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Beyond the centre: Tracing Decentralization's influence on time-varying fiscal sustainability☆

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ABSTRACT

This paper explores the nuanced relationship between fiscal decentralization and fiscal sustainability. Employing panel data analyses, it scrutinizes how decentralization influences fiscal discipline across different governmental levels. Results for 185 countries show that while tax decentralization often hampers the degree of fiscal responsiveness, potentially due to misaligned local and national objectives and loss of scale efficiency, spending decentralization can enhance fiscal outcomes by promoting efficient resource allocation. These findings are contextualized within a broad range of economic and political environments, highlighting that the impacts of decentralization are contingent upon local capacities and overarching governance frameworks. Hence, we contribute to the understanding of fiscal policies' complexity in decentralized systems and offer significant policy insights for fiscal sustainability in varied administrative contexts.

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1. Introduction

Fiscal decentralization and fiscal sustainability are two important concepts in public finance. Fiscal decentralization refers to the transfer of fiscal responsibilities and powers from the central government to lower-level entities, such as regional or local governments (Oates, 1999). It aims to enhance local autonomy, accountability, and efficiency in the provision of public services. On the other hand, fiscal sustainability refers to policy measures aimed at reducing fiscal deficit and debt levels. These measures are typically undertaken as part of fiscal consolidation packages also aimed at enhancing macroeconomic stability (Alesina & Passalacqua, 2016).

The theories behind this relationship gravitate around how the distribution of fiscal responsibilities and resources between central and local governments affects the long-term financial health of a nation. One of the primary theories supporting fiscal decentralization is that it can lead to more efficient allocation of resources. The argument is that local governments, being closer to their constituents, are better positioned to understand and meet local needs, thus potentially improving the efficiency and effectiveness of public spending (Oates, 1972; Tiebout, 1956). This increased efficiency can contribute to greater fiscal sustainability as resources are used more judiciously and, therefore, wasteful spending is reduced. Another theory posits that fiscal decentralization can promote fiscal sustainability by imposing hard budget constraints on local governments. This means that local entities are required to balance their budgets and are not routinely bailed out by the central government. Such constraints can encourage fiscal discipline, limit excessive spending, and prevent the accumulation of unsustainable debts at the local level (Rodden, 2003). On the other hand, there are theories and empirical studies that point to the potential challenges and downsides of fiscal decentralization. For instance, if local governments lack adequate administrative and financial capacities, decentralization can lead to inefficiencies and mismanagement of resources, undermining fiscal sustainability (Smoke, 2001). Moreover, without proper coordination and oversight, decentralized fiscal systems might lead to duplicative spending and inefficiency (Bird & Smart, 2002). A critical aspect of achieving fiscal sustainability in a decentralized system is striking the right balance between local autonomy and central oversight. Too much central control can stifle local initiative and responsiveness, while local autonomy can lead to a fragmentation of policies and a race to the bottom in terms of tax rates and public services (Ter-Minassian, 1997). The outcomes of fiscal decentralization are also heavily influenced by the broader economic and political context in which it occurs. Factors like the overall level of economic development, the strength of democratic institutions, and the existing fiscal capacity of local governments play a crucial role in determining whether decentralization enhances or undermines fiscal sustainability (Martinez-Vazquez & McNab, 2003).

How does fiscal decentralization influence fiscal sustainability across various government levels? In the discourse of fiscal management, the decentralization of fiscal powers is often touted as a means to enhance government responsiveness and efficiency in resource allocation. However, the implications of such structural changes on the overall fiscal health and discipline of governments remain a subject of extensive debate. This study aims to unravel the complexities associated with fiscal decentralization and ascertain its real effects on fiscal sustainability, examining whether increased autonomy at lower levels of government correlates with better or worse fiscal outcomes.

For this purpose, we use yearly data from 185 countries between 1980 and 2023 and employ panel data econometric approaches to analyse the relationship between fiscal decentralization and fiscal sustainability. Specifically, our analysis follows a time-varying approach, employing Schlicht's (2021) methodology to estimate the coefficient indicative of the degree of fiscal sustainability. Subsequently, we use a Weighted Least Squares (WLS) with country and time fixed effects, to evaluate the impact of government decentralization on fiscal sustainability.

Our results suggest that fiscal decentralization has a nuanced impact on fiscal sustainability. We find that tax decentralization tends to undermine fiscal health, indicating that transferring revenue collection responsibilities may lead to less disciplined fiscal management. Conversely, spending decentralization appears to enhance fiscal discipline and overall fiscal outcomes. These effects are significantly conditioned by the local capacity to manage finances and the institutional framework within which decentralization occurs.

Furthermore, we observe that higher levels of tax centralization are associated with a stronger fiscal response, suggesting that central control over tax revenues might lead to more disciplined fiscal management and sustainability. However, the centralization of spending does not exhibit a straightforward effect. Additionally, compliance with Stability and Growth Pact rules and the prevalence of left-wing parties are associated with higher fiscal sustainability.

Lastly, our findings suggest that simply granting fiscal autonomy is not a panacea; rather, effective decentralization requires strong local governance and accountability mechanisms to harness the potential benefits of bringing government closer to the people.

These findings underscore the need for careful decentralization policy design, emphasizing capacity building at subnational levels and consideration of political ideology's impact on fiscal outcomes.

The remainder of the paper is structured as follows. Section 2 presents a literature review on fiscal decentralization and fiscal consolidations. Section 3 explains the empirical strategy and presents the data. Section 4 discusses the empirical results and Section 5 summarizes the main conclusions and provides policy implications.

2. Literature review

2.1. Government decentralization and economic performance

The relationship between fiscal decentralization and economic performance has been a subject of extensive research. Some argue that fiscal decentralization can enhance economic growth by aligning decision-making with local preferences and needs. By transferring fiscal responsibilities and decision-making powers to lower-level entities, fiscal decentralization aligns decision-making with

local preferences and needs. This allows for more tailored policies that address specific regional or local challenges, leading to greater efficiency in resource allocation (Martinez-Vazquez & McNab, 2003). Studies have found that fiscal decentralization can enhance economic growth by providing a conducive environment for local entrepreneurship and innovation (Bird & Vaillancourt, 2014).

Additionally, decentralization can promote efficiency and innovation in public service delivery by encouraging competition among local governments. Fiscal decentralization can enhance accountability and governance, leading to improved economic performance. When local governments are responsible for revenue generation and public service delivery, they become more directly accountable to their constituents. This accountability can promote efficiency, transparency, and better management of public resources, which in turn can stimulate economic development (Bardhan, 2002).

Studies have shown that countries with greater fiscal decentralization tend to have better governance indicators and higher levels of trust in government. Decentralization can foster competition among subnational governments, promoting fiscal discipline and efficiency. As local governments gain more autonomy in revenue generation and expenditure decisions, they face competition for investment and human capital. This competition may incentivize subnational governments to adopt more responsible fiscal policies, attract investment, and provide better public services, ultimately leading to improved economic performance (Bahl et al., 2013).

Further, fiscal decentralization can help address regional disparities and promote inclusive growth. By granting more fiscal autonomy to regions or localities, resources can be allocated more equitably across different areas, reducing regional inequalities. This can lead to a more balanced distribution of economic opportunities and development outcomes, fostering inclusive growth at the local level (Bahl et al., 2013). Studies have shown that fiscal decentralization can contribute to poverty reduction and improve social outcomes in disadvantaged regions (Faguet, 2014). Moreover, Afonso and Hauptmeier (2009), report that for the EU the existence of effective fiscal rules and the degree of public spending decentralization impinge on the countries' fiscal position.

Finally, critics raise concerns about the potential fiscal imbalances and inefficiencies that may arise from decentralization, particularly when there is inadequate coordination and capacity at the subnational level. For example, Afonso et al. (2024) find thatthat tax revenue decentralization hampers public sector spending efficiency, while spending decentralization and regional authority index improve public sector efficiency.

Building on the work of Oates (1972) and Bird and Vaillancourt (2014), this paper advances the literature by applying a time-varying coefficient model to analyse the evolving impacts of fiscal decentralization on fiscal sustainability. While existing studies have largely employed static frameworks, our approach captures the gradual shifts in fiscal performance that arise as decentralization reforms take root, offering deeper insights into how these policies impact long-term economic outcomes.

2.2. Government decentralization and fiscal performance

The relationship between fiscal decentralization and fiscal consolidations is complex and context dependent. Fiscal sustainability often involves efforts to centralize fiscal decision-making and control to achieve macroeconomic stability. However, the impact of fiscal decentralization on fiscal sustainability can vary depending on the specific context and the design of decentralization reforms. Some studies suggest that fiscal decentralization can hinder fiscal sustainability by creating challenges related to intergovernmental coordination, revenue sharing, and expenditure control (Martinez-Vazquez & McNab, 2003). On the other hand, other studies argue that decentralization can contribute to fiscal consolidations by improving the efficiency and effectiveness of public expenditure management at the local level (Alesina & Passalacqua, 2016). The theoretical arguments regarding the relationship between fiscal decentralization and fiscal adjustments are mixed. On one hand, proponents argue that fiscal decentralization can enhance fiscal discipline and accountability at the subnational level. With greater fiscal autonomy, subnational governments may be incentivized to pursue fiscal adjustments to maintain their fiscal sustainability (Robben and Wibbels, 2002). Darbi et al. (2005) demonstrate that the engagement of sub-central government tiers is vital for reducing expenditure, especially concerning the government's total wage bill. They also find that central governments significantly influence sub-central tier spending through grant allocations, with control over these allocations greatly affecting consolidation efforts' overall success. Similarly, Foremny et al. (2017) reveal that during consolidation episodes, central governments cut transfers to lower tiers, increasing their burden, especially when they lack tax autonomy and influence over central decisions, leading to higher local public debt ratios. Schaltegger and Feld (2009) find that fiscal centralization hampers successful consolidation, especially when competitive and cooperative federalism effects are considered. Economic factors, like the primary balance size before consolidation, also play a crucial role in determining adjustment policy success.

Empirical studies examining the relationship between fiscal decentralization and fiscal adjustments have yielded mixed results. Some studies suggest that more fiscal decentralization is associated with higher fiscal deficits and debt levels at the subnational level, potentially hindering fiscal adjustments (Martinez-Vazquez & McNab, 2003). However, other studies find that fiscal decentralization can promote fiscal adjustments, especially when accompanied by appropriate institutional arrangements and fiscal rules (Faguet & Shami, 2008). The effectiveness of fiscal adjustments in decentralized systems often depends on the specific context, institutional framework, and governance structures in place (Martinez-Vazquez & McNab, 2003).

The impact of fiscal decentralization on fiscal sustainability can vary depending on several factors, including the specific design of decentralization reforms, the institutional framework, and the fiscal capacity and performance of subnational governments.

First, the nature of intergovernmental fiscal relations is crucial in determining whether more fiscal decentralization promotes fiscal adjustments. Effective coordination and cooperation mechanisms between the central government and subnational entities are essential to align fiscal policies and achieve overall fiscal discipline (Smoke, 2001). Transparent fiscal transfers, revenue-sharing mechanisms, and intergovernmental fiscal frameworks can help facilitate fiscal adjustments by ensuring the efficient allocation of resources and balancing fiscal capacities across levels of government (Bird & Smart, 2002).

Secondly, the design of fiscal institutions and governance structures also plays a significant role in promoting fiscal adjustments in

decentralized systems. Clear fiscal rules, expenditure control mechanisms, and accountability frameworks can help ensure fiscal discipline and encourage subnational governments to pursue fiscal adjustments. Effective oversight and monitoring mechanisms can enhance transparency, accountability, and the credibility of fiscal adjustment measures (Bird & Smart, 2002).

Third, the interplay of fiscal powers matters as fiscal decentralization involves the transfer of fiscal responsibilities and powers from the central government to subnational entities. This dispersion of decision-making authority can have implications for fiscal consolidation efforts. Subnational governments may have their own fiscal objectives and priorities that may not align with the central government's consolidation targets. As a result, fiscal sustainability may face challenges in achieving coordination and consistency across different levels of government (Martinez-Vazquez & McNab, 2003).

Fourth, effective coordination between the central government and subnational entities is crucial for successful fiscal sustainability. Fiscal decentralization can introduce coordination challenges, as different levels of government may have varying fiscal policies and priorities. Inadequate coordination mechanisms and weak intergovernmental fiscal frameworks can hinder the implementation of consolidation measures, leading to inconsistencies in policy implementation and undermining overall consolidation efforts (OECD, 2019).

Fifth, the ability to control public spending is a critical aspect of fiscal sustainability. However, fiscal decentralization can complicate expenditure control efforts. Subnational governments often have significant autonomy in setting their spending priorities, which may not align with the consolidation targets of the central government. This divergence in expenditure decisions can undermine consolidation efforts and make it challenging to enforce expenditure controls uniformly across different levels of government (Martinez-Vazquez & McNab, 2003).

Sixth, fiscal decentralization often involves revenue-sharing arrangements between the central government and subnational governments. The design and magnitude of revenue-sharing mechanisms can affect fiscal consolidation efforts. If revenue-sharing arrangements guarantee subnational governments a share of central government revenues, it may limit the central government's flexibility in implementing consolidation measures without the cooperation of subnational governments. This interdependence can pose challenges in achieving the desired fiscal consolidation outcomes (Martinez-Vazquez & McNab, 2003; Ter-Minassian, 1997).

Finally, the success of fiscal consolidation efforts in a decentralized context relies on the capacity of subnational governments to manage their fiscal affairs effectively. Strengthening subnational government capacity through training, technical assistance, and institutional reforms is crucial. It enables subnational entities to align their fiscal policies and practices with the consolidation goals of the central government. Additionally, establishing accountability mechanisms that promote transparency, fiscal discipline, and responsible fiscal management at all levels of government can support fiscal consolidation objectives (Shah & Qureshi, 2007).

Extending the analysis of Martinez-Vazquez and McNab (2003) and Rodden (2003), this paper introduces a time-varying approach to examine the evolving impact of decentralization on fiscal sustainability. Our findings, based on Schlicht's (2021) methodology for the fiscal rule responsiveness coefficients, reveal the nuanced ways in which tax decentralization undermines, while spending decentralization enhances fiscal sustainability, particularly in countries with stronger institutional frameworks. This dynamic perspective provides a more comprehensive understanding of how fiscal decentralization interacts with government capacity and long-term fiscal health.

2.3. Government decentralization and political economy

The literature has not yet sufficiently addressed the relationship between governmental decentralization and political economy. Nevertheless, various dimensions of the nation's political-economic landscape may influence the delegation of authority and responsibilities for public functions from central to subordinate levels of government.

The literature has focused on understanding the impact that elected parties have on national decentralization. For instance, in 1964, Riker stated that countries with strong national political parties achieve the necessary balance between national and local interests. The author justifies this by the alignment of interests between local politicians with national parties. Enikolopov (2007) also confirms the idea of Riker that strong political parties (measured by the age of main parties and fractionalization of government parties) may improve the effect of decentralization. Specifically, it may have good implications for growth, public goods provision, and government quality.

Other currents of the literature state that fiscal decentralization may tackle corruption opportunities, promote good political governance, and improve political and electoral accountability. For instance, Oates (1972) argues that decentralized governments possess superior knowledge of local conditions, enabling them to better fulfil citizen preferences. Similarly, Tabellini (2000) supports this notion, emphasizing that informed citizens could effectively reward or punish local politicians based on their performance. Moreover, Hindriks and Lockwood (2009) found that fiscal centralization reduces the effectiveness of holding politicians accountable through elections because corrupt incumbents can focus on pleasing only a select group of regions to maintain power. This selective distribution of resources allows them to divert rents for their own benefit. However, this situation also creates an incentive for corrupt and competent politicians to form alliances with honest ones. Consequently, this increases the likelihood of voters being able to discipline politicians through elections. Altunbas and Thornton (2012) also show that countries where more fiscal resources are managed by local governments tend to have lower levels of corruption. They also observed that the positive effect of fiscal decentralization on reducing corruption diminishes when there are mechanisms enforcing vertical administrative decentralization. Nonetheless, their findings suggest that fiscal decentralization can still decrease corruption even in countries with significant political representation at various levels of government. Relatedly, Albornoz and Cabrales (2013) showed that the relationship between fiscal decentralization and corruption is conditional on political competition, i.e. decentralization is associated with lower (higher) levels of corruption for sufficiently high (low) levels of political competition.

Conversely, other economists have posited that fiscal decentralization may have adverse effects on governance. Musgrave (1969) posits that local politicians may prioritize their constituency's interests, neglecting the broader population's preferences. Bardhan and Mookherjee (2000), Tanzi (1995), and Prud'homme (1995) suggest that local officials may be susceptible to capture by local economic interests.

In contrast to static analyses such as those by Riker (1964) and Enikolopov (2007), this study provides a dynamic analysis of how political institutions and governance frameworks influence the time-varying effects of fiscal decentralization on fiscal sustainability. Our findings show that the success of fiscal decentralization in promoting fiscal discipline is contingent not only on political party alignment but also on the evolving institutional capacities and governance structures, thus contributing to a more detailed understanding of the political economy of decentralization.

3. Methodology and data

3.1. Methodology

Regarding fiscal sustainability, we follow the backward-looking measure approach of Bohn (1998). Bohn (1998) fiscal response coefficient model allows evaluating, for a given country, the link between its primary balance and one-period lagged government debt -to-GDP ratio. In this way, we estimate the following regression for each country in the sample:

$$PB_t = \alpha + \beta Debt_{t-1} + u_t \tag{1}$$

where β_t represents the Primary Balance, $Debt_t$ denotes the government public debt over GDP and u_t denotes the standard i.i.d. disturbance term satisfying the usual assumptions. We are mostly interested in the behaviour of the β coefficient estimate. A positive response of primary balance to an increase in government debt in the previous period ($\beta > 0$) is sufficient to satisfy the Intertemporal Budget Constraint (IBC). Public finances will be more sustainable if the estimated β is closer to the unity, thus, greater values of β indicate a more substantial fiscal response to public debt, ultimately resulting in a reduction of the debt-to-GDP ratio over time. Additionally, we have estimated (1) in a time-varying approach resorting to Schlicht's (2021) methodology, which relies on the assumption that β changes "slowly and unsystematically over time":

$$\beta_t = \beta_{t-1} + \nu_t, \tag{2}$$

where $\nu_t \sim N(0; r^2)$. Schlicht (2021) stated that equations (2) and (3) should be estimated jointly. This method is a generalization of the linear model in which, contrary to what the linear model assumes the independent variables can (gradually) change over time. The expected value of the fiscal response coefficient in time t is identical to its value in time $t-1$, since it is assumed that the coefficient follows a random walk process. The change of the coefficients is denoted by ν_t , which is assumed to be normally distributed with zero mean and variance r^2. The variances r^2 are obtained using a method of moments estimator, which matches with the maximum-likelihood estimator for large samples, although it is statistically more efficient and numerically more transparent and straightforward to interpret in small samples. Therefore, the standard regression model is a special case when r^2 tends to zero, which in turn translates into $\beta_t = \beta_{t-1}$. Based on this and allowing r^2 to be small but different from zero, we enable the coefficients to move slowly through time, starting from the previous year's coefficients but reflecting changes or departures from the stance that occurred in that year.

To estimate the impact of government decentralization $(D_{i,t})$ on fiscal sustainability $(\beta_{i,t})$, we run the following reduced-form panel regression:

$$\beta_{i,t} = \alpha_i + \delta_t + \phi_k D_{i,t} + \gamma X'_{i,t-1} + \varepsilon_{i,t} \tag{3}$$

where α_i are country-fixed effects included to capture unobserved heterogeneity across countries, and time-unvarying factors such as geographical variables which may affect the degree of fiscal sustainability; δ_t are time effects to control for global shocks (such as commodity prices or the world's business cycle); $\varepsilon_{i,t}$ is an i.i.d. error term satisfying usual assumptions of zero mean and constant variance. Equation (3) is estimated by employing a Weighted Least Squares WLS approach with country and time-fixed effects since the dependent variables are based on an initial set of estimates. In particular, the estimates of the marginal responses are weighted by the inverse of the respective standard deviations. Moreover, standard errors are corrected for heteroskedasticity and serial correlation. For robustness, we also estimated this equation employing an Ordinary Least Squares OLS-FE approach with country and time-fixed effects, however, the results are similar to the ones presented by the WLS, therefore we opt to exclude them. The WLS estimations produce reliable and consistent results.

3.2. Data

This study employs yearly data from 185 economies, spanning the period from 1980 to2023.[1] The selection of these countries is

[1] We highlight that some countries report missing observations in some variables; therefore, it has to be taken into consideration that the maximum number of countries analysed in each step of our study is equal to 185.

dictated by the data availability.

For the first step estimations, we resort to general government total revenues GDP (Revenues), general government total expenditures (Expenditures), Primary balance, and Debt collected from the IMF's World Economic Outlook Database, all of them as a percentage of GDP from 1980 to 2023.

The main independent variable for the second step is the decentralization shock variable ($D_{i,t}$). The decentralization variables are of two types, namely:

- Composition of tax revenues, total revenues, and expenditure across local and subnational governments. In this case, D includes three continuous variables defined as the share of sub government tax revenues to general government tax revenues (tax revenues decentralization), the share of sub government revenues to general government revenues (revenues decentralization) and the share of sub government expenditure over the share of general government expenditures (spending decentralization). Specifically, the general government can be broadly categorized into two levels: central and subnational. Subnational decentralization variables encompasses both local and state or regional governments.[2] Local governments operate at smaller geographic levels, such as municipalities and villages, while state governments oversee larger areas like states, provinces, or regions. Data is available from Lledó et al. (2022) and cover only 86 countries over the period 1970–2020.[3]
- Subnational authority in policy-making and fiscal–financial management. The composite index (Regional Authority Index - RAI) includes several indicators related to changes in the assignment of policy-making authority and responsibilities across the different levels of administration, the executive and law-making prerogatives of the subnational governments, as well as inter-jurisdictional coordination mechanisms. Data are available from Shah and Qureshi (2007) and Hooghe et al. (2016) and cover only 95 countries over the period 1950–2018. Several individual indicators are also used to construct the composite indicators of self- and shared rule. The Self- and Shared rule measure two broad aspects of subnational authority. The Self-rule indicators are based on the policy, fiscal–financial and representation autonomy of the subnational governments within their own jurisdictional borders.[4] The Shared-rule indicators measure the extent of joint prerogatives of subnational governments based on their capacity to influence national legislation and policy.[5]

We also include a vector of other determinants of fiscal sustainability, $X_{i,t-1}$, lagged one year to reduce potential reverse causality concerns.[6] This vector includes the following variables: the logarithm of population and the age dependency ratio (as percentage of working-age population) included to control for the size of government and size of social benefits, both variables retrieved from World Bank's World Development Indicators, available from 1960 to 2022; the debt-to-GDP ratio to control for the indebtedness of each country was retrieved from the IMF's World Economic Outlook, available from 1980 to 2023, as mentioned previously; a variable stating the cabinet composition, i.e. government party Schmidt-Index[7] and a dummy variable equaling one if there was an election on the year after,[8] retrieved from Comparative Political Dataset available from 1960 to 2021[9]; government effectiveness index, voice and accountability variable and regulatory quality variable both from the World Bank's Governance Indicators, available from 1996 to 2022. Additionally, we control if a country has complied with or deviated from the rules specifically fiscal space, counter-cyclical policies and credibility has been subjected to more and more scrutiny in recent times (see. e.g. Kopits, 2001; Nerlich & Reuter,

[2] The General Government (S13) is divided in the following sub-sectors (EUROSTAT Classification of institutional sectors, ESA 2010): Central/Federal Government (excluding social security funds) (S1311); State Government (excluding social security funds) (S1312); Local Government (excluding social security funds) (S1313); and Social Security Funds (S1314).

[3] Data were collected from the IMF's Government Finance Statistics and World Economic Outlook databases, the World Bank's World Development Indicators, as well as Eurostat and OECD databases.

[4] The self-rule indicators include the institutional autonomy (depth) of regional governments (measured on a 0–3 scale with increasing level of authority), their policy scope (or range of policies under regional government authority, measured on a 0–4 scale with increasing breadth of policy areas, including economic affairs, education and welfare, etc.), their fiscal autonomy (measured on a 0–4 scale of increasing regional autonomy to set tax bases and rates), and their borrowing autonomy (measured on a 0–3 scale of decreasing central government control over subnational borrowing), and their representation independence (measure on a 0–4 scale identifying the existence of an independent executive branch and a legislature at the subnational level).

[5] The shared-rule indicators include the ability of the subnational governments to influence national legislation (law-making, measured on a 0–2 scale of increasing level of law-making co-determination between subnational and national governments) and co-set national policy in intergovernmental fora (executive control, measured on a 0–2 scale of increasing ability), the distribution of national tax revenue (fiscal control, measured on a 0–2 scale of increasing ability), subnational and national borrowing constraints (borrowing control, measured on a 0–2 scale of increasing ability), and constitutional change (constitution reform, measured on a 0–4 scale of increasing ability).

[6] Similar results are obtained using contemporaneous regressors instead.

[7] The variable takes the value 1 if there is hegemony of right-wing (and centre) parties, the value 2 if the is a dominance of right-wing (and centre) parties, i.e. if cabinet posts of social democratic and other left parties in percentage of total cabinet posts, weighted by the number of days in office in a given year, is between 0 and 0.333, takes the value 3 if there is a balance of power between left and right, takes the value 4 if there is a dominance of social-democratic and other left parties, i.e. if cabinet posts of social democratic and other left parties in percentage of total cabinet posts, weighted by the number of days in office in a given year, is between 0.666 and 1, and takes the value 5 if there is hegemony of social-democratic and other left parties.

[8] Election of national parliament (lower house).

[9] Note that the ideology variable available in the Database of Political Institutions is often incorrect. For this reason the Comparative Political Data set was used which more accurately displays the nature of the ideological streams in power across countries and over time.

2016). We considered four distinct numerical rules: the deficit rule, the structural budget balance rule, the expenditure rule, and the debt rule.[10] Data on these rules was retrieved from the IMF, available from 1998 to 2022.

Table 1 displays the summary statistics of all the variables employed in this study. Notably, the average general government expenditures stand at 31.594%, surpassing the average general government revenues of 28.791%. Furthermore, the standard deviations indicate greater volatility in government expenditures (19.414%) compared to government revenues (15.434%). The average coefficient derived from the Fiscal Reaction Function is small and negative, −0.002 points. This indicates that a unitary rise in the country's government public lagged debt over GDP will be matched by −0.002 points increase in the country's Primary Balance, on average. However, the range is considerable, spanning from −2.189 points to 3.107 points, with a noteworthy variability of 0.225 points. It is essential to underscore that this coefficient serves as a proxy for assessing fiscal sustainability.

Regarding our decentralization variables, we find that the mean and median values indicate a decentralization level of approximately 0.2% for the subnational government and approximately 0.6% for the central government. The Regional Authority Index (RAI) and the Self and Shared Rules variables exclusively report positive values and mean values ranging from 1.746 points to 9.689 points.

As for the control variables, they align with the anticipated dimensions, ensuring comprehensive coverage of relevant factors in our analysis.

In Fig. 1, we depict the correlation map of the variables under examination. We can observe that a warmer colour (red) means a greater positive correlation, while a lighter one means a more negative correlation (yellow).

Upon inspecting the correlation matrix, distinct colour gradients emerge, with certain blocks exhibiting deeper shades of red and others displaying lighter hues of yellow. These results denote varying degrees of correlation among the variables. Notably, the proxy variables representing subnational decentralization demonstrate strong positive correlations among themselves, mirroring a similar pattern observed with the Rules variables. Conversely, the measures pertaining to subnational and central decentralization exhibit very high negative correlations. Moreover, in line with expectations, the coefficients of the Fiscal Reaction Function (FRF) exhibit significant negative correlations with both Revenues and Expenditures, registering values of −0.759 and −0.638, respectively. Regarding decentralization subnational variables, they display positive correlations with the FRF coefficients, with the exception of spending decentralization of the Local government, which presents a negative correlation. Conversely, these variables show negative correlations with those associated with the central government, except for the spending decentralization of the Central government. It is worth noting, however, that these correlations are relatively low in magnitude.

Fig. 2 depicts the temporal evolution of the Debt-to-GDP ratio (Panel A) and the Primary Balance (Panel B) across 12 countries in our sample from 1980 to 2023. In Panel A, notable trends are observed, particularly in Japan, where indebtedness has substantially escalated over the past four decades. In 1980, Japan's debt was a modest 50 percent of its GDP, surging to 250 percent by 2023. Greece follows a similar trajectory, with its debt climbing from approximately 30 percent in 1980 to 170 percent in 2023, experiencing a rapid increase during the 2008 financial crisis. Similarly, many European countries, including Ireland, Portugal, and Italy, witnessed significant growth in indebtedness during the sovereign debt crisis, and again during the Covid-19 pandemic, as they ramped up spending to address the crisis's challenges.

Panel B also demonstrates considerable variability across the sample. Particularly noteworthy is Ireland's remarkably high primary balance of around 30 in 2010. In contrast, during the same year, the US, the UK, and Spain reported primary balances of −10, indicative of substantial deficits. This pattern persisted in 2020, with these three countries also reporting negative primary balances.

Fig. 3 illustrates the temporal trends of the Debt-to-GDP ratio (Panel A) and the Primary Balance (Panel B) in conjunction with the Fiscal Reaction Function Coefficients across all countries within our sample from 1980 to 2023.

In Panel A, the observed trajectory of the estimated coefficients of the Fiscal Reaction Function closely resembles that of debt, albeit with a delayed response. However, this relationship becomes markedly more apparent in Panel B, where a clear pattern emerges: an increase in the Primary Balance corresponds with a simultaneous rise in the estimated coefficients of the FRF.

Fig. 4 presents the Fiscal Reaction Function estimated coefficients for Germany (Panel A) and the US (Panel B), alongside their corresponding decentralization variables concerning subnational government revenues and spending.

In both panels, it is evident that decentralization in terms of spending surpasses that of revenues. However, the trend differs between the two countries. In Germany, decentralization exhibits a positive trajectory over time, suggesting a gradual shift of fiscal authority and decision-making power towards subnational entities. Conversely, in the US, decentralization in spending has declined, indicating a potential centralization of spending control. Meanwhile, decentralization in revenues has shown significant fluctuations, particularly experiencing a rapid decline in the 2000s but returning to previous levels by 2020, indicating a complex interplay of fiscal policies and institutional dynamics.

The fiscal sustainability coefficients of Germany align with its increasing trend towards decentralization. Conversely, in the US, fiscal sustainability notably declined during the 2008 crisis, coinciding with a substantial increase in revenues decentralization and a

[10] According with the budget deficit rule, the budget balance of the general government is equal or larger than −3% of GDP or, in case the −3% of GDP threshold is breached, the deviation remains small (maximum 0.5% of GDP) and limited to one year. The debt rule defines the debt-to-GDP ratio should be below 60% of GDP or if the excess above 60% of GDP has been declining by 1/20 on average over the past three years. The structural balance rule defines that the structural budget balance of the general government is at or above the medium-term objective or, in case the MTO has not been reached yet, the annual improvement is equal or higher than 0.5% of GDP. The expenditure rule defines that the annual rate of growth of primary government expenditure, net of discretionary revenue measures and one-offs, is at or below the ten-year average of the nominal rate of potential output growth minus the convergence margin necessary to ensure an adjustment of the structural budget deficit of the general government in line with the structural balance rule (Larch & Santacroce, 2020).

Table 1
Summary statistics.

	Mean	Median	Std. Dev.	Min	Max	Obs.
Revenues	28.791	25.642	15.434	0.036	164.05	6282
Expenditures	31.594	28.685	19.414	1.822	594.77	6229
FRF	−0.002	−0.005	0.225	−2.189	3.107	5807
Tax Dec. State Gov.	0.192	0.155	0.190	0	0.997	535
Revenues Dec. State Gov.	0.168	0.149	0.161	0	0.891	529
Spending Dec. State Gov.	0.262	0.239	0.158	0	0.816	409
Tax Dec. Local Gov.	0.129	0.084	0.123	0	0.938	1941
Revenues Dec. Local Gov.	0.124	0.094	0.103	0	0.892	1503
Spending Dec. Local Gov.	0.195	0.175	0.117	0.001	0.567	1054
Tax Dec. Sub Gov.	0.177	0.119	0.171	0	0.997	1970
Revenues Dec. Sub Gov.	0.178	0.134	0.150	0	0.892	1532
Spending Dec. Sub Gov	0.282	0.284	0.169	0.001	0.816	1088
Tax Dec. Central Gov.	0.820	0.883	0.177	0.003	1	1637
Revenues Dec. Central Gov.	0.636	0.648	0.198	0.091	0.982	1249
Spending Dec. Central Gov.	0.530	0.536	0.223	0.134	0.998	1132
RAI	9.689	7.989	9.764	0	37.722	3376
Self-Rule	7.943	7.190	7.335	0	30.453	3376
Shared Rule	1.746	0	3.240	0	14.951	3376
Population	15.368	15.627	2.171	8.940	21.072	8299
Age dependency Ratio	66.798	61.970	20.098	16.172	120.46	8299
Regulatory	0.541	0.571	0.8150	−2.548	2.369	4586
Effectiveness	0.563	0.595	0.810	−2.440	2.470	4584
Voice	0.020	0.047	0.973	−2.259	1.801	4182
Debt	55.98	46.451	44.927	0	600.12	5566
Budget Balance Rule	0.222	0	0.416	0	1	8107
Debt Rule	0.191	0	0.393	0	1	8107
Expenditure Rule	0.093	0	0.290	0	1	8107
Revenue Rule	0.040	0	0.197	0	1	8107
Gov. party	2.366	2	1.418	1	5	1380
Election number	0.285	0	0.451	0	1	1384

Notes: This table presents the summary statistics of the variables under study for the period of 1980–2023. Specifically, we report the mean, median, Standard deviation (Std. Dev.), the maximum, and the minimum of the series. The maximum number of countries reported is 185, however, there are some missing observations throughout the sample.

decrease in spending decentralization. This pattern repeated in 2020, with a significant decline in both fiscal sustainability and spending decentralization.

Finally, Fig. 5 presents the decentralization variables in terms of revenue and spending, alongside the primary balance for Germany and the US. This figure offers a visual representation compared to the previous one, enabling a clearer comparison of the behavior of decentralization variables of spending and revenues. For instance, in the case of Germany, a notable observation emerges: when there was an increase in the primary balance in the mid-1990s, there was a corresponding sharp decline in decentralization at the spending level. However, the rest of the sample seems to present a similar trajectory between the primary balance and the Decentralization variables.

Moreover, in the US, during both the 2008 financial crisis and the Covid-19 pandemic, we observed a similar pattern, wherein an increase in the primary balance coincided with a decline in spending decentralization. However, the behavior of revenue decentralization does not exhibit a comparable pattern to that of the primary balance.

4. Empirical results

4.1. Decentralization vs. centralization

The results from Table 2 detail the impacts of decentralization at the subnational government level on the Fiscal Reaction Function parameter. The coefficients associated with tax decentralization at the sub-national tier are consistently negative across all specifications, ranging from −0.126 to −0.356, with statistical significance at the 1% level in all cases. This suggests that higher levels of tax decentralization at the subnational level are associated with a weaker fiscal response, potentially indicating that decentralization might complicate efforts to maintain fiscal discipline. Further, subnational governments may have fiscal objectives and priorities that do not align with the central government, which could impose coordination challenges for policy implementation. On the other hand, the coefficients for spending decentralization (also at the sub-national tier) are positive across different specifications, ranging from 0.076 to 0.115, and are significant at the 1% level. This indicates that spending decentralization at the subnational level could contribute positively to the fiscal reaction, possibly due to better targeted and more efficient spending that can enhance fiscal sustainability. This may also be the result of an enhancement of fiscal discipline, accountability, and better management of public resources.

When expanding our analysis to encompass all revenues rather than solely focusing on tax revenues in the regressions, consistent

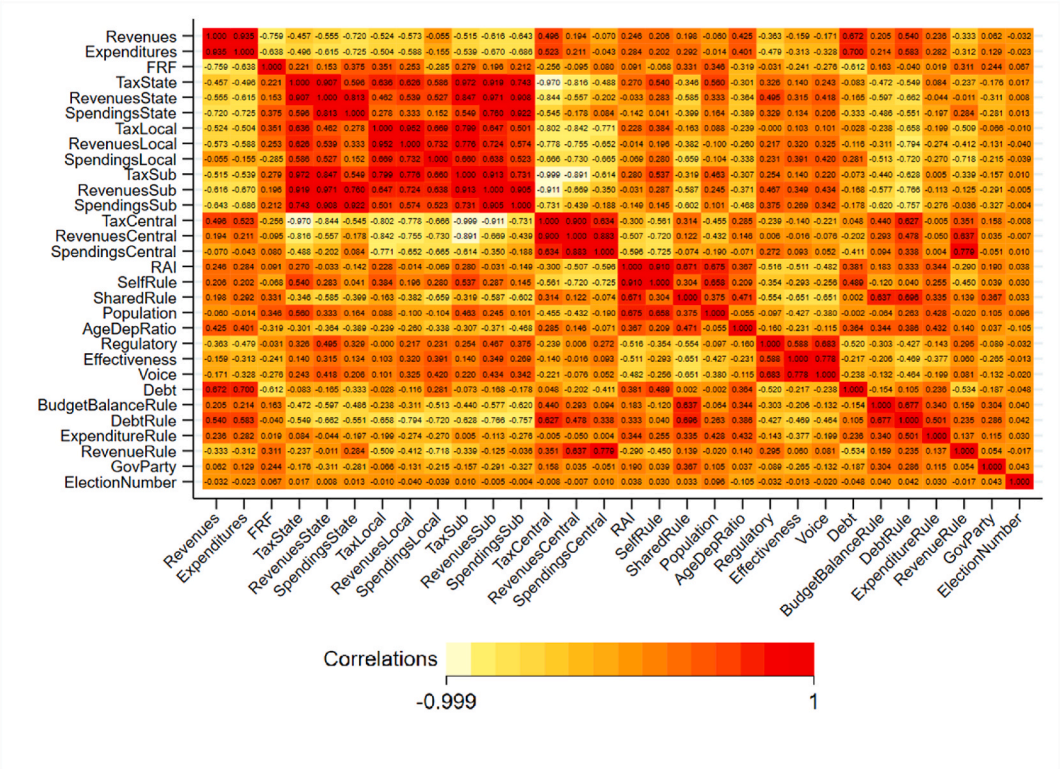

Fig. 1. Heat map of Correlation Coefficients.
Notes: This figure reports the correlation coefficients between the variables used in this study. A warmer colour means a correlation closer to 1 (red) and a lighter one closer to −1 (light yellow). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)
Source: Authors' own computations.

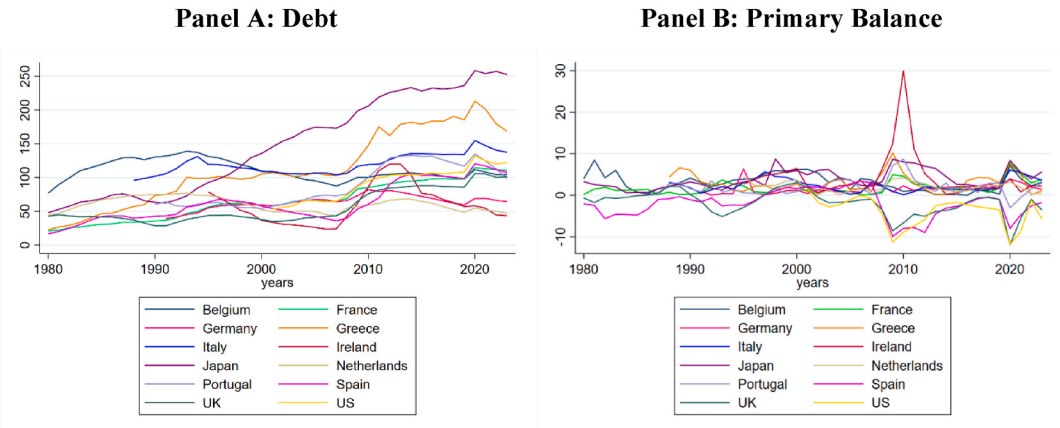

Fig. 2. Debt (Panel A) and Primary Balance (Panel B), % of GDP.
Notes: This figure displays the evolution over time of the Debt-to-GDP ratio and the Primary Balance over GDP for 12 countries of our sample between 1980 and 2023. The choice of these 12 out of 185 countries is based on the pertinence of their behaviour over the sample, and the completeness of the sample.
Source: Authors' own computations.

conclusions emerge. This broader perspective indicates that increased decentralization of revenues may lead to a heightened demand for maintaining a higher primary balance to stabilize debt. Consequently, this phenomenon exerts a detrimental effect on the fiscal sustainability of governments.

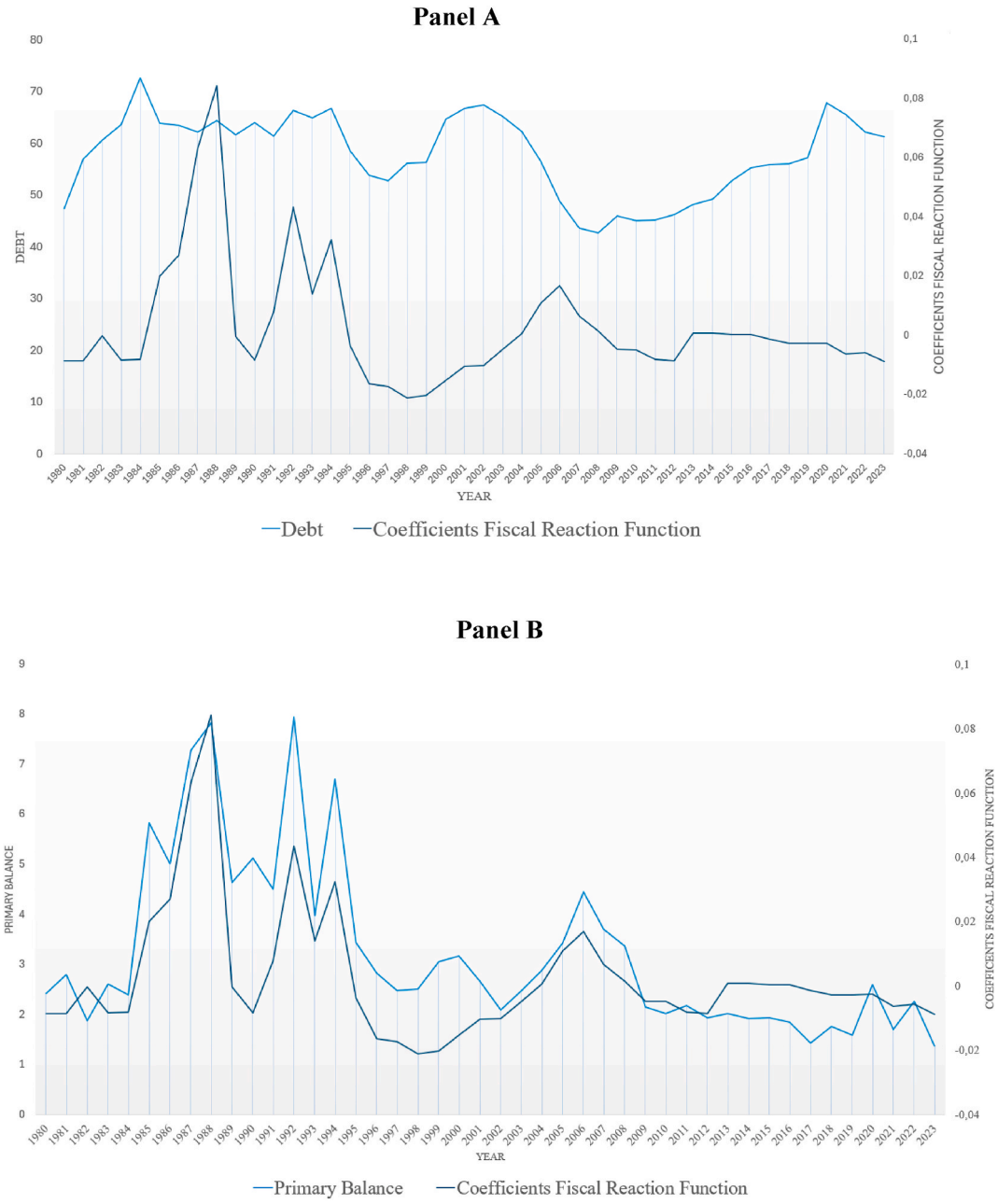

Fig. 3. Fiscal Reaction Function Coefficients against Debt (Panel A) and Primary Balance (Panel B).
Notes: This figure displays the evolution over time of the Debt-to-GDP ratio (Panel A) and the Primary Balance (Panel B) against the Fiscal Reaction Function Coefficients for all 185 countries of our sample between 1980 and 2023.
Source: Authors' own computations.

Additionally, regarding the control variables the age dependency ratio generally shows a very small or insignificant impact, suggesting that the demographic composition, in terms of dependency, does not have a strong influence on the fiscal outcomes at the subnational level. The Government Effectiveness Index demonstrates a positive relation with the fiscal sustainability of public accounts, whereas the debt-to-GDP ratio exhibits a negative impact on sustainability. This relationship is logical, as higher levels of debt necessitate a greater primary balance to achieve stabilization.

Further, we control if a country has complied with or deviated from the rules set out in the Stability and Growth Pact (SGP). Our findings indicate that adherence to these targets bolsters fiscal sustainability and may foster the maintenance of sound public accounts.

Lastly, our results demonstrate that an increased dominance of social democrats and other left-wing parties may enhance fiscal sustainability, as evidenced by the Government party variable. This finding underscores the potential impact of political ideology on

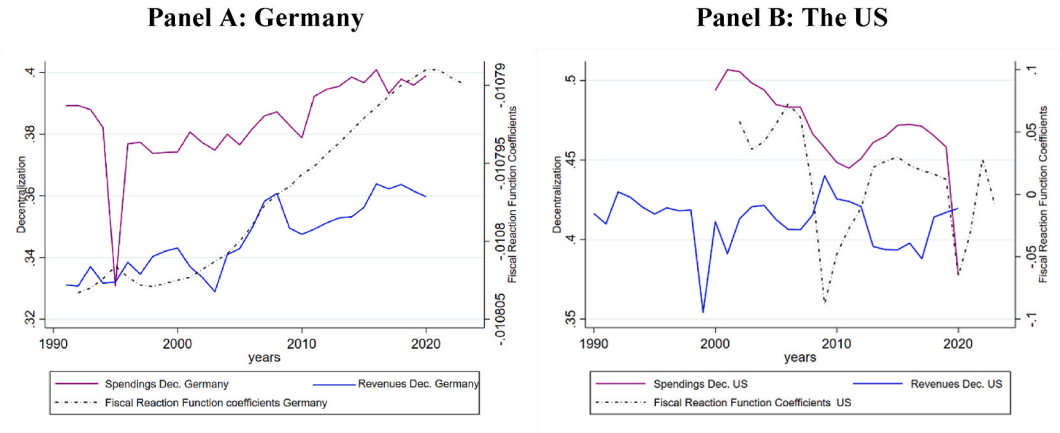

Fig. 4. Spending and Revenue Decentralization against Fiscal Reaction Function Coefficients.
Notes: This figure displays the evolution over time of the spending and Revenues Subnational decentralization and the Fiscal Reaction Function Coefficients for Germany and the US between 1990 and 2023.
Source: Authors' own computations.

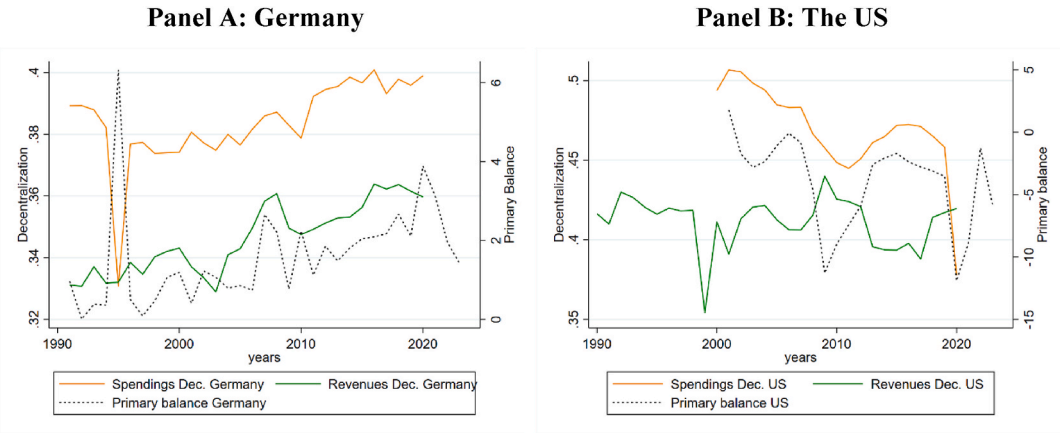

Fig. 5. Spending and Revenue Decentralization against Primary balance.
Notes: This figure displays the evolution over time of the Spending and Revenues Subnational decentralization and the Primary Balance for Germany and the US between 1990 and 2023.
Source: Authors' own computations.

fiscal policy outcomes.

In turn, Table 3 discusses the impact of centralization at the Central Government level on the Fiscal Reaction Function parameter. The results show varying effects of centralization on fiscal metrics, distinguished by the type of fiscal activity—whether tax or spending. For tax centralization, the coefficients are consistently positive across different specifications, ranging from 0.068 to 0.111, all significant at the 1% or 5% levels. This indicates that higher levels of tax centralization (or lower decentralization) are associated with a stronger fiscal response, suggesting that central control over tax revenues might lead to more disciplined fiscal management and sustainability. Conversely, the coefficients for spending centralization show mostly insignificant and mixed signs, ranging from −0.010 to 0.002, indicating that spending centralization does not have a clear or consistent impact on fiscal sustainability. This might suggest that the effects of centralizing spending are more dependent on other factors such as the efficiency of spending and the specific areas where spending is directed.

Additionally, control variables such as population and age dependency ratio, show varied impacts on the fiscal reaction function. The population variable occasionally shows positive significance, suggesting that larger populations might require more robust fiscal responses to manage larger-scale budgetary needs. The age dependency ratio frequently shows negative coefficients, although often insignificant, implying that higher dependency ratios might pose challenges to fiscal sustainability, though the effect is not robust across models. Further, the SGP rules compliance, the debt ratio and the governmental party majority keep their signal direction as in the analysis of fiscal decentralization in Table 2.

To supplement our analysis, we provide disaggregated findings in the appendix, detailing results for the subnational variable. Table A1 presents results pertaining to state government, while Table A2 outlines findings related to local government. Our

Table 2
Impact of decentralization (sub national government) on fiscal reaction function.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Tax Dec. Sub Gov.	−0.126***	−0.131***	−0.122***	−0.092***	−0.080***	−0.104***	−0.121***	−0.120***	−0.126***	−0.138***	−0.109***	−0.356***	−0.330***	−0.278***
	(0.030)	(0.029)	(0.029)	(0.030)	(0.030)	(0.031)	(0.030)	(0.028)	(0.029)	(0.031)	(0.028)	(0.064)	(0.060)	(0.082)
Spending Dec. Sub Gov.	0.085***	0.082***	0.076***	0.080***	0.090***	0.089***	0.077***	0.080***	0.083***	0.093***	0.096***	0.109**	0.115**	0.093
	(0.025)	(0.026)	(0.025)	(0.026)	(0.028)	(0.029)	(0.024)	(0.025)	(0.025)	(0.026)	(0.025)	(0.054)	(0.053)	(0.099)
Population		0.016												−0.011
		(0.012)												(0.049)
Age dependency Ratio			−0.030***											−0.0009
			(0.000)											(0.001)
Regulatory				0.002										−0.028**
				(0.004)										(0.013)
Effectiveness					0.010**									0.023*
					(0.005)									(0.012)
Voice						−0.003								0.019
						(0.004)								(0.024)
Debt							−0.008							−0.027*
							(0.000)							(0.000)
Budget Balance Rule								0.012***						0.011
								(0.003)						(0.012)
Debt Rule									0.006**					−0.006
									(0.003)					(0.013)
Expenditure Rule										0.007**				0.012***
										(0.003)				(0.005)
Revenue Rule											0.050***			0.031***
											(0.007)			(0.011)
Gov. party												0.007***		0.008***
												(0.002)		(0.002)
Election number													0.001	0.003
													(0.003)	(0.003)
Observations	1020	1020	1020	942	942	891	1020	1020	1020	1020	1020	455	455	386
R-squared	0.912	0.912	0.912	0.919	0.920	0.920	0.912	0.913	0.912	0.912	0.914	0.870	0.862	0.889
	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Revenues Dec. Sub Gov.	−0.153***	−0.156***	−0.152***	−0.124***	−0.112***	−0.128***	−0.145***	−0.145***	−0.152***	−0.161***	−0.126***	−0.471***	−0.466***	−0.358***
	(0.039)	(0.038)	(0.039)	(0.039)	(0.038)	(0.040)	(0.039)	(0.037)	(0.038)	(0.040)	(0.037)	(0.095)	(0.092)	(0.117)

(*continued on next page*)

Table 2 (*continued*)

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Spending Dec. Sub Gov.	0.104***	0.102***	0.098***	0.097***	0.111***	0.104***	0.093***	0.099***	0.103***	0.112***	0.112***	0.197***	0.207***	0.107
	(0.027)	(0.028)	(0.027)	(0.028)	(0.030)	(0.030)	(0.026)	(0.027)	(0.027)	(0.028)	(0.027)	(0.065)	(0.064)	(0.106)
Population		0.012												0.031
		(0.012)												(0.049)
Age dependency Ratio			−0.040**											−0.019
			(0.000)											(0.001)
Regulatory				0.006*										−0.016
				(0.004)										(0.013)
Effectiveness					0.012**									0.027**
					(0.005)									(0.012)
Voice						−0.004								0.025
						(0.004)								(0.024)
Debt							−0.008*							−0.036**
							(0.000)							(0.000)
Budget Balance Rule								0.008***						−0.002
								(0.003)						(0.009)
Debt Rule									0.006**					0.006
									(0.003)					(0.010)
Expenditure Rule										0.006**				0.011**
										(0.003)				(0.005)
Revenue Rule											0.048***			0.033***
											(0.006)			(0.010)
Gov. party												0.006***		0.006***
												(0.002)		(0.002)
Election number													0.001	0.004
													(0.003)	(0.003)
Obs.	988	988	988	914	914	863	988	988	988	988	988	423	423	358
R-squared	0.919	0.919	0.920	0.926	0.927	0.927	0.920	0.920	0.920	0.920	0.921	0.884	0.878	0.903

Notes: Weighted Least Squares regression with weights given by the inverse of the estimated SE of the fiscal sustainability coefficients obtained using Schlicht's (2021) approach. We also considered Year and Fixed Effects. The maximum number of countries reported are 185 for the period of 1980–2023. * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets, we report the robust standard errors. Obs. are the observations for each regression.

Table 3
Impact of centralization (central government) on fiscal reaction function.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Tax Cent. Central Gov.	0.104***	0.111***	0.102***	0.068**	0.058**	0.075***	0.099***	0.097***	0.105***	0.108***	0.090***	0.299***	0.286***	0.260***
	(0.033)	(0.033)	(0.033)	(0.028)	(0.028)	(0.029)	(0.033)	(0.031)	(0.033)	(0.034)	(0.034)	(0.067)	(0.068)	(0.080)
Spending Cent. Central Gov.	−0.011	−0.010	−0.016	−0.000	−0.003	0.000	−0.010	−0.013	−0.014	−0.013	−0.017	−0.074	−0.101	−0.030
	(0.019)	(0.019)	(0.019)	(0.017)	(0.018)	(0.017)	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.072)	(0.073)	(0.085)
Population		0.027**												0.010
		(0.012)												(0.050)
Age dependency Ratio			−0.044***											−0.040
			(0.000)											(0.001)
Regulatory				0.002										−0.023*
				(0.004)										(0.014)
Effectiveness					0.007									0.018
					(0.005)									(0.011)
Voice						−0.002								0.020
						(0.004)								(0.023)
Debt							−0.008*							−0.008**
							(0.000)							(0.000)
Budget Balance Rule								0.011***						0.010
								(0.003)						(0.012)
Debt Rule									0.006*					−0.004
									(0.003)					(0.013)
Expenditure Rule										0.005*				0.011**
										(0.003)				(0.004)
Revenue Rule											0.025**			0.031***
											(0.011)			(0.012)
Gov. party												0.006***		0.007***
												(0.001)		(0.002)
Election number													0.002	0.004
													(0.003)	(0.003)
Obs.	1052	1052	1052	955	955	885	1052	1052	1052	1052	1052	507	507	395
R-squared	0.911	0.911	0.912	0.924	0.924	0.922	0.911	0.912	0.911	0.911	0.912	0.871	0.865	0.894

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Rev. Dec. Central Gov.	0.041*	0.044**	0.037*	0.002	0.001	0.007	0.040*	0.042**	0.041*	0.044**	0.038*	0.439***	0.434***	0.269***
	(0.021)	(0.021)	(0.021)	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)	(0.021)	(0.022)	(0.021)	(0.080)	(0.080)	(0.092)
Spending Dec. Central Gov.	−0.020	−0.020	−0.023	0.002	−0.002	0.002	−0.020	−0.022	−0.024	−0.023	−0.027	−0.159**	−0.184**	−0.013
	(0.021)	(0.021)	(0.021)	(0.020)	(0.020)	(0.020)	(0.021)	(0.021)	(0.022)	(0.021)	(0.021)	(0.075)	(0.076)	(0.088)
Population		0.022*												0.054
		(0.012)												(0.049)
Age dependency Ratio			−0.037***											0.040
			(0.000)											(0.001)
Regulatory				0.006										−0.010
				(0.004)										(0.013)
Effectiveness					0.009*									0.022**
					(0.005)									(0.011)
Voice						−0.001								0.020
						(0.004)								(0.023)
Debt							−0.010**							−0.000***

(*continued on next page*)

Table 3 (*continued*)

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
							(0.000)							(0.000)
Budget Balance Rule								0.009***						−0.005
								(0.003)						(0.010)
Debt Rule									0.006*					0.014
									(0.003)					(0.011)
Expenditure Rule										0.005*				0.009**
										(0.003)				(0.004)
Revenue Rule											0.027***			0.039***
											(0.010)			(0.011)
Gov. party												0.005***		0.006***
												(0.001)		(0.002)
Election number													0.002	0.004
													(0.003)	(0.003)
Obs.	1020	1020	1020	927	927	857	1020	1020	1020	1020	1020	475	475	367
R-squared	0.918	0.918	0.918	0.930	0.930	0.928	0.918	0.918	0.918	0.918	0.918	0.887	0.883	0.908

Notes: Weighted Least Squares regression with weights given by the inverse of the estimated SE of the fiscal sustainability coefficients obtained using Schlicht's (2021) approach. We also considered Year and Fixed Effects. The maximum number of countries reported are 185 for the period of 1980–2023. * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets, we report the robust standard errors. Obs. are the observations for each regression.

Table 4
Stand-alone impact of decentralization on fiscal reaction function.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Government	***State***			***Local***			***Central***			***Subnational***		
Variables	***Tax***	***Rev.***	***Spend.***	***Tax***	***Rev.***	***Spend.***	***Tax***	***Rev.***	***Spend.***	***Tax***	***Rev.***	***Spend.***
	−0.195	−0.339*	0.172	−0.285***	−0.314***	0.071	0.177***	0.232***	0.049	−0.253***	−0.264***	−0.014
	(0.119)	(0.188)	(0.168)	(0.067)	(0.096)	(0.127)	(0.046)	(0.068)	(0.078)	(0.049)	(0.079)	(0.088)
Population	−0.045	−0.060	−0.070	−0.111***	0.058	−0.028	−0.105***	0.046	0.001	−0.106***	0.052	−0.029
	(0.098)	(0.097)	(0.102)	(0.026)	(0.042)	(0.050)	(0.026)	(0.042)	(0.053)	(0.026)	(0.043)	(0.052)
Age dependency Ratio	0.018	0.020	0.010	−0.019***	−0.010	0.000	−0.016***	0.010	0.010	−0.017***	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
Regulatory	−0.003	0.001	0.007	−0.000	−0.008	−0.026**	0.001	−0.007	−0.018	0.001	−0.007	−0.023*
	(0.022)	(0.022)	(0.021)	(0.009)	(0.011)	(0.013)	(0.009)	(0.011)	(0.013)	(0.009)	(0.011)	(0.013)
Effectiveness	0.028	0.028	0.047**	−0.016**	0.023***	0.030**	−0.019***	0.019**	0.023**	−0.020***	0.017*	0.026**
	(0.017)	(0.017)	(0.019)	(0.007)	(0.009)	(0.012)	(0.007)	(0.009)	(0.011)	(0.007)	(0.009)	(0.012)
Voice	0.038	0.037	0.069	0.006	0.022	−0.002	0.006	0.019	0.011	0.008	0.024	0.010
	(0.051)	(0.052)	(0.050)	(0.012)	(0.018)	(0.026)	(0.012)	(0.018)	(0.022)	(0.012)	(0.019)	(0.024)
Debt	−0.038	−0.030	0.010	0.010**	−0.030**	−0.032**	0.010	−0.035**	−0.036**	0.013*	−0.037**	−0.039**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Budget Balance Rule	0.024*	0.026*	0.016	0.003	−0.002	0.020	0.001	−0.003	0.017	0.002	0.001	0.018
	(0.013)	(0.013)	(0.014)	(0.006)	(0.009)	(0.013)	(0.006)	(0.009)	(0.012)	(0.006)	(0.009)	(0.013)
Debt Rule	−0.055**	−0.059**	−0.038	−0.010	0.012	−0.012	−0.007	0.012	−0.006	−0.009	0.007	−0.010
	(0.024)	(0.025)	(0.025)	(0.007)	(0.010)	(0.015)	(0.007)	(0.011)	(0.014)	(0.007)	(0.010)	(0.014)
Expenditure Rule	0.030**	0.032**	0.025**	−0.000	0.007*	0.009*	−0.000	0.008*	0.008*	0.001	0.008**	0.009*
	(0.013)	(0.013)	(0.012)	(0.004)	(0.004)	(0.005)	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.005)
Revenue Rule	0.012	0.010	0.017	0.026***	0.047***	0.044***	0.031***	0.038***	0.047***	0.023***	0.036***	0.046***
	(0.014)	(0.015)	(0.013)	(0.005)	(0.009)	(0.010)	(0.005)	(0.009)	(0.011)	(0.004)	(0.009)	(0.010)
Gov. party	0.006**	0.006**	0.007**	0.003***	0.005***	0.007***	0.003***	0.006***	0.007***	0.003***	0.005***	0.007***
	(0.003)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)
Election number	−0.000	0.000	0.001	0.002	0.004	0.003	0.001	0.004	0.004	0.002	0.004	0.003
	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Obs.	171	171	171	722	412	367	729	419	395	741	431	386
R-squared	0.927	0.928	0.927	0.888	0.908	0.890	0.885	0.907	0.891	0.885	0.903	0.885

Notes: Weighted Least Squares regression with weights given by the inverse of the estimated SE of the fiscal sustainability coefficients obtained using Schlicht's (2021) approach. We also considered Year and Fixed Effects. The maximum number of countries reported are 185 for the period of 1980–2023. * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets, we report the robust standard errors. Obs. are the observations for each regression.

Table 5
Impact of regional authority index on fiscal reaction function.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
RAI	−0.001**	−0.001**	−0.001**	−0.000	−0.000	−0.001*	−0.001**	−0.001**	−0.001**	−0.001**	−0.001**	−0.002***	−0.002***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
Population		0.003												−0.144***
		(0.007)												(0.028)
Age depend. Ratio			−0.100											−0.110**
			(0.000)											(0.001)
Regulatory				−0.004										−0.003
				(0.004)										(0.010)
Effectiveness					−0.000									−0.018**
					(0.004)									(0.007)
Voice						0.003								0.010
						(0.002)								(0.012)
Debt							−0.004*							0.011
							(0.000)							(0.000)
Budget Bal. Rule								0.004**						0.006
								(0.002)						(0.006)
Debt Rule									−0.003					−0.004
									(0.002)					(0.007)
Expenditure Rule										0.000				0.000
										(0.002)				(0.004)
Revenue Rule											0.016***			0.026***
											(0.004)			(0.005)
Gov. party												0.002***		0.005***
												(0.001)		(0.001)
Elect. Numb.													0.001	0.002
													(0.002)	(0.003)
Obs.	2157	2146	2146	1707	1707	1576	2157	2157	2157	2157	2157	989	990	683
R-squared	0.872	0.874	0.874	0.889	0.889	0.899	0.873	0.873	0.872	0.872	0.873	0.861	0.861	0.887

Notes: Weighted Least Squares regression with weights given by the inverse of the estimated SE of the fiscal sustainability coefficients obtained using Schlicht's (2021) approach. We also considered Year and Fixed Effects. The maximum number of countries reported are 185 for the period of 1980–2023. * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets, we report the robust standard errors. Obs. are the observations for each regression.

Table 6
Impact of self & shared rule on fiscal reaction function.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Self Rule	−0.001***	−0.001***	−0.001***	−0.001**	−0.001**	−0.002***	−0.001***	−0.001***	−0.001***	−0.001***	−0.001***	−0.003***	−0.002***	−0.004***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Shared Rule	0.001**	0.001**	0.001**	0.002*	0.002**	0.002**	0.001	0.002**	0.001**	0.001**	0.001**	0.001	0.001	0.005
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)
Population		0.003												−0.147***
		(0.007)												(0.028)
Age depend. Ratio			−0.100											−0.120**
			(0.000)											(0.001)
Regulatory				−0.002										−0.002
				(0.004)										(0.010)
Effectiveness					0.000									−0.016**
					(0.004)									(0.007)
Voice						0.000								0.007
						(0.002)								(0.012)
Debt							−0.010							0.010*
							(0.000)							(0.000)
Budget Bal. Rule								0.005***						0.005
								(0.002)						(0.006)
Debt Rule									−0.002					−0.002
									(0.002)					(0.007)
Expenditure Rule										0.001				0.000
										(0.002)				(0.004)
Revenue Rule											0.016***			0.026***
											(0.004)			(0.005)
Gov. party												0.003***		0.005***
												(0.001)		(0.001)
Elect. Numb.													0.001	0.002
													(0.002)	(0.003)
Obs.	2157	2146	2146	1707	1707	1576	2157	2157	2157	2157	2157	989	990	683
R-squared	0.873	0.874	0.874	0.890	0.890	0.900	0.873	0.873	0.873	0.873	0.873	0.862	0.861	0.888

Notes: Weighted Least Squares regression with weights given by the inverse of the estimated SE of the fiscal sustainability coefficients obtained using Schlicht's (2021) approach. We also considered Year and Fixed Effects. The maximum number of countries reported are 185 for the period of 1980–2023. * indicates the level of significance of 10%, ** a level of 5% and *** a level of 1%. In brackets, we report the robust standard errors. Obs. are the observations for each regression.

observations indicate striking similarities with those presented in Table 2, thereby affirming the significant influence of revenue and spending decentralization on fiscal sustainability.

This first set of results reveals the nuanced impacts of decentralization on fiscal sustainability, where tax decentralization seems to undermine while spending decentralization supports fiscal health. Table 3's findings suggest that while tax centralization at the central government level can enhance fiscal sustainability through improved fiscal responses, the centralization of spending does not exhibit a straightforward effect, highlighting the complexity of fiscal management and the necessity of considering other contextual and governance-related factors in evaluating the impact of fiscal centralization. Overall, these findings suggest that while decentralization can offer more tailored fiscal management at local levels, its success significantly depends on the capacities and governance structures at the subnational level. In what follows, we will conduct sensitivity and robustness.

4.2. Robustness results

Table 4 examines the standalone impact of decentralization on the Fiscal Reaction Function parameter by focusing on various types of decentralization — tax, revenue, and spending, across different government tiers (state, local, central, and subnational).

For tax decentralization across different government tiers, the results vary.

In the case of the State, Local and Subnational Government, tax decentralization is consistently associated with negative coefficients, ranging from −0.253 to −0.285, significant at the 1% level. This suggests that increased tax decentralization at the State, Local and its aggregate governmental level negatively affects the fiscal response, potentially indicating difficulties in maintaining fiscal discipline at more decentralized levels. This reflecting challenge in fiscal management with increased decentralization are consistent with the conclusions presented in Table 2. In turn, the results for the central government are positive and highly significant at a 1% level, with a value of 0.177. Once more, consistent with the results presented before in Table 3.

Revenues decentralization results are negative and highly significant across all subnational variables. The measure of revenues decentralization is positive and highly significant for the central government emphasizing the potential fiscal challenges associated with decentralization.

Lastly, spending decentralization only reports non statistically significant values.

Control variables like population and age dependency ratio generally show minimal or no significant effects, suggesting that these demographic factors do not strongly influence the fiscal impacts of decentralization in the models tested. The coefficients for regulatory, effectiveness, voice, and other governance indicators vary across the models, sometimes showing significant positive or negative impacts, highlighting the complex interplay between fiscal decentralization and governance quality. Revenues and Expenditure rules and Governmental party majority also report positive and statistically significant results across all government levels.

Overall, Table 4 suggests that taxes and revenues decentralization tend to have a negative impact on fiscal responses across government tiers, pointing towards the nuanced and tier-specific effects of decentralization policies. The findings underline the importance of considering local capacities and governance structures when implementing decentralization reforms.

Table 5 examines the influence of the Regional Authority Index (RAI) on the Fiscal Reaction Function parameter, presenting findings that reflect the complexities of fiscal management in decentralized systems. The results from this table indicate that the coefficients for the RAI are consistently negative across all model specifications provided. This signifies that an increase in regional autonomy, as measured by the RAI, tends to be associated with a less robust fiscal response. These negative coefficients suggest that higher degrees of decentralization might complicate fiscal coordination or dilute fiscal responsibility, potentially leading to weaker fiscal discipline. These coefficients are generally statistically significant, emphasizing that the observed negative relationship between the level of decentralization and fiscal responsiveness is robust across different model setups. The significance of these results indicates that the negative impact of decentralization on fiscal policy effectiveness is not incidental but rather indicative of a systematic pattern. The negative impact of RAI could be interpreted as decentralization possibly leading to challenges in aligning regional spending with overall fiscal health goals. Regions with greater autonomy may prioritize local agendas that do not necessarily align with national fiscal objectives, potentially leading to inefficiencies and fragmented fiscal policies. Furthermore, decentralized regions might face challenges in generating sufficient revenue to match their expenditure needs, relying more on central transfers or increasing borrowing, which could undermine fiscal stability.

Overall, the analysis provided in Table 5 challenges the assumption that decentralization always leads to better fiscal outcomes. Instead, it suggests that while regional autonomy can offer tailored local governance, it also brings challenges that need careful management to ensure that it does not adversely affect the fiscal health of the government. This underscores the need for balanced approaches in decentralization policies, where autonomy is coupled with accountability mechanisms to maintain fiscal discipline.

In what follows, we split the RAI into its main components: Self Rule and Shared Rule. This division provides presented in Table 6 insight into how different forms of regional autonomy influence fiscal responses:

The coefficients for Self-Rule are negative across various models, suggesting that regions with greater autonomy in making independent decisions tend to have a weaker fiscal response. This could imply that when regions have the unilateral power to govern, they might prioritize local objectives, which could misalign with broader national fiscal policies, leading to potential fiscal indiscipline. In contrast, the coefficients for Shared Rule are positive but tend to be less significant compared to Self-Rule in some models. This suggests that shared decision-making authority between central and regional governments does not strongly mitigate the negative impacts seen with high levels of Self Rule. Although Shared Rule involves more collaboration, it may still present challenges in maintaining cohesive fiscal strategies across different levels of government. The significance of these results supports the interpretation that increased autonomy, whether exercised independently or shared, complicates fiscal management.

The negative impact associated with Self-Rule might stem from potential inefficiencies in local tax collection or spending, where

local governments could either overspend or generate insufficient revenue, adversely affecting the overall fiscal balance. For Shared-Rule, the collaboration aspect is intended to harmonize decisions and cut slow response times to fiscal needs or diluted responsibilities, which typically lead to suboptimal fiscal outcomes.

In summary, Table 6 provides a nuanced view indicating that both Self-Rule and Shared-Rule components of the RAI contribute negatively and positively to fiscal discipline, respectively. This analysis suggests that while decentralization can enhance local responsiveness and governance, it also raises significant challenges for maintaining fiscal stability and requires effective mechanisms to balance local autonomy with national fiscal objectives.

5. Conclusions and policy implications

This paper explores the relationship between revenues and spending decentralization, and fiscal sustainability, a subject that sits at the crossroads of public finance and economic governance. Driven by the research question of how fiscal decentralization impacts fiscal sustainability at different governmental levels, this study has critically examined the assertion that decentralization can potentially enhance government responsiveness and efficiency in resource management. Employing a robust panel data econometric framework over more than four decades, the paper used a comprehensive dataset from the 185 OECD countries to analyse fiscal patterns across multiple countries. Methodologically, we first follow a time-varying approach resorting to Schlicht's (2021) methodology to estimate the coefficient proxied as the fiscal sustainability indicator. In the second step, we estimate the impact of government decentralization on fiscal sustainability by employing a Panel Data Weighted Least Squares WLS-FE approach with country and time-fixed effects.

The key results of the paper indicate a nuanced impact of fiscal decentralization on fiscal sustainability. Specifically, tax decentralization was found to generally weaken fiscal health, suggesting that the decentralization of revenue collection responsibilities might lead to less disciplined fiscal management and is associated with poor fiscal response. Conversely, spending decentralization appeared to contribute positively to fiscal discipline, likely due to the more targeted and efficient allocation of resources at local levels. This dichotomy underscores that the impacts of fiscal decentralization are multifaceted and heavily dependent on the local capacity and institutional frameworks within which decentralization occurs.

On the other hand, results show varying effects of centralization on fiscal metrics. Specifically, higher levels of tax centralization (or lower decentralization) are associated with a stronger fiscal response, suggesting that central control over tax revenues might lead to more disciplined fiscal management and sustainability. However, the centralization of spending does not exhibit a straightforward effect, highlighting the complexity of fiscal management and the necessity of considering other contextual and governance-related factors in evaluating the impact of fiscal centralization.

Additionally, our results suggest that while regional autonomy can offer tailored local governance it may negatively impact fiscal sustainability. This may be justified by the fact that greater autonomy in regions may lead to local agendas misaligned with national fiscal goals, fostering inefficiencies and fragmented policies. Decentralized regions may struggle to generate revenue-matching expenditure, relying heavily on central transfers or increased borrowing, risking fiscal stability.

Lastly, we highlight that fiscal sustainability is higher for countries complying with rules set out in the Stability and Growth Pact (SGP) and also heightened for countries with a greater prevalence of social-democratic and other left-wing parties.

The policy implications of our findings are significant. They suggest that governments considering decentralization as a strategy to enhance fiscal management need to carefully design their decentralization policies. Effective decentralization should not only involve transferring fiscal powers but also building institutional capacities at the subnational levels. Ensuring robust local governance systems and accountability mechanisms is crucial to reaping the potential benefits of decentralization. Further, political ideology may affect considerable fiscal policy outcomes.

However, the study is not without its limitations. The reliance on available data may introduce sample biases, and conclusions may not be generalized to other country contexts such as emerging markets or low-income developing countries. Additionally, the paper's focus on broad indicators of fiscal sustainability might overlook more granular impacts of decentralization, such as those on local economic development or equity. Future research could extend this analysis by exploring more detailed aspects of fiscal decentralization, such as the role of specific political or cultural factors in shaping the outcomes of decentralization efforts. Moreover, longitudinal case studies or qualitative analyses could provide deeper insights into the mechanisms through which decentralization influences fiscal sustainability. Exploring these avenues would not only broaden our understanding of fiscal decentralization but also refine the policy frameworks that guide its implementation, ensuring that decentralization effectively contributes to fiscal and economic stability.

Declaration of competing interest

We declare that we do not have any conflict of interests regarding our paper "Beyond the Centre: Tracing Decentralization's Influence on Time-varying Fiscal Sustainability", which we hope is considered as relevant for the ***International Review of Economics and Finance***.

Appendix

Table A1
Impact of Decentralization (State Government) on Fiscal Reaction Function

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Tax Dec. State Gov.	−0.348***	−0.348***	−0.348***	−0.273***	−0.278***	−0.338***	−0.369***	−0.331***	−0.341***	−0.379***	−0.282***	−0.481***	−0.477***	−0.416**
	(0.071)	(0.073)	(0.073)	(0.086)	(0.083)	(0.093)	(0.071)	(0.069)	(0.071)	(0.068)	(0.067)	(0.124)	(0.116)	(0.183)
Spending Dec. State Gov.	0.255***	0.256***	0.254***	0.224**	0.257**	0.289***	0.318***	0.266***	0.252***	0.262***	0.247***	0.356**	0.348**	0.475*
	(0.088)	(0.091)	(0.088)	(0.098)	(0.102)	(0.104)	(0.098)	(0.084)	(0.088)	(0.086)	(0.086)	(0.147)	(0.142)	(0.243)
Population		−0.050												−0.079
		(0.047)												(0.104)
Age dependency Ratio			0.000											0.001
			(0.000)											(0.002)
Regulatory				0.020*										−0.005
				(0.011)										(0.021)
Effectiveness					0.017**									0.038**
					(0.008)									(0.017)
Voice						0.017								0.041
						(0.013)								(0.050)
Debt							0.000**							0.000
							(0.000)							(0.000)
Budget Balance Rule								0.015***						0.017
								(0.004)						(0.014)
Debt Rule									0.007					−0.037
									(0.005)					(0.025)
Expenditure Rule										0.015***				0.025**
										(0.004)				(0.012)
Revenue Rule											0.042***			0.002
											(0.006)			(0.016)
Gov. party												0.006***		0.007***
												(0.002)		(0.003)
Election number													−0.001	−0.001
													(0.004)	(0.004)
Observations	378	378	378	337	337	321	378	378	378	378	378	209	209	171
R-squared	0.910	0.910	0.910	0.914	0.914	0.912	0.911	0.912	0.910	0.913	0.914	0.913	0.907	0.932

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Revenue Dec. State Gov.	−0.629***	−0.672***	−0.659***	−0.503***	−0.513***	−0.599***	−0.680***	−0.585***	−0.618***	−0.668***	−0.514***	−0.787***	−0.818***	−0.749***
	(0.114)	(0.124)	(0.121)	(0.137)	(0.133)	(0.148)	(0.113)	(0.113)	(0.116)	(0.112)	(0.114)	(0.172)	(0.167)	(0.285)
Spending Dec. State Gov.	0.326***	0.346***	0.328***	0.284***	0.316***	0.352***	0.408***	0.326***	0.322***	0.334***	0.304***	0.352***	0.364***	0.521**
	(0.088)	(0.094)	(0.089)	(0.100)	(0.101)	(0.106)	(0.095)	(0.087)	(0.088)	(0.087)	(0.088)	(0.134)	(0.132)	(0.242)
Population		−0.091*												−0.116
		(0.049)												(0.107)
Age dependency Ratio			0.000											0.002
			(0.000)											(0.002)
Regulatory				0.019*										0.004
				(0.010)										(0.021)
Effectiveness					0.015**									0.039**
					(0.008)									(0.017)
Voice						0.009								0.038
						(0.013)								(0.051)
Debt							0.000***							0.000

(*continued on next page*)

Table A1 (*continued*)

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
							(0.000)							(0.000)
Budget Balance Rule								0.013***						0.021
								(0.004)						(0.014)
Debt Rule									0.004					−0.045*
									(0.005)					(0.024)
Expenditure Rule										0.015***				0.029**
										(0.004)				(0.012)
Revenue Rule											0.038***			−0.004
											(0.006)			(0.016)
Gov. party												0.005***		0.007**
												(0.002)		(0.003)
Election number													−0.000	0.000
													(0.004)	(0.004)
Observations	378	378	378	337	337	321	378	378	378	378	378	209	209	171
R-squared	0.912	0.913	0.912	0.915	0.915	0.914	0.913	0.913	0.912	0.915	0.915	0.914	0.908	0.933

Table A2
Impact of Decentralization (Local Government) on Fiscal Reaction Function

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Tax Dec. Local Gov.	−0.092***	−0.095***	−0.087***	−0.073***	−0.067**	−0.069**	−0.082***	−0.088***	−0.093***	−0.098***	−0.096***	−0.447***	−0.401***	−0.409***
	(0.026)	(0.026)	(0.026)	(0.027)	(0.026)	(0.033)	(0.026)	(0.025)	(0.026)	(0.027)	(0.026)	(0.100)	(0.097)	(0.112)
Spending Dec. Local Gov.	0.075***	0.074***	0.066**	0.062**	0.069***	0.073***	0.069***	0.068***	0.073***	0.083***	0.083***	0.102	0.112	0.080
	(0.026)	(0.026)	(0.026)	(0.025)	(0.026)	(0.028)	(0.025)	(0.026)	(0.026)	(0.027)	(0.026)	(0.077)	(0.075)	(0.123)
Population		0.014												−0.008
		(0.012)												(0.047)
Age dependency Ratio			−0.000***											−0.001
			(0.000)											(0.001)
Regulatory				0.002										−0.027**
				(0.004)										(0.013)
Effectiveness					0.009**									0.033***
					(0.005)									(0.012)
Voice						−0.003								0.023
						(0.004)								(0.026)
Debt							−0.000							−0.000
							(0.000)							(0.000)
Budget Balance Rule								0.012***						0.008
								(0.003)						(0.011)
Debt Rule									0.006**					−0.002
									(0.003)					(0.013)
Expenditure Rule										0.006**				0.010**
										(0.003)				(0.005)
Revenue Rule											0.053***			0.041***
											(0.007)			(0.010)
Gov. party												0.007***		0.008***
												(0.002)		(0.002)
Election number													0.001	0.003
													(0.003)	(0.003)
Observations	999	999	999	920	920	865	999	999	999	999	999	436	436	367
R-squared	0.908	0.908	0.908	0.916	0.916	0.916	0.908	0.909	0.908	0.908	0.910	0.873	0.866	0.895

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Revenue Dec. Local Gov.	−0.092***	−0.095***	−0.092***	−0.083**	−0.079**	−0.052	−0.075**	−0.086***	−0.094***	−0.096***	−0.094***	−0.485***	−0.468***	−0.494***
	(0.034)	(0.033)	(0.033)	(0.035)	(0.034)	(0.038)	(0.032)	(0.033)	(0.034)	(0.034)	(0.034)	(0.144)	(0.141)	(0.154)
Spending Dec. Local Gov.	0.078***	0.077***	0.072***	0.067***	0.079***	0.078***	0.068***	0.072***	0.076***	0.084***	0.084***	0.216**	0.224**	0.159
	(0.026)	(0.026)	(0.026)	(0.025)	(0.026)	(0.027)	(0.025)	(0.026)	(0.026)	(0.027)	(0.026)	(0.089)	(0.087)	(0.137)
Population		0.012												0.047
		(0.011)												(0.049)
Age dependency Ratio			−0.000**											−0.001
			(0.000)											(0.001)
Regulatory				0.005										−0.017
				(0.004)										(0.013)
Effectiveness					0.011**									0.037***
					(0.005)									(0.012)
Voice						−0.003								0.019
						(0.004)								(0.025)
Debt							−0.000**							−0.000*

(*continued on next page*)

Table A2 (*continued*)

	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
							(0.000)							(0.000)
Budget Balance Rule								0.009***						−0.004
								(0.003)						(0.009)
Debt Rule									0.006**					0.010
									(0.003)					(0.010)
Expenditure Rule										0.006**				0.010**
										(0.003)				(0.005)
Revenue Rule											0.049***			0.043***
											(0.006)			(0.010)
Gov. party												0.006***		0.006***
												(0.002)		(0.002)
Election number													0.001	0.004
													(0.003)	(0.003)
Observations	967	967	967	892	892	837	967	967	967	967	967	404	404	339
R-squared	0.916	0.916	0.916	0.923	0.924	0.923	0.916	0.916	0.916	0.916	0.918	0.887	0.881	0.909

References

Afonso, A., & Hauptmeier, S. (2009). *Fiscal behaviour in the European union: Rules, fiscal decentralization and government indebtedness*. European Central Bank. Working Paper 1054.

Afonso, A., Jalles, J. T., & Venâncio, A. (2024). Fiscal decentralization and public sector efficiency: Do natural disasters matter? *Economic Modelling* (in press).

Alesina, A., & Passalacqua, A. (2016). The political economy of government debt. In J. B. Taylor, & H. Uhlig (Eds.), *Handbook of macroeconomics* (pp. 2599–2651). Elsevier.

Bahl, R., Linn, J. F., & Wetzel, D. L. (2013). *Financing metropolitan governments in developing countries*. World Bank Publications.

Bardhan, P. (2002). Decentralization of governance and development. *The Journal of Economic Perspectives, 16*(4), 185–205.

Bardhan, P., & Mookherjee, D. (2000). Capture and governance at local and national levels. *The American Economic Review, 90*(2), 135–139.

Bird, R. M., & Smart, M. (2002). Intergovernmental fiscal transfers: International lessons for developing countries. *World Development, 30*(6), 899–912.

Bird, R. M., & Vaillancourt, F. (2014). *Fiscal decentralization in developing countries: Theory, practice, and impact*. Edward Elgar Publishing.

Darbi, J., Muscatelli, V. A., & Roy, G. (2005). Fiscal consolidation and decentralisation: A tale of two tiers. *Fiscal Studies, 26*(2), 169–195.

Faguet, J. P. (2014). Decentralization and governance. *World Development, 53*(2), 2–13.

Faguet, J. P., & Shami, M. (2008). *Fiscal policy and spatial inequality in Latin America and beyond, LSE research online documents on economics 27162, London school of economics and political science*. LSE Library.

Kopits, G. (2001). Fiscal rules: Useful policy framework or unnecessary ornament?. In *IMF working papers 2001/145*. International Monetary Fund.

Larch, M., & Santacroce, S. (2020). *Numerical compliance with EU fiscal rules: The compliance database of the Secretariat of the European Fiscal Board*. European Commission.

Martinez-Vazquez, J., & McNab, R. M. (2003). Fiscal decentralization and economic growth. *World Development, 31*(9), 1597–1616.

Musgrave, R. A. (1969). Theories of fiscal federalism. *Public Finance/Finances Publiques, 24*(4), 521–536.

Nerlich, C., & Reuter, W. H. (2016). Fiscal rules, fiscal space, and the procyclicality of fiscal policy. *FinanzArchiv/Public Finance Analysis, 72*(4), 421–452.

Oates, W. E. (1972). *Fiscal federalism*. Edward Elgar Publishing.

Oates, W. E. (1999). An essay on fiscal federalism. *Journal of Economic Literature, 37*(3), 1120–1149.

OECD. (2019). *Making decentralization work: A handbook for policy-makers, OECD multi-level governance studies*. Paris: OECD Publishing.

Prud'homme, R. (1995). On the dangers of decentralization. *The World Bank Research Observer, 10*(2), 201–220.

Robben, J., & Wibbels, E. (2002). Beyond the fiction of federalism: Macroeconomic management in multitiered systems. *World Politics, 54*(4), 494–531.

Rodden, J. (2003). Reviving leviathan: Fiscal federalism and the growth of government. *International Organization, 57*(4), 695–729.

Schlicht, E. (2021). VC: A method for estimating time-varying coefficients in linear models. *Journal of the Korean Surgical Society, 50*(4), 1164–1196.

Shah, A., & Qureshi, Z. (2007). *The practice of fiscal federalism: Comparative perspectives*. McGill-Queen's University Press.

Smoke, P. (2001). *Fiscal Decentralization in developing countries: A Review of current Concepts and practice (democracy, governance and human rights programme paper number 2)*. United Nations Research Institute for Social Development.

Tabellini, G. (2000). *Constitutional determinants of government spending*. CESifo Working Paper No. 265, Munich, Germany.

Tanzi, V. (1995). Fiscal federalism and decentralization: A review of some efficiency and macroeconomic aspects. In *Annual World Bank conference on development economics*. Washington, DC: The World Bank.

Ter-Minassian, T. (1997). *Fiscal federalism in theory and practice*. International Monetary Fund.

Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of Political Economy, 64*(5), 416–424.