character of spending from particularistic to public goods oriented or the opposite way.

To check whether all social groups defined by different religion, race, ethnicity or the region of residence receive the same level of civil liberties and are treated equally before law in the context of property rights, freedom of movement and freedom from forced labor another variable was added to the models (*groups_equality*). If some groups are not treated equally, it can reduce the level of trust in the society and in this way it may negatively affect the readiness of citizens to comply for public goods (Whitt, 2021).

The subsequent variable describes the frequency of corruption appearance among public sector employees (*public_corruption*). Potentially, high levels of corruption can reduce effectiveness of governing, including governance at the lower levels, as groups of interest can aim to realize their own goals at the cost of the others. This might directly shift the character of local and regional spending into more particularistic.

In order to measure to what extent the expression of inhabitants is free from governmental and political restrictions, another variable was incorporated into the model (*expression_freedom*), which refers to multiple dimensions of freedom: to ones of political, academic and cultural expression, but to the press media freedom as well. Presence of media independent from the governmental impairment and citizens who are able to freely express their

political views are important tools of controlling authorities on both national and subnational tiers of government, and in the effect of supervising the budgeting process.

The last of the variables included in the study describes how politically active the public is (*political_engagement*). Political engagement is here defined as regular activity of citizens in independent political organizations, with an exception to political parties and trade unions, and in associations that take effort in the matters especially important for their participants like climate changes or minorities' rights. Political engagement through marking an importance of specific problems in a society can directly affect the selection of needs that public money will be spent on.

Descriptive statistics, including mean, standard deviation, median value, minimum and maximum value, and number of observations, of all the variables included are provided in Table 1. Centile plots for the introduced variables, analogous to ones presented for *public_goods*, *regional_power* and *local_power* in Figures 2-4, are provided on Figures 1a-6a in Appendix.

Table 1. Descriptive statistics

Variable name	Mean	Standard deviation	Median	Min. value	Max. value	No of obs
public_goods	0.6203	1.1372	0.7310	-3.3630	3.5310	7059
regional_power	0.1231	1.4536	0.0230	-2.4930	3.1480	5383
local_power	0.7078	1.2704	0.9550	-2.6340	2.8100	6509
education_years	7.0970	3.2793	7.0770	0.2180	13.610	5467
party_control	0.1498	1.4572	0.1640	-2.8150	3.0130	7041
groups_equality	0.7391	1.2244	0.9040	-2.8680	3.3680	7059
public_corruption	-0.1107	1.4653	-0.3490	-3.0540	4.1040	7038
expression_freedom	0.6043	0.3189	0.7090	0.0120	0.9890	7059
political_engagement	0.4807	1.1462	0.5940	-2.7530	3.5470	6820

Source: Own elaboration.

Kendall correlation matrix for analyzed variables is presented in Table 2. As it can be noticed, the highest correlations are obtained between the pair of *local_power* and *regional_power*, the pair of *local_power* and *expression_freedom* and the pair of *regional_power* and *expression_freedom* variables. The first of these correlations is equal to 0.57, which is relatively high, but these variables refer to the same characteristic with only different level of analysis and are not applied to any of models simultaneously. The two following pairs highlight the coexistence of strong subnational officials with high levels of political expression freedom and media freedom in countries. The rest of correlations is weaker, indicating that the variables do not overlap too intensively. In the following section the structure of our empirical analysis, including econometric models and unsupervised learning tools, is be presented.

Table 2. Kendall's tau-b correlation coefficients between continuous variables

	public_goods	regional_power	local_power	party_control	groups_equality	public_corruption	expression_freedom	political_engagement	education_years
public_goods	1	0.275	0.334	-0.094	0.4	0.471	0.409	0.273	0.276
regional_power	0.275	1	0.569	-0.202	0.265	0.345	0.486	0.344	0.32
local_power	0.334	0.569	1	-0.198	0.299	0.38	0.529	0.306	0.37
party_control	-0.094	-0.202	-0.198	1	-0.165	-0.139	-0.254	-0.128	-0.158
groups_equality	0.4	0.265	0.299	-0.165	1	0.357	0.443	0.3	0.286
public_corruption	0.471	0.345	0.38	-0.139	0.357	1	0.387	0.225	0.396
expression_freedom	0.409	0.486	0.529	-0.254	0.443	0.387	1	0.421	0.364
political_engagement	0.273	0.344	0.306	-0.128	0.3	0.225	0.421	1	0.159
education_years	0.276	0.32	0.37	-0.158	0.286	0.396	0.364	0.159	1

Source: Own elaboration.

3.2. Empirical design

In this study the relationship between the character of public spending and the relative power of subnational tiers of government in a given country is the main phenomenon analyzed. This is noticeable in the functional forms, as *public_goods* indicator constitutes the dependent variable. The primary versions of the estimated models have panel structure, as the broad range of countries and the section of years 1980-2020 were picked from the V-DEM dataset. Two separate panel models for regional and local levels of governments were prepared, to ascertain whether the influence of both *regional_power* and *local_power* variables is meaningful in determining the way budget is being disposed. The remaining characteristics mentioned in the previous section were added to the models as the following explanatory variables in order to control for their impact on the dependent variable. The below functional forms of static panel models were proposed:

$$\begin{aligned}
 &public_goods_{i,t} \\
 &= \beta_0 regional_power_{i,t} + \beta_1 secondary_education_{i,t} + \beta_2 party_control_{i,t} \\
 &+ \beta_3 groups_equality_{i,t} + \beta_4 public_corruption_{i,t} + \beta_5 expression_freedom_{i,t} \\
 &+ \beta_6 political_engagement_{i,t} + u_i + \varepsilon_{i,t} \\
 &public_goods_{i,t} \\
 &= \beta_0 local_power_{i,t} + \beta_1 secondary_education_{i,t} + \beta_2 party_control_{i,t} \\
 &+ \beta_3 groups_equality_{i,t} + \beta_4 public_corruption_{i,t} + \beta_5 expression_freedom_{i,t} \\
 &+ \beta_6 political_engagement_{i,t} + u_i + \varepsilon_{i,t}
 \end{aligned}$$

As the panel models were about to be conducted additional verification was provided to check if fixed or random effects estimators should be applied in the models. Firstly, the results of the F Test for individual effects, which compares within and pooling versions of models, indicated that there are individual effects in the data both for datasets corresponding to local and regional level. Later, the outcome of the Hausman Test for random effects stated that there are no random effects in models on the local nor on the regional level. The results obtained for both the F Test and the Hausman Test, and followed by the Wooldridge's test for unobserved effects are provided in the first section of Appendix. Null hypotheses of no fixed effects and of the presence of random effects, verified in abovementioned tests, were rejected, entailing that the fixed effects estimators were applied for both of analyzed governments' tiers. Followingly, the R^2 and adjusted R^2 values of models were compared.

In the fixed effects estimator there is no need to make an assumption of no correlation between individual effects u_i and explanatory variables. Due to the use of panel data and thus obtaining multiple observations for each of countries, it is possible to not only count the between-countries variation but also the within-countries variation. The use of the second one is feasible in the fixed effects regressor, but not when Ordinary Least Squares regression is applied on panel data. Because of that, the choice of fixed effects estimator enables to control for the effect of omitted variables and diminish the problem of not including all potentially affecting variables to the functional form. Contrary, as the fixed effects estimator uses only the within-group variation to calculate the coefficients near parameters, only the effect of variables that change their values in time for specific groups can be estimated using the fixed effect estimator. In the analyzed data observations of all the variables change over time for the included countries, which allows to apply the estimator and deal with the omitted variables bias as long as it is considered to be time invariant.

After obtaining the results for the static panel models, the outputs were verified and deepened by using dynamic panel models. Dynamic structure of a model allows to include lags of dependent variable as a determinant of its future values. If the character of budget spending (*public_goods*) in a specific country is not only indicated by other features in a time t , but also depends on the preceding values of the manner of budgeting, the significance of the lags of the dependent variable is expected. Analogously to the previous models, dynamic panel models were calculated separately for regional and local levels.

Our dynamic panel models were executed using the Arellano-Bond Difference Estimator, which is based on Generalized Method of Moments. Precisely, the One Step GMM

estimator was applied, which calculates the output on the first differences of variables. The Arellano-Bond Estimator allows for modeling future outputs depending on the comparison of units' past outputs and excluding present and future observations. It is especially applicable to datasets of relatively low number of periods and high number of units, which is quite consistent with the structure of the data analyzed as they contain observations for 41 years maximum and for 114 or 132 countries depending on if the regional or local level is analyzed.

Additionally, dynamic models with adequate functional form modifications were prepared. Variables considering the relative power of local authorities - *regional_power* and *local_power* – were replaced with the lagged by one period versions of each of them. This modification, in comparison to static panel models, makes it possible to check whether the impact of the relative power of elected authorities is more significant in the preceding or the current period in determining the way spending is distributed. Finally, the four below listed versions of dynamic panel models' functional forms were implemented:

*public_goods*_{*i,t*}

$$= \beta_0 \text{public_goods}_{i,(t-1)} + \beta_1 \text{regional_power}_{i,t} + \beta_2 \text{secondary_education}_{i,t} \\ + \beta_3 \text{party_control}_{i,t} + \beta_4 \text{groups_equality}_{i,t} + \beta_5 \text{public_corruption}_{i,t} \\ + \beta_6 \text{expression_freedom}_{i,t} + \beta_7 \text{political_engagement}_{i,t} + u_i + \varepsilon_{i,t}$$

*public_goods*_{*i,t*}

$$= \beta_0 \text{public_goods}_{i,(t-1)} + \beta_1 \text{local_power}_{i,t} + \beta_2 \text{secondary_education}_{i,t} \\ + \beta_3 \text{party_control}_{i,t} + \beta_4 \text{groups_equality}_{i,t} + \beta_5 \text{public_corruption}_{i,t} \\ + \beta_6 \text{expression_freedom}_{i,t} + \beta_7 \text{political_engagement}_{i,t} + u_i + \varepsilon_{i,t}$$

*public_goods*_{*i,t*}

$$= \beta_0 \text{public_goods}_{i,(t-1)} + \beta_1 \text{regional_power}_{i,(t-1)} + \beta_2 \text{secondary_education}_{i,t} \\ + \beta_3 \text{party_control}_{i,t} + \beta_4 \text{groups_equality}_{i,t} + \beta_5 \text{public_corruption}_{i,t} \\ + \beta_6 \text{expression_freedom}_{i,t} + \beta_7 \text{political_engagement}_{i,t} + u_i + \varepsilon_{i,t}$$

*public_goods*_{*i,t*}

$$= \beta_0 \text{public_goods}_{i,(t-1)} + \beta_1 \text{local_power}_{i,(t-1)} + \beta_2 \text{secondary_education}_{i,t} \\ + \beta_3 \text{party_control}_{i,t} + \beta_4 \text{groups_equality}_{i,t} + \beta_5 \text{public_corruption}_{i,t} \\ + \beta_6 \text{expression_freedom}_{i,t} + \beta_7 \text{political_engagement}_{i,t} + u_i + \varepsilon_{i,t}$$

As in dynamic panel model estimations different model specifications can be achieved by selecting specific parameters, a few combinations of them were calculated and compared. For *public_goods* the variable was lagged by one period. We decided to use the one step version of the Difference GMM estimator with non-robust version of variance-covariance matrix. The

results of the econometric tests for these models are provided in the second section of the Appendix.

Apart from econometric tools applied in the study, two unsupervised machine learning techniques were also applied. To check whether countries can be divided into subgroups depending on characteristics analyzed in the previous models, k-means clustering was applied on the data and the outputs were compared for the four following decades over years 1980-2020. The two sets of variables were prepared, each of them containing all explanatory variables and one of *regional_power* and *local_power* variable. K-means clustering was chosen as it provides an intuitive way to distinguishing groups of minimalized intra-class dissimilarity. It is vulnerable to occurrence of outliers in the data, but the variables used in the models did not contain them, as they already had symmetric distributions similar to the standardized ones, centered around zeros and with relatively short tails. The only variable which was distinctive was *education_years*, as it contained observations equal to the recorded numbers of years. To be certain that variables' values will not distort the clustering reliability, they were standardized using z-score standardization before processing the k-means clustering. As the number of clusters in k-means clustering needs to be defined apriori, the Silhouette width and Calinski-Harabasz measure were used to find a proper number. Specific outputs those measures are provided in Tables 4a and 5a of the Appendix.

The second unsupervised machine learning instrument applied onto the data was the principal component analysis (PCA). Precisely, normal and then rotated PCA was used to achieve the loadings measures for the analyzed dataset. The loadings are used to check for the impact that the change of each variable exerts on the change of the whole set of variables. Principal component analysis also allowed for verifying how intensively each variable influences the total change in specific dimensions. This step made it possible to group variables by dimension they have most significant effect on and in the same time state which of them influence the total change of the dataset in a similar way. Moreover, using PCA, the levels of complexity and uniqueness of each variable were described. They stand for the level of how many factors determine a single variable and of the level of how much of the variance of a single variable is not shared with other explanatory variables, respectively, and both of these measures are desired to be low.

3.3. Empirical results

The first of the analyzed models are static panel models with fixed effects. Their results are presented in Table 3 and Table 4 for the regional and the local level respectively. It can be seen that both *regional_power* and *local_power* variables demonstrate positive effects on *public_goods*, which constitutes the dependent variable. As it was presented in the literature review, the effect of decentralized governing on the quality of provided goods in a country is not unilateral. The output of our analysis is so far closer in conclusions to the authors pointing at information, competitiveness and accountability gains resulting from decentralization and its favoring for more publicly oriented distribution of goods.

Table 3. Regional fixed effects regression

	Estimate (S.E.)
regional_power	0.066*** (0.016)
education_years	0.074*** (0.012)
party_control	0.080*** (0.009)
groups_equality	0.219*** (0.022)
public_corruption	0.338*** (0.016)
expression_freedom	0.539*** (0.060)
political_engagement	-0.039* (0.019)
N	4232
RMSE	
R^2	0.216
adj R^2	

* $p \leq 0.05$ * * $p \leq 0.01$ * * * $p \leq 0.001$

Table 4. Local fixed effects regression

	Estimate (S.E.)
local_power	0.158*** (0.017)
education_years	0.093*** (0.010)
party_control	0.079*** (0.008)
groups_equality	0.247*** (0.019)
public_corruption	0.285*** (0.014)
expression_freedom	0.705*** (0.057)
political_engagement	-0.147*** (0.018)
N	5022
RMSE	
R^2	0.247
adj R^2	

* $p \leq 0.05$ * * $p \leq 0.01$ * * * $p \leq 0.001$

Source: Own elaboration.

Source: Own elaboration.

In case of the remaining characteristics the influence they cause on the dependent variable has the same direction both when controlling for the power of authorities at local and at regional levels. This indicates that these results are not vulnerable to the chosen level of analysis. Nearly all variables have positive sign and therefore the results are mostly in line with the literature. Only *political_engagement* shows opposite influence, but findings in the literature about how engagement of citizens impacts decentralization effectiveness were mixed as well.

The positive influence of *education_years* indicates that the higher is the average number of years in population aged 15 and over of received education, the more spending is found as attributed to public goods. This relationship seems reasonable as education is recognized as an important factor of equipping society with highly enough trained and resolute workers that are needed for good functioning of decentralized governance and its practical separation from the supervisors. When local governments are present, there is a demand for a higher number of skilled officials on the peripheries than in a country with centralized power. In such a structure it is also desired that they will be more evenly distributed over jurisdictions, as more local offices need to be held, and those are not only concentrated in large urban centers.

The level of unification among parties controlling the government on the national level represented by *party_control* also positively influences the dependent variable. The lower the number of parties, the more publicly designated budget spending is expected. This implication is hard to be unambiguously compared to the literature findings as those are quite mixed. The output is more consistent with the studies revealing advantageous impact of easing the process of decision making and simplification of management that occurs in more homogeneously constructed governments. Contrary, it is less coherent with conclusions highlighting the danger of overrepresentation of particular interests in public budgeting made by governments consisting of too little parties or dominated by just one of them.

The relationship between *groups_equality* and the dependent variable occurred to be positive as well. The more unified is access to civil liberties among different social groups, the more nature of budget spending can be described as directed for the provision of public goods. Model outputs are thus contributing to the literature highlighting the obstacles in governing that might be indicated by the occurrence of horizontal inequalities and cooperation problems related to insufficient trust between the minorities functioning in the society entailed by them. The effective appointment of redistribution targets for money collected in taxes can become more complicated if specific social groups are afraid of their needs not being duly included in

the expenditure plan. Moreover, if substantial inequalities between different society fractions are present, general attitude of citizens for increasing tax levels may be sceptic, indirectly affecting the potential of broadening the provision of public goods.

Due to the encoding of *public_corruption* variable, models findings suggest that the lower the perception of corruption in a country is noted, the more publicly oriented budget spending is anticipated. This is in line with the provided literature conclusions. High corruption levels can threaten the fairness of budget decision-making process, as groups of interest are then in conducive situation for the use of unlawful means to turn spending into shape more beneficial for them. If corruption occurs rarely, every bribery attempts will be more evident and alarming to a society than in situations where it is a common practice. Moreover, lower corruption levels can contribute to increased trust to authorities and more favorable evaluation of local rulings and thereat to higher satisfaction with provided public services.

In the model findings, the higher values *expression_freedom* variable achieves, meaning that political expression remains more unreservedly undisturbed from local and national authorities, the more public character budget spending should have. This relationship highlights the importance of the role that presence of press and media freedom plays in the process of accounting incumbents from actually taken actions compared to their declarations. If local media are not an immanent part of information flow in a country, the potential effectiveness that might be achieved through decentralization can be limited, because citizens might share too low awareness about authorities duties and not be familiar enough with local officials and political events.

The only variable that in the executed models shows a counter relationship with budget spending character to most of the literature positions is *political_engagement*, but those were mixed, too. Basing on the results, the stronger is engagement of citizens in independent political organizations, the more particularistic character budget spending has. This seems not intuitive, as activity of citizens in political life and presence of NGOs is usually considered as a factor helping in the accounting of subnational governments but also in strengthening the quality of cooperation between domestic politicians and communities. Moreover, in the literature local organizations are considered as facilitator of citizens capability to shape local politics which should be helpful in shifting budget decisions into more publicly orientated ones. The obtained results are more consistent with the literature findings highlighting the insufficient contribution of political engagement to increasing the accountability of politicians.

The following models included in the analysis were dynamic panel models constructed with the Arellano-Bond estimator. Their results are provided in Table 5 where it can be seen that not all variables that were significant in static panel models are significant in all four of new settings. Nevertheless, the majority of the results obtained the same sign near coefficients as the corresponding variable in our static panel models. Only *education_years* and *party_control* variables are affecting *public_goods* in a reverse way than previously. Relatively higher values of these variables result in shaping budget policies in a more particularistic manner which was especially unforeseen in case of how amount of received education influences the phenomenon. Relying on the literature findings, increased education accessibility would be expected to strengthen the capacity of governing structures and the divisibility of its local tiers from upper ones, and this way help to limit particularistic spending. Contrary, in the literature the extent of party unification in governments represent twofold implications for practiced manner of funds distribution. In dynamic panel models the positive effect of diversification among ruling parties on more publicly oriented budgeting is noticed. It is worth highlighting, that absolute values of coefficients near both variables are relatively low, so the relationships are not very expressive.

Table 5. Dynamic panel models

	Model local	Model regional	Model local lagged	Model regional lagged
lag(pubic_goods, t-1)	0.888*** (0.005)	0.863*** (0.005)	0.902*** (0.005)	0.867*** (0.005)
local_power	0.030*** (0.007)			
education_years	-0.015*** (0.004)	-0.013** (0.004)	0.003 (0.004)	-0.012** (0.004)
party_control	-0.019*** (0.003)	-0.014*** (0.003)	-0.019*** (0.003)	-0.014*** (0.003)
groups_equality	0.089*** (0.008)	0.071*** (0.008)	0.085*** (0.008)	0.085*** (0.008)
public_corruption	0.129*** (0.006)	0.110*** (0.006)	0.128*** (0.006)	0.110*** (0.006)
expression_freedom	0.204*** (0.022)	0.191*** (0.023)	0.204*** (0.021)	0.171*** (0.023)
political_engagement	-0.019** (0.007)	0.003 (0.007)	-0.011 (0.007)	0.007 (0.007)
regional_power		0.022*** (0.006)		
lag(local_power, t-1)			-0.068*** (0.006)	

	Model local	Model regional	Model local lagged	Model regional lagged
lag(regional_power, t-1)				-0.026*** (0.006)
n	181	181	181	181
T	41	41	41	41
Num. obs.	7059	7059	7059	7059
Num. obs. used	4606	3880	4609	3877
Sargan Test: chisq	130.015	113.000	131.000	112.000
Sargan Test: df	779.000	779.000	779.000	779.000
Sargan Test: p-value	1.000	1.000	1.000	1.000
Wald Test Coefficients: chisq	52657.422	45103.617	52899.235	44197.673
Wald Test Coefficients: df	8	8	8	8
Wald Test Coefficients: p-value	0.000	0.000	0.000	0.000

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Source: Own elaboration.

Structure of dynamic panel models enables to include the lag of dependent variable that was not present in static models. In the provided calculations the version of *public_goods* lagged by one year was used. This extra variable is strongly significant in all variants of models which indicates that the preceding observation from year t , that measures how undoubtedly spending is considered as allocated on public goods, has an explicit and proportional impact on how it will be recognized in following year $t+1$. The observed relationship is quite intuitive as it would be tough for the character of budget spending to vary dynamically in year to year comparisons, especially in a repeated manner throughout long periods. It is more probable that it will change slowly over longer intervals. Such changes could for example occur due to some shifts between parties exercising power in a government or modification of residents expectations about the way social politics should be conducted. Still, there is little chance that it will reverse the character of spending substantially between single years repeatedly in a long perspective.

Variables characterizing the decentralization – *regional_power* and *local_power* – maintain the positive effect on public goods oriented spending in dynamic panel models. What was additionally done in dynamic version of the models, was the replacement of *regional_power* and *local_power* variables with their lagged versions constructed analogously to the lag of *public_goods*. Similarly, they were lagged by one period. In the obtained outputs both of the modified variables keep their validity, but contrary to static panel models, signs of their coefficients are negative. This indicates that even though extent to which the elected authorities on regional and local level are independent from the rest of officials is positively

determining how publicly oriented budgeting is practiced, when same period t is analyzed for both variables, it has opposite effect on shaping spending character in following period $t+1$. This conclusion points out that modifying the distribution of power between the elected and non-elected municipal authorities can specifically change the course of budgeting in the same period, but will constitute a predictor of a contrary shift in the manner of budgeting for further periods.

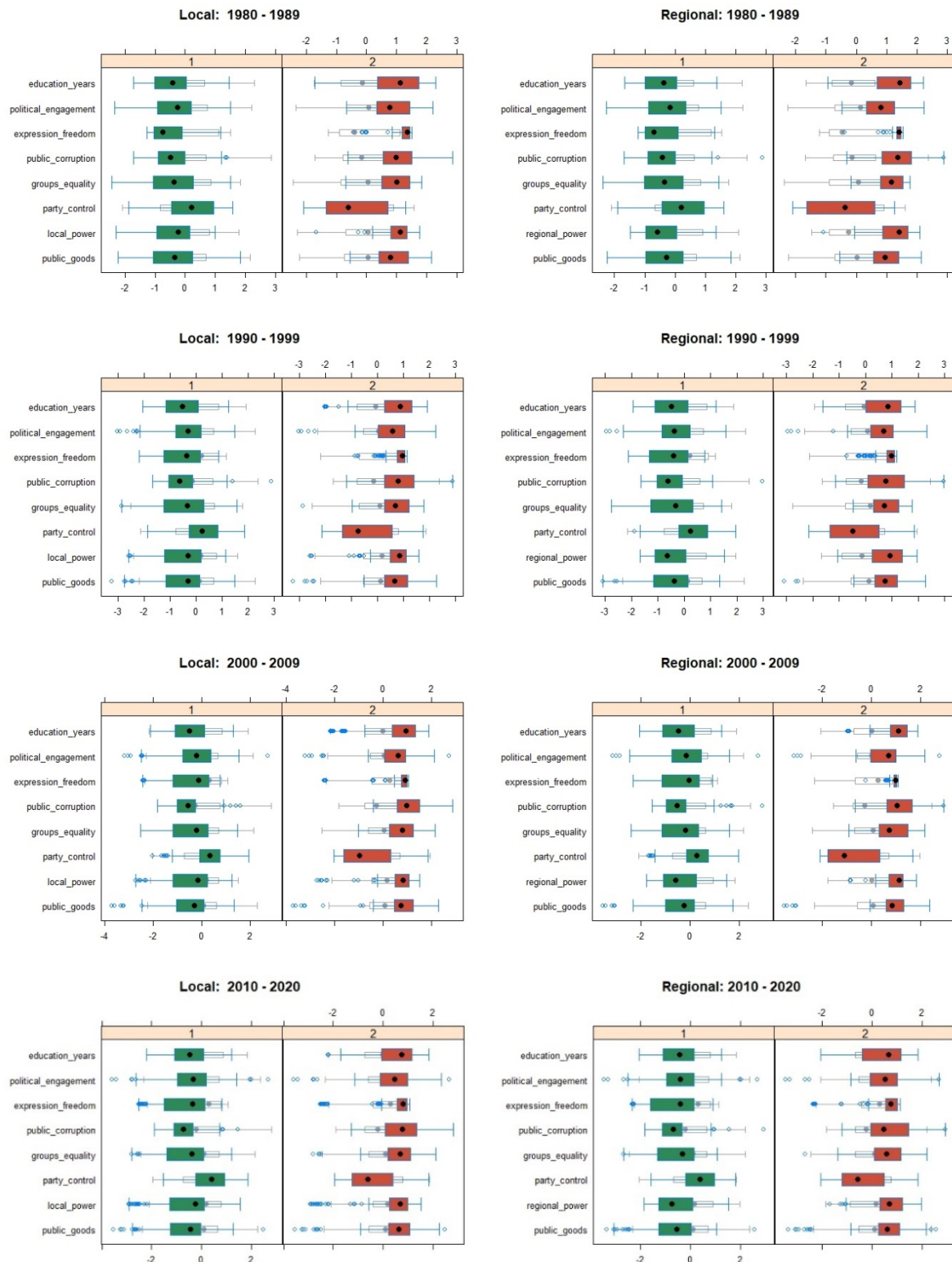
Negative coefficients of the parameters of lagged *regional_power* and *local_power* variables suggest that some nonlinear mechanisms may occur between the abovementioned countries' characteristics. Potentially, path dependence phenomenon can constitute a reason for counter relationships of variables lagged by one period with present public goods distribution. This phenomenon indicates that different paths followed by specific institutions in the past can lead those institutions to achieve various equilibrium states in the present. It ensures that institutions in a given time t are determined not only by circumstances taking place simultaneously, but to a large extent by events and decisions from the preceding periods. In accordance with that, the present manner of budgeting can be shaped both by the actual and past institutional constraints. This indicates that relatively higher power of the elected subnational officials might affect budget decisions in a diverse manner in the present and in the future.

Additionally, the abovementioned negative relationships can reveal the presence of gradual changes in the data, as when they occur, instead of rapid dynamics, periods of even nearly stable levels of variables followed by their incremental transitions can be found. If such changes are recognized in the data, relationships between specific variables can become changeable and switch their direction not only when data is synchronously analyzed in the subsequent years, but also when the span between compared periods is shortened or expanded as well. This could explain the positive signs near the parameters of the elected local officials' relative power in time t and the negative signs in time $t-1$ in the relationship with public goods distribution. Additionally, the analysis conducted in our panel models is dependent on the application of unsupervised learning methods in the following subsection, which should enable a better understanding of how the interactions between countries' characteristics are being explored.

3.4. *Model extensions*

To provide a broader analysis of the relationships between the characteristics determining the successfulness of decentralized governing, it was decided to cluster countries basing on the previously selected variables. To find some similarities between groups of countries assigned to the same clusters, as well as prepare a comparison of the outputs over the years, k-means clustering was done separately for all decades from year 1980 to 2020. The below outputs for the following decades 1980–1989, 1990–1999, 2000–2009 and 2010–2021 are presented on Figures 5-12, for local on the left and for regional level on the right. In all eight cases the choice of two clusters occurred to be most informative basing on Silhouette and Calinski-Harabasz measures. The methodology of clustering applied for the whole decades assumed that observations for each country from all ten years in a decade (or eleven in the period 2010-2020) were clustered as separate records. This indicates that country's observations from separate years could be assigned to different clusters even in one decade. Proportion of such cases is relatively small and presented more precisely on Figures 13 and 14.

Fig. 5-12. Box plots for the obtained cluster results in decades 1980-1989, 1990-1999, 2000-2009 and 2010-2020 at the local and at the regional level



Source: Own elaboration.

What is visible, is that both for the local and the regional levels of analysis observations in the latter of the two clusters are more coherent and the first one is broader and contains more differentiated cases. The more homogeneous clusters in all decades and for both types of analysis are represented by higher center values, which are equal to means of observations, of *political_engagement*, *expression_freedom*, *pubic_corruption*, *groups_equality*, *education_years* and, contrary, with lower values of *party_control*. More uniform clusters also contain observations that on average are characterized by more powerful elected officials in subnational governments in comparison to non-elected ones and by budget spending oriented stronger on public goods provision.

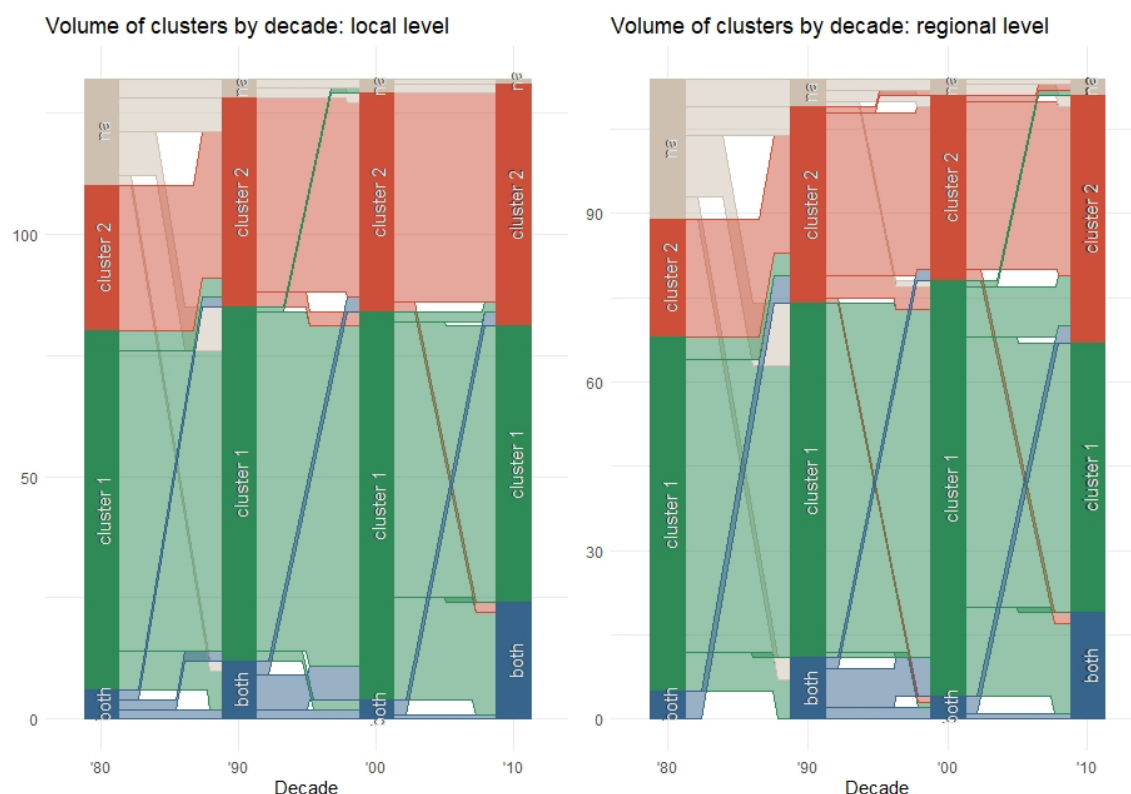
The coappearance of high values of *local_power* or *regional_power* and *public_goods* variables in one cluster and with appropriately relatively high or low levels of the rest of the variables supports previously obtained results from panel models informing how each of these variable influences the design of budget decision making. It is especially congruent with static panel models outputs. Only *political_engagement* observations were clustered in a different manner, as its high levels were clustered with high values of dependent variable, and in panel models *political_engagement* was described as negatively affecting provision of public goods. It is confirmed that most of applied characteristics can be propitious in providing more public goods oriented instead of overrepresenting particular interests execution of public funds. Moreover, the fact that observations that were classified to the wider cluster are more internally diversified and have lower center value of *public_goods* variable, indicates that among countries with more particularistic spending values of characteristics are not as unambiguously tightened to any specific levels of the variable. There is more evident coexistence of high values of *public_goods* variable with concrete levels of remaining variables that by static panel models mostly were suggested to boost the public good character of spending.

Subsequently, it was checked the how assignment of countries to clusters changed over following decades. Most of countries are characterized by a stable clusters affiliation as years passes, but there is also a relatively small fraction of countries that had changed their assignment. For both local and regional levels of analysis group of countries containing: Armenia, Belarus, Benin, Bolivia, Brazil, Bulgaria, Colombia, Czech Republic, Ecuador, Gabon, Georgia, Ghana, Guyana, Hungary, India, Ivory Coast, Lesotho, Liberia, Mexico, Namibia, Nepal, Niger, Panama, Peru, Philippines, Poland, Romania, Senegal, South Africa, Gambia, Tunisia, Ukraine, Venezuela and Zambia changes clusters between years. Additionally, this set of countries is extended by Burkina Faso, Malawi, Moldova, Seychelles,

Sierra Leone and Zimbabwe which only at the local level were shifted from one cluster to another, and by Algeria, Kenya, Malaysia, Paraguay, South Korea, Sri Lanka and Tanzania on regional level, respectively. When looking at these countries development ratings provided by Fiscal Affairs Department of International Monetary Fund, most of them, if included in the classification, is characterized as low developed or developing countries. Czech Republic was the only one to be assigned to the group of advanced economies. A few countries were not present in that classification at all, so for them World Bank categories of low, lower middle, upper middle and high development were applied. From this group of states Seychelles and South Korea were only rated as highly developed. This finding seems quite reasonable as more developed countries will be less likely to change their classification if it depends on the comparison with other countries, because more often less developed countries strive to advance their level of development.

A particularly strong trend is noticeable when analyzing the dynamics of how the abovementioned countries change their affiliations to clusters which are presented on Figures 13 and 14 and marked as 'both' category. In some exceptional cases a country can be present in both clusters in the same decade as observations for separate years are a matter of clustering, indicating that not all observations for a specific country had to be clustered jointly. A vast majority of such cases takes place in the period 2010-2020, but in 1990–1999 there are a few of them, as well. This shows that these two decades were comparatively more diversified and unstable in countries classification.

Fig. 13-14. River plots for the observed shifts of countries' assignment to clusters in years 1980-2020 at the local and at the regional level



Source: Own elaboration.

The reduction of Cluster 1, which represents countries with, on average, poorer provision of public goods, and especially the diminishment of its relative size to Cluster 2, is visible in the two abovementioned decades as well. As long as in the first of them, the change results mainly from the appearance of previously absent countries which joined the second cluster, in the decade 2010–2020, contradictory, more than a quarter of countries previously assigned to the first cluster was reassigned mainly to ‘both’ category on the local level and on the regional also directly to the second cluster. The relative widening of the second decade clusters, that are described by higher average levels of *public_goods*, but also of more powerful subnational governments, suggests that countries shifted towards the conduction of less particularistic politics and strengthening the role of local authorities.

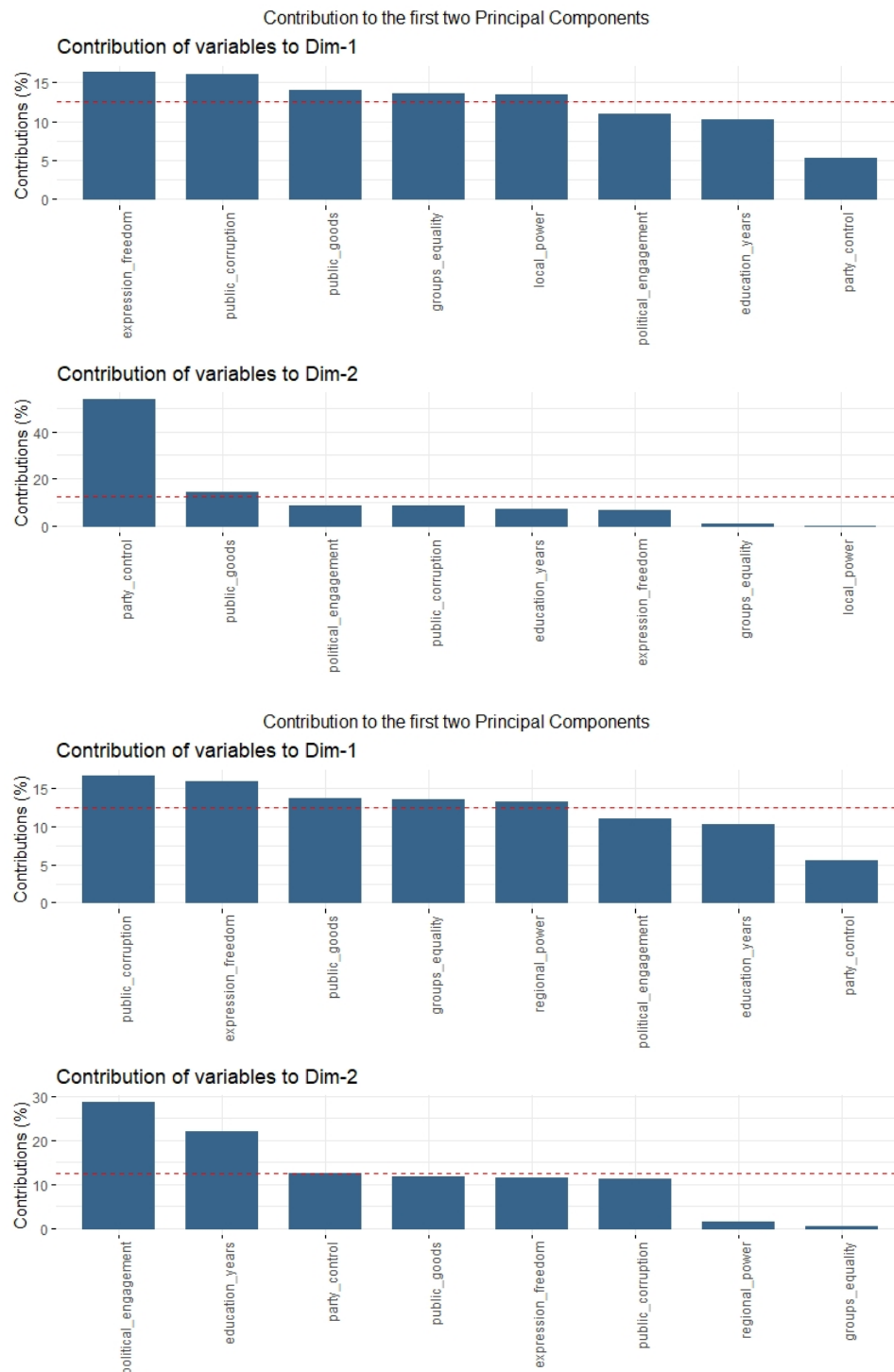
This result can stand for an approximation of how global trends in social policies provided by governments are being shaped, as it suggest that particularistic spending is being replaced with the more public goods oriented one. This is consistent with the part of literature findings highlighting the rise in social spending and its determinants including economic development or implementation of Euro currency in some European countries (Molina-Morales et al., 2013). However, more universal and inclusive budgeting is conditioned with factors such

as demographic changes that are taking place most firmly in many developed countries and are indicating transformations into more elderly societies. Such a turning creates a strong incentive for authorities to concentrate more intensively on older groups of citizens when setting up spending targets, as they start to constitute greater and greater section of voters (Gamliel-Yehoshua & Vanhuysse, 2010).

As it was mentioned, part of observations from countries that were earlier present just in the wider clusters, was moved in the newest decade to a cluster that previously was more unified or to a group of countries present in both clusters. The difference in countries assignment between decade 2010–2020 and previous decades indicates not only a shift in manner of budgeting from more particularistic to more collective spending oriented but also a change in average levels of the remaining variables. In the newest decade variables tend to more frequently adopt levels that in static panel models were concerned as indicating more public goods oriented spending. Apart from the already listed *local_power* and *regional_power*, lower levels of *party_control* and higher levels of the rest of variables are recognized in widening second cluster, so shifts towards more efficient decentralization related characteristics can be noted in the latest decade.

Principal component analysis constituted another tool for a deeper examination of the relationships between characteristics important for the effectiveness of decentralization process. Standard PCA followed by rotated PCA were conducted and similarly to how it had been done before, outputs for the local and the regional levels were compared. On Figures 15-18 contributions of each variable to first two principal components are presented firstly for the local and later for the regional levels. Principal components can be interpreted as composite variables and contribution of each variable to the first or second dimension shows how much of variance explained by this dimension comes from a specific variable.

Fig. 15-18. Bar plots for contributions of variables to the first two dimensions in principal component analysis at the local (upper plot) and at the regional level (lower plot)

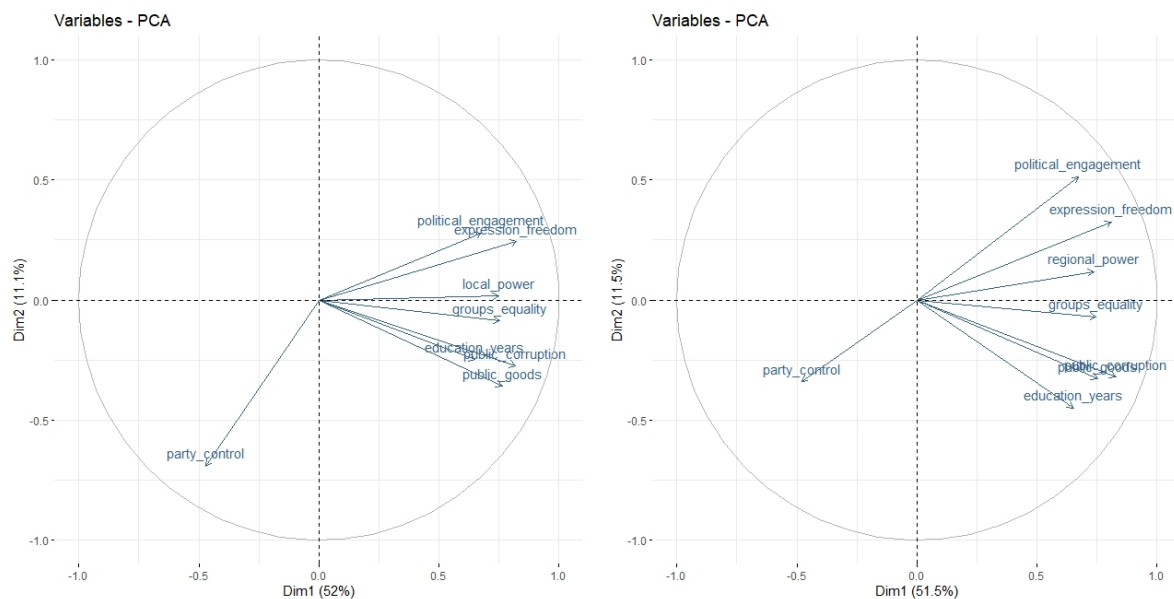


Source: Own elaboration.

It is visible on the plots that the set of variables can be divided into two subgroups depending on which of two dimensions they influence more substantially. The first two principal components do not explain the whole variance of the dataset but are two most meaningful in its explanation. Cumulatively they are responsible for 63.10% of variance at the

local and 62.96% at the regional level. On the first dimension the effect of specific variables in determining the total change is divided more equally and between higher number of variables in comparison to the second dimension. Moreover, on the first principal component on both levels of analysis, in the context of variance, the most explanatory variables occurred to be *public_corruption* and *expression_freedom*. They are followed by *public_goods*, *groups_equality* and later *local_power* or *regional_power*, respectively. Another variables are more important in explaining the variance of the second dimension. At the local level *party_control* stands for 50.00% of variance and is followed by *public_goods* and *political_engagement* with visibly lower impacts. At the regional level the division is different and *political_engagement* together with *education_years* are the most determinative. Characteristics that were together classified as strongly informative on one of the principal components are considered to be changing their values with a similar dynamics among observations in the dataset.

Fig. 19-20. Correlation circles for principal component analysis at the local (on left) and at the regional (on right) level of analysis



Source: Own elaboration.

On the loading plots presented on Figures 19-20 the relationships between our variables are more precisely explained. The difference between the two subgroups is visible as for both tiers of analysis *party_control* is separated from the rest of characteristics. While on the local level it has higher impact on the total variance but negative correlation with *political_engagement* even though is still around 0.7, on the regional, contrary, it is less meaningful, but these two variables are nearly perfectly negatively correlated. This indicates

that the situation when the national power is substantially diversified between the different political parties coappears with higher political engagement observed. The remaining variables are more or less intensively, but in all cases positively correlated to each other. Relatively higher unification of civil liberties among social groups, lower corruption, better education attainability, less constraints put on political and academic expression of citizens, stronger positions of elected local officials and finally budgeting oriented more on public goods provision appear simultaneously among analyzed countries. Overall, the most influential variables occurred to be *expression_freedom*, *public_corruption* and *pubic_goods*, and additionally *party_control* on the local and *political_engagement* on the regional levels.

To complement the standard PCA analysis, loadings of each variable were calculated basing on rotated by varimax transformation version of PCA. As they give information about how substantially a variable determinates the total variance of a dataset, in order to present the most influential characteristics and find the groups of similarly behaving variables, the ones described by loading value of 0.4 or more were presented in Table 6.

Table 6. Principal component analysis

	RC3	RC1	RC2		RC1	RC2	RC3
public_goods	0.696	0.469		public_goods	0.759		
local_power	0.475	0.560		regional_power	0.442	0.549	
education_years	0.813			education_years	0.790		
party_control			0.932	party_control			-0.929
groups_equality	0.521	0.556		groups_equality	0.571	0.522	
public_corruption	0.809			public_corruption	0.817		
expression_freedom		0.740		expression_freedom		0.748	
political_engagement		0.893		political_engagement		0.909	
SS loadings	2.446	2.337	1.107	SS loadings	2.537	2.218	1.111
Proportion Var	0.306	0.292	0.138	Proportion Var	0.317	0.277	0.139
Cumulative Var	0.306	0.598	0.736	Cumulative Var	0.317	0.594	0.733

Source: Own elaboration.

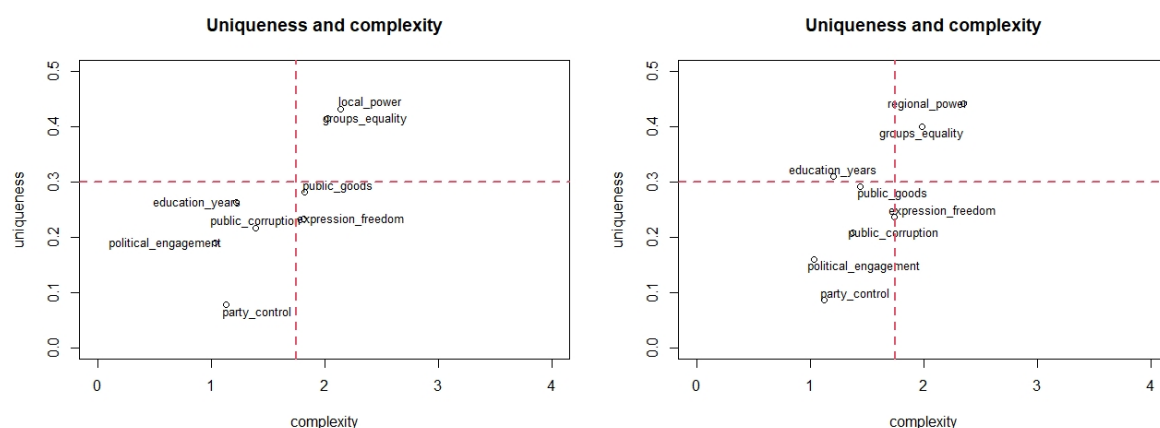
The results are partly convergent with the previous findings, but they add new information about how the determinants of cumulated variance are sharing the impact on it and let one to compare the obtained outputs. Variables such as *public_goods*, *local_power* or *regional_power*, *education_years*, *groups_equality* and *public_corruption* are most influential for the first rotated component and apart from *education_years* were all appointed as highly

important in shaping first dimension in standard PCA, too. The only difference is that in the previous PCA calculations, *expression_freedom* was considered as strongly determinative.

Referring to the two remaining rotated components, variables that were most influential in case of the second principal component were splitted between different rotated components. On the both levels of analysis *party_control* nearly by itself constitutes a separate dimension and on the regional level is additionally negatively correlated to the rest of characteristics. On the regional level *political_engagement* and *education_years*, that were meaningful in the second principal component, are included separately in the first and second rotated component. Additionally, the second rotated component is also strongly determined by *expression_freedom* which was not identified in our standard PCA analysis. The first two rotated components explain lower part of the variation in comparison to the first two respective principal components, as 59.80% and 59.40% are explained for the local and the regional perspectives here. Nevertheless, when these outputs are supplemented with the third rotated component, their informativeness rises expressly to 73.60% and 73.30%, respectively, and by so become quite profound.

What can also provide valuable findings about the variables informativeness basing on the principal component analysis is their uniqueness and complexity. Uniqueness stands for a percentage of variance that a variable does not share with other variables and complexity describes how many factors have loadings greater than zero and by so, how many factors constitute a single variable. Thus, if a variable is characterized by uniqueness significantly different from zero and by complexity higher than one, it is difficult to be interpreted, as on the one hand it cannot be reduced because of additional information this variable contains and on the other hand because of the fact that many factors have impact on this variable. The situation is worst, if high values of parameters are combined by given variable.

Fig. 21-22. Uniqueness and complexity plots for principal component analysis at the local (on left) and at the regional (on right) level



Source: Own elaboration.

As presented on Figures 21 and 22, in the analyzed data especially *groups_equality* and *local_power* or *regional_power* variables, respectively, are characterized by rather high uniqueness and complexity on both levels of interpretation. Nevertheless, on the regional level much worse results seem to be obtained, because these two features occur simultaneously for higher number of variables. This indicates that in interpreting the results from the previous PCA calculations one should be cautious not only when it comes to supplementary variables, but also to relative power of domestic officials represented by *local_power* and *regional_power*, as these variables can be disturbed by other factors. If a variable has high uniqueness but its complexity is kept close to one, which is true for *education_years* on the regional level, it is hard for such a variable to be combined in one component with other variables in PCA, but on the other hand it provides additional information to the dataset so it can be valuable to be interpreted.

Taking into consideration all PCA results provided above, it is worth highlighting that groups of variables with similar influence were distinguished. As characteristics 'cooperate' together, it can be suspected that there is some joint impact they exert on the process of decentralization. Especially, the coexistence of the following four variables: *groups_equality*, *public_corruption*, *public_goods* and *local_power* or *regional_power* in the first principal and the first rotated component for both government levels, and respectively with *expression_freedom* in the first principal component and with sole *education_years* in the rotated component, stresses their importance in the decentralization phenomenon and publicly oriented budgeting. Relatively high uniqueness of *groups_equality* and *local_power* or *regional_power* for both tiers of governing and *education_years* for the regional tier, stresses

the inconsistency of these variables variation with variation of the rest of characteristics and the fact that new information is added by these variables to the dataset. As far as it is proved by the results for *education_years* in the first dimension on the regional level, it is not that clear for two remaining variables, as these were considered as influential in first dimensions together with other variables, so this interpretation should be taken with caution.

4. Discussion

As it was presented, the power of local and regional authorities, which in conducted studies constitutes an approximation of applied decentralization's depth in a country, occurred to contribute to more publicly than particularly oriented distribution of resources. In panel models it was revealed that the higher is the autonomy of territorial officials, the more public character budgeting will have. In the clustering analysis two groups of similarly characterized countries were distinguished for plural period configurations. In all of them countries with on average stronger elected subnational officials were classified together with countries on average oriented more on providing public than particularistic goods through national expenditures. These findings support the conclusions from the literature that point on conducive role of transferring power from upper to lower tiers of government on the effectiveness of policies management (Oates, 2005; Bahl & Martinez-Vazquez, 2006). Basing on these results, it can be inferred that the hypothesis H1 claiming, that empowering local and regional governmental structures in countries favors the redirection of national budgeting more onto the provision of public, rather than particularistic, goods, can be accepted.

Apart from the direct effect of decentralized governing on the management of goods provision, the role of factors expected to support the effectiveness of decentralization, was included in the study as well. All of the conducted econometric tools demonstrate a coherent effect of the three factors on improving the quality of public goods provision. Those include equality of all social groups in a society, low levels of corruption practices and high freedom of political and media freedom. The above listed characteristics present relationships with publicly oriented character of budgeting, consistent with most of findings presented in the literature review. In the discussed studies both horizontal inequalities itself and significant income inequalities between social groups are described as impeding the process of delivering policies aimed at the public goods provision (Baldwin & Huber, 2010; Whitt, 2021). Moreover, authors often suggest that high corruption levels are expected to diminish citizens trust to authorities and their evaluation of rulings on national and subnational levels as well, and hinder

the effective provision of services by state officials (Khemani, 2020; Moldogaziev & Liu, 2021; Wolf, 2007). Finally, the presence of strong and independent media is believed to be crucial for familiarizing citizens with political scenes' actors, accounting politicians from taken actions and for obtaining decentralization effectiveness. In the context of the last matter, presence of local media seems to be especially important (Ahmad et al., 2005; Lessmann & Markwardt, 2010; Wolf, 2007).

Additionally, in most of the presented econometric outputs, high average number of received years of education among country's citizens demonstrates positive effect on conducting policies aimed at public goods provision. Only in the dynamic panel models the finding occurred to be contrary. In the literature it is widely proved that high education accessibility helps to equip country's labor force with more comprehensively skilled workers, also including administrative staff. Presence of qualified administration is recognized as a significant factor in successful performance of decentralized governments, as in such structure more officials are required than in centralized government. Furthermore, electing sufficiently educated representatives enables local structures to sustain their autonomy from upper governmental tiers (Ahmad et al., 2005; Bello-Gomez, 2021; Loayza et al., 2014). The abovementioned results regarding the positive effect of freedom of expression on reducing the realization of particularistic interests from national budgets and, similarly, the positive effect of the access to education on switching towards the provision of public goods, obtained in most of conducted models, rather induce for accepting our hypothesis H2. These conclusions highlight the importance of citizens' ability to account governments in maintaining the public character of country's expenses.

Somehow mixed findings were achieved with the provided models in the context of the role that political engagement and unification of political parties control play in the reinforcement of public goods providing policies. Twofold relationships are not that surprising, as those indicators are related to various country's characteristics that even if outwardly are contrasting, can result in similar tendencies. In our panel models intensified political engagement contributes to more particularistic distribution of goods, but in cluster analysis it corresponds to more publicly oriented distribution of goods. On the one hand, some of the literature findings show that citizens' high engagement in political debate and presence of nongovernmental organizations provides a communication instrument between authorities and a society. Thereat, it is considered as helpful in keeping publicly oriented character of budgeting (Faguet, 2017; Nyawo, 2017). On the other hand, other authors claim that activity of political

organizations might not always be sufficient for accounting authorities, especially if NGOs do not keep full autonomy from government or, contrary, start to take over the tasks of public administration (Hu & Zhu, 2021; Nelson-Nuñez, 2019). Referring to the second problem, more unified party control occurred to be associated with rather particularistic spending in the remaining econometric tools, but in static panel models it determines more publicly oriented provision of goods. Twofold implications were partially expected, as in the literature the extent to which power is gathered in hands of one or more parties was described as having nonlinear effect on distribution of goods. From the one point of view, this kind of control of a single party endangers public character of budgeting due to lowered competition in ruling bodies (Ashworth et al., 2014; Hicken, 2002). But conversely, spread of power between too many entities can favor spending intended for small social groups and additionally reduce governments' effectiveness by slowing down decision making process (Ashworth et al., 2014; Chhibber & Nooruddin, 2004). The results of our panel models combined with clustering outputs suggest, that relatively politically differentiated governments favor budgeting steered on public goods provision. But, as obtained results are not unilateral, there is no irrefutable ground for accepting nor for rejecting our H3 hypothesis of positive effect of political scene unification on the reinforcement of public the character of spending. Additionally, rather lesser politically engaged societies occurred to receive more public oriented budgeting, which counterparts the positive effect of high political differentiation in a society on the phenomenon, but the results are varied here as well.

Besides analyzing econometric outputs referring to the discussed problem, it is worth to take a look on how decentralizing tendencies are applied by real governing bodies. As the principal of subsidiarity constitutes one of foundations of the European Union functioning, we can observe how this principle is implemented to policies prepared by EU representatives in European Commission. For example, it is expressed in in the summary of Cohesion Policy for years 2021-2027 (European Commission, 2021), that manageability of funds in hands of local, regional and territorial officials should be strengthened. In comparison to the preceding period 2014-2020 it is declared by Commission that it will strive for greater participation of member countries in the distribution of granted transfers. This change does not refer only to national governments, but also to deepening the engagement of territorial structures into the execution of public policies.

Strengthened decisiveness of local authorities is visible in the Regulation 2021/1058 referring to European Regional Development Fund and Cohesion Fund (European Commission,

2021) which states that granted funds can be distributed in compliance with thematic concentration on national or any category of regional level. This enables member states to more flexibly decide if and how downward to transfer the decisiveness. If country perceives a potential of territorial authorities for more appropriate allocation of funds, resulting from for example their higher familiarity with local needs, it can decide to share the management role. From the other perspective, enabling countries to chose which level of governing structure should take care of distributing funds, is an example of decentralizing the decisiveness, too. Moreover, in European Urban Initiative, which is a subsection of the Regulation 2021/1058, the need for supporting the engagement of local authorities in thematic partnership resulting from the Urban Agenda for the EU and overall empowerment of subnational authorities in managing process is stressed. Followingly, in the Regulation 2021/1060, specific methods for regions classification and scope of power that can be transmitted to them are distinguished. Additionally, in those legislative acts countries are encouraged to build interregional cooperation and exchange knowledge not only between each other but among their subregions, too, which emphasizes the potential of regional authorities that is recognized by European officials.

World Bank is another policymaking body that recently included more regionally oriented politics into one of its programs. Looking at the Environmental and Social Framework (ESF; World Bank, 2016), one can notice that change of from more centralized towards more diffused organizational structure has taken place. The framework of program, that originally was launched in year 2018, in 2020 was updated by World Bank specialists. Among a few other aspects changes referring to organizational structure were applied through which an emphasis was redirected more onto knowledge and resources of local representatives. It was decided to create and engage regional structures into management of implemented policies.

One of the paragraphs contained in the policy update from 2020 entitled 'Organizational structure and OESRC' refers directly to the realignment of organizational structure resulting from creation of ESF new units, including regional and global departments, and special unit for ESF implantation. These changes were reinforced through general policy shifts seeking for strengthening of regional and national development programs. Since 2020 Regional Environmental and Social Standards Advisors and Regional and Global Practice Sustainable Development units cooperate with Operations Policy and Country Services. Additionally, Sustainable Development Regional Directors are subordinate to the Regional Vice Presidents and later to the Sustainable Development Practice Group Vice Presidents. Their role is to

control the management and funds of policies realized by a specific Practice Group both on national and regional levels. These new organizational setup supports the effort made by World Bank representatives in returning the supervision of local programs to local specialist. It is additionally emphasized by creating regional divisions that do not only consist of one level hierarchy but have vertical structure, which enables for more complex engagement of local professionals.

On the examples of the abovementioned institutions, it can be seen that nuances of decentralization are being willingly implemented into transnational policies in the recent years. If the proposed changes will result in fairer programs' outputs, will be known at the earliest in few years time, but for now their presence proves the existence of the interest in empowering the voice of local communities. Together with the presented econometric and unsupervised machine learning results, it suggests that there is a potential of rising the effectiveness of ruling strategies and reorienting them towards more beneficial to society, by transferring the decisiveness closer to citizens and domestic experts.

5. Conclusions

Public goods are perceived as one of the core components of economic and social development. The available literature identified various determinants of public goods provision, focusing to a large extent on the impact of public policies. At the same time, by so far, institutional factors have been considered relatively rarely in this context. The primarily goal of our study was to investigate the relevance of governmental power decentralization for public goods provision. The empirical part of this research covers the global sample of 181 countries in the period 1980-2020. A battery of statistical, econometric and machine learning apparatus was applied to get a precise and robust insight into our research problem, enough for verifying the hypotheses posed. The obtained output brings valuable conclusions, as in contrary to the most of available studies, the effect of institutional framework design, instead of specific social policies implementation, on the provision of public goods was explored.

The essential implications of our research are as follows. As exposed by econometric panel-data models, principal components and clustering algorithms, decentralization of governmental power, approximated by the level of power of local and regional authorities, matters for public goods provision. It appears that the higher autonomy of local officials, the more important public goods are in public expenditure, so that relatively stronger empowerment of local and regional government structures favors distribution of public rather than

particularistic goods provided from the national budget (H1). Additionally, the outcome of our quantitative study proves the relevance of equality of social groups in a society, level of corruption, as well as political and media freedom for public goods provision. Namely, it seems that reinforcement of citizens' ability for accounting government officials ensures relatively more publicly oriented budgeting (H2). Last, but not least, the obtained results were not sufficient to accept the hypothesis that political diversity in terms of party unification over executive and legislative power at the national level, promotes delivering public goods as compared to particularistic ones (H3).

The study is a multifold contribution to the existing literature. Namely, it brings a value-added to the strand of literature on the role of power decentralization in the context of effectiveness in managing public policies. Moreover, it broadens the current thoughts on the impact of the society on distribution of public goods. Importantly, the set of the quantitative methods used in our research allows for delivering credible conclusions and is unique as compared to the other current articles.

Our research can be further extended in various directions. One of the options is to review the issue of public goods provision in the context of general government and local government spending rules. Moreover, it would be interesting to include more detailed information about the considered public goods and their further role in sustainable development of a country. It may be also beneficial to broaden the study by investigating the eventual relevance of public goods distribution in neighboring countries.

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Appendix:

Table 1a. Description and sources of variables

Variable	Description	Citation
public_goods	Extent to which spending from the national budget for social and infrastructural needs have particularistic character or the nature of public goods. If an expenditure is considered as public good, it should benefit all subgroups of a society but can be means-tested. If an expenditure advantages only a specific part of a society indicated in a different way than by the income level (f. ex. specific sector of the economy, territory or social minority) it should be recognized as particularistic one. Interval scale [-3.363: most or all national budget expenditures are particularistic; 3.531: most or all national budget expenditures are considered as public goods]	Coppedge et al. (2021)
regional_power	The comparative power of elected officials to non-elected officials measured at the regional level. In the variable only major offices are accounted and less significant departments are omitted. The comparative power is estimated as the number of offices of one kind (elected or non-elected) that are subordinative to those of another. Subordination is defined as the hierarchy in which one of the offices, including its members, can be appointed or dismissed by the another office or when its decisions can be meaningfully affected by it but this does not work the opposite way. Data is missing when there is no regional level of government. Interval scale [-2.493: most of elected officials are subordinate to non-elected ones; 3.148: most of non-elected officials are subordinate to elected ones]	Coppedge et al. (2021)
local_power	Analogously to the previous variable, the comparative power of elected officials to non-elected officials measured at the local level. In the variable only major offices are accounted and less significant departments are omitted. The comparative power is estimated as the number of offices of one kind (elected or non-elected) that are subordinative to those of another. Subordination is defined as the	Coppedge et al. (2021)

	hierarchy in which one of the offices, including its members, can be appointed or dismissed by the another office or when its decisions can be meaningfully affected by it but this does not work the opposite way. Data is missing when there is no local level of government. Interval scale [-2.634: most of elected officials are subordinate to non-elected ones; 2.810: most of non-elected officials are subordinate to elected ones]	
education_years	Average number of years in population that people aged 15 or more spent on education. Continuous scale [0.218: on average around 80 days of education; 13.610: on average around over 13 years of education]	Clio Infra (clio-infra.eu) along with other sources
party_control	The degree of party unification over the executive and legislative power at the national level. Only offices or chambers of parliament with de facto power should be considered. Interval scale [-2.815: multiparty coalition control; 3.013: unified control of a single party]	Coppedge et al. (2021)
groups_equality	Level of unification of civil liberties accessibility between specific social groups living in country's society. If access to liberties such as private property rights, equality before the law, freedom of movement or from forced labor is somehow differentiated between groups characterized by religion, race, ethnicity or caste affiliation, or by territory alignment, it cannot be considered as equal. Interval scale [-2.868: access to civil liberties is strongly differentiated between social groups; 3.368: access to civil liberties is equal between social groups]	Coppedge et al. (2021)
public_corruption	Level of corruption occurrence among public sector employees. Variable describes the perception of how often do clerks in a public sector (apart from people employed in the military section) provide good turns for applicants served by them or other civilians in exchange for money or other types of bribes and kickbacks. Interval scale [-3.054: most public sector employees take bribes; 4.104: extremely small part of public sector employees takes bribes]	Coppedge et al. (2021)
expression_freedom	Extent to which the expression is free from the government restrictions or impairment. Specifically it is defined as the freedom of	Coppedge et al. (2021)

	political expression recognized by citizens as well as freedom of academic and cultural expression. Press and media freedom respected by the government is measured by the variable, too. Interval scale [0.012: low levels of freedom of expression; 0.989: high levels of freedom of expression]	
political_engagement	Political engagement of the population defined as the share of a society maintaining regular activity in organizations that represent different aspects of political interests but were not appointed as political parties or trade unions. For example those associations can represent interests of minorities or concentrate on specific matters like climate change or international security. Interval scale [-2.753: share of population politically engaged is extremely small; 3.547: significant fraction of a society is politically engaged]	Coppedge et al. (2021)

Source: Own elaboration.

Extensions of the econometric methods used in the empirical study:**1. Static panel models**

The output of the econometric tests introduced for static panel models:

Regional level:

F test for individual effects:

F = 66.663,
df1 = 113,
df2 = 4111,
p-value < 2.2e-16

Hausman Test:

chisq = 27.61,
df = 7,
p-value = 0.0002587

Wooldridge's test for unobserved effects:

z = 5.6538,
p-value = 1.57e-08

Local level:

F test for individual effects:

F = 70.944,
df1 = 131,
df2 = 4883,
p-value < 2.2e-16

Hausman Test:

chisq = 53.229,
df = 7,
p-value = 3.34e-09

Wooldridge's test for unobserved effects:

z = 6.2235,
p-value = 4.862e-10

Table 2a. Static panel models at the local level calculated for subsamples of countries by income level (World Bank classification)

	Local low (RE)	Local lower-middle (FE)	Local upper-middle (RE)	Local high (FE)
local_power	0.176*** (0.031)	0.142** (0.043)	-0.161*** (0.040)	-0.022 (0.053)
education_years	-0.050* (0.023)	0.229*** (0.030)	-0.050 (0.028)	0.099*** (0.021)
party_control	0.034 (0.020)	0.019 (0.020)	0.074** (0.023)	-0.019 (0.010)
groups_equality	0.346*** (0.038)	0.270*** (0.044)	0.272*** (0.037)	0.067* (0.032)
public_corruption	0.157*** (0.023)	0.345*** (0.031)	0.514*** (0.047)	0.436*** (0.051)
expression_freedom	0.778*** (0.107)	1.075*** (0.133)	0.868*** (0.152)	1.611*** (0.276)
political_engagement	0.038 (0.034)	-0.178*** (0.051)	0.053 (0.034)	-0.224*** (0.054)
(Intercept)	-0.115 (0.158)		0.588* (0.251)	
R ²	0.273	0.331	0.360	0.181
Adj. R ²	0.268	0.278	0.354	0.132
Num. obs.	1212	1179	826	877
s_idios	0.408		0.356	
s_id	0.854		0.662	

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Source: Own elaboration.

Table 3a. Static panel models at the regional level calculated for subsamples of countries by income level (World Bank classification)

	Regional low (FE)	Regional lower- middle (FE)	Regional upper- middle (FE)	Regional high (FE)
regional_power	0.003 (0.030)	0.070* (0.035)	-0.083* (0.041)	-0.103** (0.038)
education_years	-0.031 (0.029)	0.198*** (0.031)	-0.045 (0.043)	0.093*** (0.022)
party_control	0.067** (0.021)	-0.029 (0.020)	0.108*** (0.022)	0.008 (0.011)
groups_equality	0.208*** (0.047)	0.310*** (0.046)	0.382*** (0.049)	0.111** (0.039)
public_corruption	0.223*** (0.029)	0.353*** (0.030)	0.598*** (0.054)	0.337*** (0.053)
expression_freedom	0.835*** (0.119)	0.773*** (0.140)	0.485** (0.183)	2.219*** (0.279)
political_engagement	0.147*** (0.037)	-0.096 (0.052)	0.075* (0.038)	-0.070 (0.062)
R ²	0.220	0.309	0.421	0.184
Adj. R ²	0.177	0.254	0.372	0.134
Num. obs.	1049	1089	670	680

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Source: Own elaboration.

2. Dynamic panel models

The output of the econometric tests introduced for dynamic panel models calculated with *the Arellano-Bond estimator* (Arellano & Bond, 1991), one step GMM, individual effect and non-robust matrix is provided below. The output of Sargan test and Wald test for coefficients was presented in the main text.

Model local:

Autocorrelation test AR(1):
normal = -7.276862
p-value = 3.4167e-13

Autocorrelation test AR(2):
normal = -0.6442043
p-value = 0.51944

Model regional:

Autocorrelation test AR(1):
normal = -6.784544
p-value = 1.1645e-11

Autocorrelation test AR(2):
normal = -0.5145717
p-value = 0.60685

Model local, lagged:

Autocorrelation test AR(1):
normal = -7.348507
p-value = 2.0043e-13

Autocorrelation test AR(2):
normal = -0.6245684
p-value = 0.53225

Model regional, lagged:

Autocorrelation test AR(1):
normal = -6.792683
p-value = 1.1007e-11

Autocorrelation test AR(2):
normal = -0.5635169
p-value = 0.57308

3. K-means clustering

Table 4a. Silhouette width and Calinski-Harabasz index values for the subsequent clusters at the local level

		Number of clusters									
		1	2	3	4	5	6	7	8	9	10
1980-1989	Silhouette	0.0000	0.3668	0.2277	0.2069	0.2038	0.1997	0.2044	0.2107	0.2050	0.2075
	Calinski-Harabasz	0.00	675.68	462.86	352.10	340.72	304.81	286.74	257.20	254.53	238.67
1990-1999	Silhouette	0.0000	0.3012	0.2564	0.2179	0.2111	0.1964	0.2043	0.2228	0.2146	0.2104
	Calinski-Harabasz	0.00	670.13	510.81	393.82	399.45	333.62	343.10	311.49	307.87	283.33
2000-2009	Silhouette	0.0000	0.3164	0.2818	0.2240	0.2305	0.2584	0.2484	0.2623	0.2589	0.2446
	Calinski-Harabasz	0.00	691.51	601.55	505.02	448.29	392.32	366.97	336.00	335.49	308.59
2010-2020	Silhouette	0.0000	0.2820	0.2428	0.2022	0.1981	0.2178	0.2219	0.2096	0.2079	0.2044
	Calinski-Harabasz	0.00	735.41	624.37	510.45	445.16	413.18	383.83	367.75	341.77	333.87

Source: Own elaboration.

Table 5a. Silhouette width and Calinski-Harabasz index values for the subsequent clusters at the regional level

		Number of clusters									
		1	2	3	4	5	6	7	8	9	10
1980-1989	Silhouette	0.0000	0.4072	0.2573	0.2294	0.2271	0.2160	0.2275	0.2235	0.2286	0.2550
	Calinski-Harabasz	0.00	568.95	385.86	341.77	290.41	260.72	245.47	238.89	221.42	203.41
1990-1999	Silhouette	0.0000	0.2928	0.2368	0.2041	0.1939	0.2148	0.2262	0.2135	0.2229	0.2504
	Calinski-Harabasz	0.00	576.44	453.61	364.38	327.38	301.33	266.45	269.67	255.19	245.03
2000-2009	Silhouette	0.0000	0.3262	0.2714	0.2159	0.2142	0.2152	0.2047	0.2047	0.1932	0.2304
	Calinski-Harabasz	0.00	595.50	514.32	406.89	352.14	333.52	316.13	297.41	249.71	263.30
2010-2020	Silhouette	0.0000	0.2691	0.2614	0.2284	0.2175	0.2004	0.1945	0.2190	0.2214	0.2261
	Calinski-Harabasz	0.00	595.86	517.22	425.12	390.01	340.76	331.45	301.44	293.71	293.97

Source: Own elaboration.

Table 6a. Clusters' centers at the local level provided on the z-score standardized data

Decade	Cluster	Variable							
		public_goods	local_power	party_control	groups_equality	public_corruption	expression_freedom	political_engagement	education_years
1980-1989	cluster 1	-0.36717	-0.42255	0.16232	-0.37913	-0.44377	-0.52262	-0.35633	-0.40736
	cluster 2	0.89998	1.03571	-0.39786	0.92930	1.08773	1.28099	0.87339	0.99849
1990-1999	cluster 1	-0.48533	-0.50501	0.26018	-0.46801	-0.58095	-0.56161	-0.40127	-0.49281
	cluster 2	0.74286	0.77297	-0.39823	0.71635	0.88922	0.85961	0.61419	0.75430
2000-2009	cluster 1	-0.47663	-0.43214	0.33940	-0.43551	-0.56995	-0.48198	-0.33665	-0.44559
	cluster 2	0.84208	0.76349	-0.59963	0.76942	1.00695	0.85153	0.59478	0.78725
2010-2020	cluster 1	-0.63012	-0.54231	0.39424	-0.60637	-0.68187	-0.65191	-0.47135	-0.44643
	cluster 2	0.68528	0.58978	-0.42875	0.65945	0.74156	0.70897	0.51261	0.48551

Source: Own elaboration.

Table 7a. Clusters' centers at the regional level provided on the z-score standardized data

Decade	Cluster	Variable							
		public_goods	regional_power	party_control	groups_equality	public_corruption	expression_freedom	political_engagement	education_years
1980-1989	cluster 1	-0.31271	-0.41098	0.15233	-0.35130	-0.41448	-0.44410	-0.28833	-0.39284
	cluster 2	0.97223	1.27774	-0.47358	1.09220	1.28862	1.38072	0.89642	1.22133
1990-1999	cluster 1	-0.51783	-0.50173	0.26652	-0.49355	-0.55303	-0.59421	-0.43812	-0.42235
	cluster 2	0.77795	0.75377	-0.40040	0.74147	0.83084	0.89271	0.65820	0.63451
2000-2009	cluster 1	-0.40590	-0.41266	0.28280	-0.35554	-0.48710	-0.39966	-0.26382	-0.42398
	cluster 2	0.96636	0.98245	-0.67330	0.84646	1.15968	0.95152	0.62811	1.00942
2010-2020	cluster 1	-0.65683	-0.60963	0.37592	-0.57748	-0.65837	-0.68845	-0.51971	-0.41285
	cluster 2	0.66342	0.61575	-0.37969	0.58327	0.66497	0.69536	0.52492	0.41699

Source: Own elaboration.

Table 8a. Clusters' statistics at the local level

		Cluster 1				Cluster 2			
		Min.	Median	Mean	Max	Min.	Median	Mean	Max
1980-1989	public_goods	-2.426	0.034	0.001	2.891	-0.231	1.548	1.656	3.294
	local_power	-2.345	0.248	-0.014	1.753	-1.560	1.918	1.805	2.730
	party_control	-2.474	0.885	0.774	3.013	-2.785	-0.437	-0.114	2.583
	groups_equality	-2.868	-0.045	-0.084	2.481	-0.494	1.818	1.693	2.934
	public_corruption	-2.532	-0.755	-0.696	1.975	-0.948	1.380	1.527	4.090
	expression_freedom	0.012	0.200	0.273	0.867	0.309	0.939	0.906	0.989
	political_engagement	-2.753	-0.201	-0.339	1.927	-0.712	1.066	1.161	2.799
	education_years	0.218	4.418	4.389	10.275	0.280	9.301	8.841	12.980
1990-1999	public_goods	-3.363	0.177	-0.040	2.353	-0.083	1.375	1.446	3.294
	local_power	-2.422	0.399	0.155	2.188	-0.544	1.844	1.732	2.752
	party_control	-2.464	0.499	0.514	2.759	-2.815	-0.876	-0.405	2.595
	groups_equality	-2.632	0.427	0.245	2.692	-0.362	1.655	1.663	2.934
	public_corruption	-2.695	-1.119	-1.056	1.912	-1.950	1.029	1.125	4.090
	expression_freedom	0.012	0.547	0.489	0.907	0.402	0.935	0.904	0.989
	political_engagement	-2.738	0.185	0.072	2.102	-0.427	1.151	1.154	2.913
	education_years	0.426	5.298	5.387	10.848	0.518	9.771	9.332	13.050
2000-2009	public_goods	-3.363	0.426	0.217	2.212	-0.288	1.584	1.678	3.294
	local_power	-2.422	0.718	0.380	2.431	-0.544	1.932	1.840	2.752
	party_control	-2.745	0.518	0.506	2.716	-2.725	-1.256	-0.781	2.583
	groups_equality	-1.987	0.649	0.399	2.596	-0.251	1.818	1.776	3.368
	public_corruption	-3.054	-1.123	-1.139	2.167	-0.894	1.225	1.260	4.090
	expression_freedom	0.012	0.658	0.557	0.907	0.567	0.949	0.930	0.989
	political_engagement	-2.613	0.515	0.372	2.315	0.080	1.379	1.339	3.547
	education_years	1.030	6.106	6.264	11.668	0.884	10.617	10.088	13.550
2010-2020	public_goods	-2.998	0.370	0.149	2.212	-0.152	1.527	1.576	3.531
	local_power	-2.422	0.727	0.356	2.810	-0.546	1.835	1.688	2.810
	party_control	-1.982	0.788	0.752	2.864	-2.593	-0.659	-0.426	2.815
	groups_equality	-2.385	0.447	0.171	2.285	-0.170	1.701	1.646	3.368
	public_corruption	-2.942	-1.175	-1.132	2.058	-2.022	1.051	0.990	4.090
	expression_freedom	0.013	0.605	0.522	0.925	0.586	0.920	0.892	0.989
	political_engagement	-2.613	0.594	0.449	2.891	-0.185	1.379	1.418	3.547
	education_years	1.310	6.630	6.674	11.748	1.310	10.360	9.503	13.610

Source: Own elaboration.

Table 9a. Clusters' statistics at the regional level

		Cluster 1				Cluster 2			
		Min.	Median	Mean	Max	Min.	Median	Mean	Max
1980-1989	public_goods	-2.426	0.137	0.085	2.891	-0.231	1.754	1.765	3.294
	regional_power	-2.231	-0.905	-0.674	1.868	-1.651	1.982	1.780	2.953
	party_control	-2.474	0.844	0.746	3.013	-2.785	-0.046	-0.236	2.482
	groups_equality	-2.868	-0.035	-0.045	2.481	0.188	2.074	1.977	2.934
	public_corruption	-2.502	-0.666	-0.661	1.975	-0.512	1.919	1.803	4.090
	expression_freedom	0.012	0.195	0.286	0.907	0.309	0.954	0.937	0.989
	political_engagement	-2.753	-0.143	-0.309	1.927	-0.542	1.067	1.158	2.799
	education_years	0.390	4.590	4.498	10.275	2.690	10.482	9.751	12.980
1990-1999	public_goods	-3.363	-0.009	-0.183	2.121	-0.083	1.382	1.425	3.294
	regional_power	-2.306	-0.792	-0.599	2.317	-1.419	1.472	1.210	2.953
	party_control	-2.464	0.440	0.463	2.759	-2.815	-0.555	-0.440	2.595
	groups_equality	-2.632	0.362	0.155	2.481	0.188	1.648	1.665	2.934
	public_corruption	-2.695	-1.163	-1.091	1.292	-1.950	0.896	0.951	4.090
	expression_freedom	0.012	0.522	0.465	0.871	0.431	0.935	0.905	0.989
	political_engagement	-2.738	0.022	-0.049	2.102	-0.892	1.181	1.123	2.913
	education_years	0.734	5.492	5.639	10.848	1.820	9.731	9.039	13.050
2000-2009	public_goods	-3.363	0.370	0.174	2.605	0.563	1.596	1.723	3.294
	regional_power	-2.324	-0.574	-0.323	2.449	-0.976	1.965	1.731	2.953
	party_control	-2.230	0.440	0.435	2.716	-2.745	-1.410	-0.851	2.331
	groups_equality	-1.987	0.629	0.407	2.692	-0.251	1.700	1.819	3.368
	public_corruption	-2.695	-1.119	-1.089	2.242	-1.342	1.261	1.408	4.090
	expression_freedom	0.012	0.663	0.562	0.935	0.609	0.959	0.947	0.989
	political_engagement	-2.613	0.516	0.392	2.315	0.001	1.390	1.317	3.547
	education_years	1.030	6.163	6.270	11.668	4.510	11.099	10.818	13.550
2010-2020	public_goods	-2.998	0.118	-0.022	1.841	-0.240	1.396	1.433	3.531
	regional_power	-2.358	-0.754	-0.559	2.475	-2.116	1.330	1.199	3.148
	party_control	-1.982	0.785	0.777	2.767	-2.660	-0.536	-0.289	2.815
	groups_equality	-2.385	0.411	0.107	2.044	-0.845	1.498	1.477	3.368
	public_corruption	-2.942	-1.222	-1.201	2.058	-2.022	0.485	0.758	4.090
	expression_freedom	0.013	0.566	0.482	0.925	0.322	0.890	0.869	0.989
	political_engagement	-2.613	0.455	0.344	2.891	0.015	1.412	1.393	3.547
	education_years	1.310	6.532	6.560	11.748	1.310	9.978	9.179	13.610

Source: Own elaboration.

4. Principal Component Analysis

Table 10a. Matrix of variables' loadings in principal component analysis at the local level

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
public_goods	0.374	-0.381	0.095	-0.300	0.426	-0.240	-0.489	0.371
local_power	0.367	0.017	0.085	0.619	0.387	0.330	0.328	0.328
party_control	-0.231	-0.733	0.515	0.253	-0.221	0.106	-0.013	-0.143
groups_equality	0.369	-0.092	0.122	-0.587	-0.226	0.602	0.282	0.049
public_corruption	0.401	-0.291	-0.210	-0.041	0.210	-0.352	0.412	-0.608
expression_freedom	0.404	0.258	0.188	0.227	-0.086	0.259	-0.587	-0.515
political_engagement	0.332	0.296	0.572	0.009	-0.365	-0.513	0.206	0.190
education_years	0.319	-0.264	-0.545	0.254	-0.620	-0.069	-0.129	0.247
Standard deviation	2.0393	0.9430	0.9178	0.8149	0.71856	0.61126	0.54156	0.51230
Proportion of Variance	0.5198	0.1111	0.1053	0.0830	0.06454	0.04671	0.03666	0.03281
Cumulative Proportion	0.5198	0.6310	0.7363	0.8193	0.88383	0.93053	0.96719	1.00000

Source: Own elaboration.

Table 11a. Matrix of variables' loadings in principal component analysis at the regional level

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
public_goods	0.371	-0.344	0.199	-0.369	0.422	-0.197	0.269	-0.528
regional_power	0.364	0.123	0.005	0.613	0.324	0.367	-0.368	-0.318
party_control	-0.237	-0.355	0.827	0.322	-0.090	0.063	0.089	0.102
groups_equality	0.368	-0.072	0.210	-0.485	-0.438	0.527	-0.333	0.008
public_corruption	0.408	-0.335	-0.056	0.000	0.364	-0.106	-0.139	0.745
expression_freedom	0.399	0.340	0.065	0.150	-0.117	0.263	0.765	0.177
political_engagement	0.332	0.536	0.386	-0.015	-0.139	-0.606	-0.259	0.022
education_years	0.321	-0.470	-0.274	0.355	-0.593	-0.312	0.047	-0.154
Standard deviation	2.0292	0.9587	0.9106	0.85523	0.71003	0.59351	0.5565	0.48655
Proportion of Variance	0.5147	0.1149	0.1036	0.09143	0.06302	0.04403	0.0387	0.02959
Cumulative Proportion	0.5147	0.6296	0.7332	0.82465	0.88767	0.93170	0.9704	1.00000

Source: Own elaboration.

Table 12a. Full output of the rotated components matrix calculated with varimax transformation at the local and regional levels

	RC3	RC1	RC2		RC1	RC2	RC3
	local				regional		
public_goods	0.696	0.469	0.123	public_goods	0.759	0.359	-0.060
public_corruption	0.809	0.339	-0.120	groups_equality	0.571	0.522	0.020
education_years	0.813	0.023	-0.273	public_corruption	0.817	0.308	0.172
local_power	0.475	0.560	-0.168	education_years	0.790	0.026	0.254
groups_equality	0.521	0.556	-0.069	regional_power	0.442	0.549	0.249
expression_freedom	0.354	0.740	-0.306	expression_freedom	0.344	0.748	0.293
political_engagement	0.077	0.893	-0.090	political_engagement	0.103	0.909	0.058
party_control	-0.138	-0.189	0.932	party_control	-0.136	-0.182	-0.929
SS loadings	2.446	2.337	1.107	SS loadings	2.537	2.218	1.111
Proportion Var	0.306	0.292	0.138	Proportion Var	0.317	0.277	0.139
Cumulative Var	0.306	0.598	0.736	Cumulative Var	0.317	0.594	0.733

Source: Own elaboration.

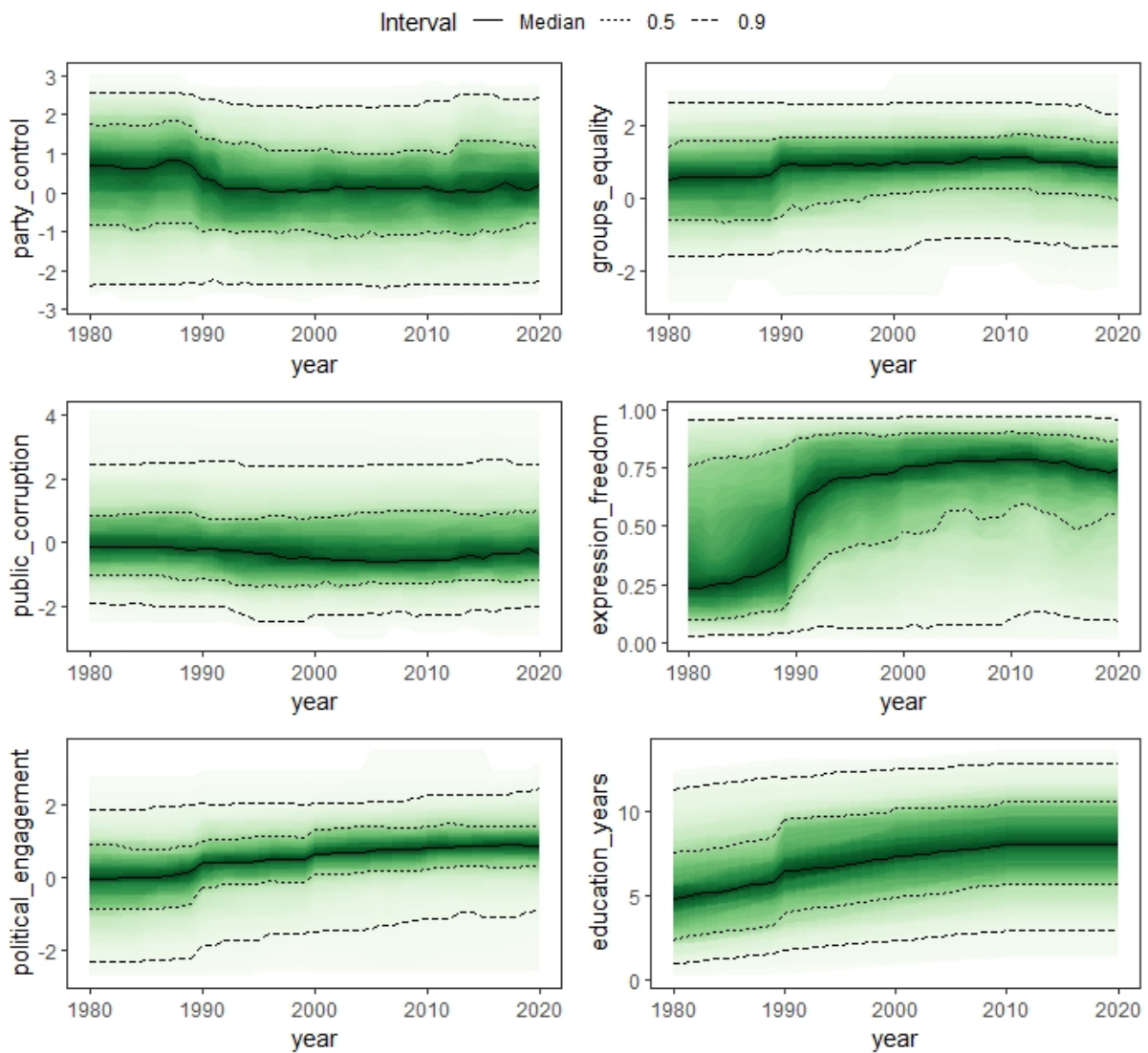
Table 13a. Uniqueness and complexity of variables at the local and regional levels

	Complexity (local)	Uniqueness (local)		Complexity (regional)	Uniqueness (regional)
public_goods	1.8273	0.2810	public_goods	1.4412	0.2917
local_power	2.1448	0.4327	regional_power	2.3510	0.4413
party_control	1.1279	0.0773	party_control	1.1214	0.0861
groups_equality	2.0234	0.4149	groups_equality	1.9867	0.4007
public_corruption	1.3903	0.2172	public_corruption	1.3777	0.2081
expression_freedom	1.8143	0.2335	expression_freedom	1.7437	0.2362
political_engagement	1.0355	0.1892	political_engagement	1.0337	0.1600
education_years	1.2243	0.2640	education_years	1.2061	0.3101

Source: Own elaboration.

Overall data statistics:

Fig. 1a-6a. Centile plots for supportive explanatory variables used in the empirical models



Source: Own elaboration.

List of countries:

The list of countries analyzed throughout econometric and unsupervised learning methods is provided in Table 14a. It is structured with respect to the level of research and constitutes a result of clearing out the V-DEM database from missing observations that previously contained information for 181 countries in a chosen timespan.

Table 14a. List of countries included in static panel models, dynamic panel models, k-means clustering and principal component analysis at the local and regional levels

Country	Local	Regional	Country	Local	Regional
Afghanistan	yes	yes	Laos	yes	yes
Algeria	yes	yes	Latvia	yes	no
Angola	yes	yes	Lebanon	yes	yes
Argentina	yes	yes	Lesotho	yes	yes
Armenia	yes	yes	Liberia	yes	yes
Australia	yes	yes	Libya	yes	no
Austria	yes	yes	Lithuania	yes	yes
Azerbaijan	yes	yes	Madagascar	yes	yes
Bangladesh	yes	no	Malawi	yes	no
Belarus	yes	yes	Malaysia	yes	yes
Belgium	yes	yes	Mauritius	yes	no
Benin	yes	yes	Mexico	yes	yes
Bolivia	yes	yes	Moldova	yes	yes
Botswana	yes	no	Morocco	yes	yes
Brazil	yes	yes	Mozambique	yes	yes
Bulgaria	yes	yes	Namibia	yes	yes
Burkina Faso	yes	yes	Nepal	yes	yes
Burma/Myanmar	yes	yes	Netherlands	yes	yes
Burundi	yes	yes	New Zealand	yes	no
Cambodia	yes	yes	Nicaragua	yes	no
Cameroon	yes	yes	Niger	yes	yes
Canada	yes	yes	Nigeria	yes	yes
Central African Republic	yes	yes	North Korea	yes	yes
Chad	yes	yes	Norway	yes	yes
Chile	yes	yes	Pakistan	yes	yes
China	yes	yes	Panama	yes	yes
Colombia	yes	yes	Paraguay	yes	yes
Costa Rica	yes	yes	Peru	yes	yes
Cuba	yes	yes	Philippines	yes	yes
Cyprus	yes	no	Poland	yes	yes
Czech Republic	yes	yes	Portugal	yes	no
Democratic Republic of the Congo	yes	yes	Republic of the Congo	yes	yes
Denmark	yes	yes	Romania	yes	yes
Dominican Republic	yes	yes	Russia	yes	yes
Ecuador	yes	yes	Rwanda	yes	yes
Egypt	yes	yes	Saudi Arabia	yes	yes

El Salvador	yes	yes	Senegal	yes	yes
Estonia	yes	yes	Seychelles	yes	yes
Eswatini	yes	yes	Sierra Leone	yes	no
Fiji	yes	yes	Slovakia	yes	yes
Finland	yes	yes	Somalia	yes	yes
France	yes	yes	South Africa	yes	yes
Gabon	yes	yes	South Korea	yes	yes
Georgia	yes	yes	Spain	yes	yes
Germany	yes	yes	Sri Lanka	yes	yes
Ghana	yes	yes	Sweden	yes	yes
Greece	yes	yes	Switzerland	yes	yes
Guatemala	yes	yes	Syria	yes	yes
Guinea	yes	yes	Tajikistan	yes	yes
Guyana	yes	yes	Tanzania	yes	yes
Haiti	yes	yes	Thailand	yes	yes
Honduras	yes	yes	The Gambia	yes	yes
Hungary	yes	yes	Togo	yes	no
Iceland	yes	no	Trinidad and Tobago	yes	no
India	yes	yes	Tunisia	yes	yes
Iran	yes	yes	Turkey	yes	yes
Ireland	yes	yes	Uganda	yes	no
Israel	yes	no	Ukraine	yes	yes
Italy	yes	no	United Kingdom	yes	yes
Ivory Coast	yes	yes	United States of America	yes	yes
Jamaica	yes	no	Uruguay	yes	yes
Japan	yes	yes	Uzbekistan	yes	yes
Jordan	yes	yes	Venezuela	yes	yes
Kazakhstan	yes	yes	Vietnam	yes	yes
Kenya	yes	yes	Zambia	yes	yes
Kyrgyzstan	yes	yes	Zimbabwe	yes	yes

Source: Own elaboration.



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