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Optimal Local Decentralisation and Public Service Quality in the EU: A Sector-Specific Analysis

Abstract. *Improving the public service quality is essential for enhancing societal well-being. This study investigates the impact of local decentralisation on the public service quality in European Union (EU) member states, with a specific focus on identifying an optimal level of disaggregated local decentralisation at which the public service quality is maximised. Using panel data from 27 EU countries over the period 2014-2020, the analysis employs both fixed effects and advanced panel threshold regression models. The findings reveal that while decentralisation generally enhances public service quality, it exerts negative effects on the health and social protection sectors, underscoring a sector-specific dynamic often overlooked in previous research. Distinctively, this study identifies a threshold level of decentralisation, demonstrating that quality improvements occur when decentralisation remains below this threshold, whereas exceeding it results in diminishing returns. By offering granular, sector-specific insights and employing rigorous empirical methodologies, this research significantly enriches the discourse on decentralisation. It also provides actionable policy recommendations, guiding governments toward optimal expenditure levels to achieve the most effective outcomes in public service delivery.*

Keywords: *local decentralisation, public service quality, panel data, fixed effects, threshold regression, sector-specific analysis, public policy optimisation.*

JEL Classification: H50, H72, C33.

1. Introduction

This study aims to enhance research on improving the public service quality by examining the relationship between local decentralisation and public service quality in EU Member States, utilising the Classification of Functions of Government (COFOG) framework. COFOG categorises government expenditure data from the System of National Accounts based on the purpose of funding allocation. Additionally, this paper seeks to identify an optimal level of disaggregated local decentralisation that allows states to effectively maximise the quality of their public services. The topic is particularly significant because decentralisation, defined as the transfer of authority from central to local governments, has the potential to improve service quality by aligning decision-making processes with the needs and

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preferences of local populations (Kyriacou & Roca-Sagalés, 2019). By bringing governance closer to citizens, decentralisation can promote responsiveness, foster innovation, and stimulate competition among local governments, ultimately improving the delivery of public services.

The quality of local governance can vary according to regional economic and political circumstances, affecting the success of decentralisation. Differences in the institutional capacity of local governments, as well as the capacity of local governments to make efficient use of resources and deliver services, have a significant influence on the overall effect on the quality of services. In the current context of the emergence of suprastate authorities (exemplified by the European Union at the European spatial level), the policy of each state regarding the extent to which it intervenes in economic and social life, including the size of budgets, cannot be conducted independently of regional policy (Rahmat, 2020), as suprastate authority can influence the budgetary policy conducted by member states. Studying the impact of local decentralisation on the public service quality in EU countries is important because these countries have different governance structures and levels of decentralisation. Examining these variations provides a comprehensive understanding of how different models impact public service delivery, providing insights that can inform policy decisions across Europe (Kyriacou, Roca-Sagalés, 2019). Understanding the impact of decentralisation can contribute to EU integration and cohesion policies by addressing disparities in the public service quality across Member States. This knowledge can support efforts to achieve more balanced and equitable development across the EU (Ibrahim, 2024).

This paper makes several novel contributions to the literature on decentralisation and public service quality. First, while existing research predominantly focuses on the general effects of decentralisation, this study offers a nuanced perspective by evaluating the specific impacts of local decentralisation across individual COFOG functions, including education, health, and social protection, as well as aggregated expenditures across the remaining seven COFOG categories. By analysing these effects at a disaggregated level, this research improves our understanding of sectoral variations in resource allocation and impact, thus improving the precision and reliability of empirical analyses. Second, previous studies have struggled to reach a consensus on the indicators used to measure public service quality and the extent of local decentralisation. To address this gap, this study employs the Government Effectiveness indicator – part of the World Bank's World Governance Indicators – as a robust measure of public service quality. Additionally, the analysis incorporates critical control variables to mitigate potential biases and enhance the validity of the results. These controls include general government expenditure as a percentage of GDP (disaggregated by education, health, social protection, and other categories), real GDP per capita, the local governance index, local financial autonomy, and the local autonomy index. These variables, described in detail in the methodology section, account for factors such as the degree of local government autonomy from central authorities and the method of leadership selection (elected vs. appointed), both of which may influence decentralisation

outcomes and service delivery quality. The empirical analysis is conducted using a sample of 27 EU member states, with annual panel data spanning the period from 2014 to 2020. Third, to the best of our knowledge, this study is the first to explore the existence of an optimal level of local decentralisation that maximises public service quality. To achieve this, an advanced panel threshold regression model is used, leveraging data from the 27 EU member states. The analysis, conducted using EViews 10 and Gauss 10 software, reveals that the level of local decentralisation has a bifurcated impact: it positively influences public service quality when below a certain threshold but has a negative effect when exceeding this threshold. These findings provide important insights into how varying degrees of decentralisation can shape public service outcomes.

The remainder of this paper is structured as follows: Section 2 presents the relevant theory and literature review. Section 3 outlines the sample design and key indicators used in the study. Section 4 introduces the empirical methodology, based on the panel data model and the panel threshold model. Section 5 shows the results and discussions derived from the empirical tests. Section 6 provides the conclusions and implications of the study.

2. Literature review

This literature review examines how local decentralisation manifests itself and affects the public service quality. While decentralisation has been implemented in many countries, it has been observed to have a wide range of effects on the public service quality, highlighting the importance of careful planning and execution that takes into account the complexities of local governance (Setiawan et al., 2022). These case studies provide valuable insights and comparative analysis that can contribute to the EU context, demonstrating both successful strategies and potential pitfalls.

The continued decentralisation of public services from the central to the local level, coupled with the provision of financial autonomy, means that local governments intervene differently in the economy at the state level. The literature review shows a number of positive aspects related to the implementation of local decentralisation. For example, studies have shown that it can help improve the provision of public services by tailoring to the needs of local communities, increasing accountability, citizen involvement, and reducing operational costs (Elliott, 2023). Also, the devolution of powers to local authorities can lead to an improvement in the quality of governance by shifting public procurement spending, which can increase the effectiveness of governance as a whole. Kyriacou and Roca-Sagalés (2019, 2021) showed that local decentralisation can lead to a more efficient use of material, financial, and human resources, as they can be directed to meet the priority needs of the local community. Also, local decentralisation provides local communities with a certain degree of autonomy, allowing them to define their own rules of action and choose their modes of intervention. Because local authorities are

directly accountable to their voters, this can lead to greater transparency and accountability in the provision of public services.

On the other hand, not all countries see beneficial results from decentralisation. In the literature, issues such as variations in the public service quality, difficulties in coordination at the national level, and uneven implementation of decentralisation in different regions have been highlighted. These dangers emphasise the need for careful design and implementation of fiscal decentralisation, with attention to local conditions and the specificities of public services. Decentralisation can aggravate disparities between regions, leading to differences in the quality of services and the allocation of resources. In general, common concerns about decentralisation include the possibility of uneven quality of services due to differences in local capacities and resources. Decentralised systems may also face difficulties in coordination and standardisation across regions, leading to possible inefficiencies or duplication of efforts.

Such general approaches, while emphasising the advantages of decentralised governance, have failed to address how different sectors face different levels of impact and resource allocation. A search of the literature revealed few studies that have assessed the effects of decentralisation reforms on each sector - such as Arends (2020). Therefore, this study fills this gap in the literature by providing new insights in assessing the concrete effects of local decentralisation pursued through COFOG functions. In contrast to previous studies, the optimal level of decentralisation highlighted in the current study adds depth to the results by providing a threshold value up to which it can positively influence the public service quality.

3. Data and key indicators

This paper aims to explore the impact of local decentralisation on the public service quality in EU member countries. The empirical analysis carried out is based on a sample of 27 EU member countries and includes annual data for each variable for the period 2014-2020. The countries included in the sample are the EU member states, as EU membership and its instruments (EU directives, regulations, and policies) can have a specific impact on both the quality of governance and public spending (such as those limiting budget deficits).

The description of the dependent and independent variables is given in Table 1.

Table 1. Description of dependent and independent variables in the study

Indicators	Description	Source
Dependent variable		
Public service quality (GovEf)	Government effectiveness	World Bank
Independent variables		
Local disaggregated decentralisation in education (LDEduc)	Local public expenditure on education divided by general public expenditure on education	COFOG-Eurostat

Indicators	Description	Source
Local disaggregated decentralisation in Health (LDHealth)	Local public expenditure on health divided by general public expenditure on health	
Local disaggregated decentralisation in Social Protection (LDSocPro)	Local public expenditure on social protection divided by general public expenditure on social protection	
Control variables		
GovEduc	General government expenditure on education as a share of GDP	COFOG-Eurostat
GovHealth	General government expenditure on health as a share of GDP	
GovSocPro	General government expenditure on social protection as a share of GDP	
GovOther	Variable obtained by subtracting education, health and social protection expenditure from total general government expenditure as a share of GDP	
LocGovInd	Local government (administration) index	World Bank
GDPcap	Real GDP per capita	Eurostat
LocFinSelf	Local financial autonomy	
LocAut	Local autonomy	
Local disaggregated decentralisation into other areas (LDOther)	Other local government expenditure divided by other general government expenditure	

Source: Authors' processing.

This study measures the public service quality as the dependent variable through the Government Effectiveness indicator (denoted GovEf in the model), a dimension included in the World Bank's Global Governance Indicators, in line with Kyriacou and Roca-Sagalés (2019) and Duho et al. (2020). The Government Effectiveness indicator captures perceptions (by survey respondents, non-governmental organisations, business information providers and public sector organisations) of the public service quality in general, the quality of public functions, and the degree of independence of government from political pressures, as well as the quality of policy formulation and implementation and the credibility of government commitment to such policies. The Government Effectiveness indicator is scaled between -2.5 and +2.5, with higher values indicating higher effectiveness. As independent variables, to measure decentralisation at the local level, this study used Eurostat, which reports data on both aggregated and disaggregated indicators using the Classification of Functions of Government (COFOG), in line with Kyriacou and Roca-Sagalés (2019). This classification provides data on government expenditure for 10 different functions (general public services; defence; public safety and order; economic action; economic action; environmental protection; housing and community facilities; health; recreation, culture, religion; education; social protection), and is a major analytical tool for expenditure, useful especially for international comparisons. In order to examine the relationship between local decentralisation and the public service quality, control variables are used in the regression models to add value and certainty to the models. General government spending in terms of GDP on

education, health, social protection, and other expenditures is important because it reflects the amount of resources spent on these areas and can affect perceptions of the public service quality. This study also controls for real GDP per capita (GDPcap) as an indicator of the size of the economy, given that smaller nations often exhibit a higher degree of centralisation (Panizza, 1999) and superior governance. The Local government index (LocGovInd), developed by the World Bank, is the answer to the question *Do elected local governments exist and, if so, to what extent can they function without interference from non-elected bodies at the local level?* The reason for choosing this indicator is that the degree of autonomy that local governments have from the central government may affect decentralisation outcomes. If local leaders are elected rather than appointed, they may be more accountable to their constituents, leading to better service delivery. Financial self-reliance (LocFinSelf) is defined as the proportion of local government revenues from local sources (taxes, fees, charges) in total local revenues, and local autonomy (LocAut) is an index realised by defining a number of 11 variables, which together reflect the quality of local governance in a country (European Commission, Self-rule Index for Local Authorities (Release 1.0) Final report).

4. Empirical methodology

4.1 Panel data model

The objective of the study is to define the relationship between the intensity of local decentralisation and the public service quality in EU member countries. The data sample in this study is panel data, i.e. *cross-sectional* time-series data. The analysis of panel data involves three more or less independent approaches: Pooled Ordinary Least Squares (POLS) models; Fixed Effects models (FE); Random Effects models (RE). The choice between these methods depends on the objective of the analysis and the exogeneity issues of the explanatory variables. Therefore, the aim is to choose and fit a regression model that is appropriate for the panel data sets in the sample of this study. The regression model should allow us to express the annual change in the public service quality experienced by country i in time period (year) t as a function of the annual change in the decentralisation of public services in country i in time period t. The application of the methods was performed using the Eviews 10 software.

4.2 Panel Threshold Regression Model

The panel threshold regression model (Hansen, 1999) is used to examine whether the increase in the public service quality is subject to the influence of the intensity of disaggregated local decentralisation by threshold effects and whether this relationship is asymmetric. The advantage of this model is that it provides a more objective method of determining partition points by using the threshold variable, avoiding the lack of subjective determination of partition points used by general

researchers (Chang and Su, 2010). The application of the method was realised using Gauss 10 software.

Regarding the public service quality, when the intensity of disaggregated local decentralisation is lower than the threshold value, γ, a lower share of local public expenditure as a percentage of general public expenditure (as proxy used in this study for disaggregated local decentralisation, in line with Kyriacou and Roca-Sagalés, 2019) boosts the public service quality, appearing as a positive correlation in this regime. However, when the share of local public expenditure in overall public expenditure is higher than the threshold valueγ, these higher expenditures turn out to be a waste of resources and lead to a reduction in the public service quality, appearing as a negative correlation in this regime.

Based on the research background of Hansen's (1999) panel threshold regression model, this study includes control variables and adopts balanced panel data by establishing the following single threshold model:

$$GovEf_{i,t} = \begin{cases} \mu_i + \beta_1 AggLd_{i,t} + \alpha' x_{i,t} + \varepsilon_{it}, \ if\ AggLd_{it} \le \gamma \\ \mu_i + \beta_2 AggLd_{i,t} + \alpha' x_{i,t} + \varepsilon_{it}, \ if\ AggLd_{it} > \gamma \end{cases} \quad (1)$$

$$\alpha = (\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6)'$$

$$x_{it} = (GovEduc_{it}, GovHealth_{it}, GovSocPro_{it}, GDPcap_{it}, LocGovInd_{it}, LocAut_{it})$$

where: $AggLd_{i,t}$ is the level of disaggregated local decentralisation (percentage of local public expenditure in general public expenditure); $GovEf_{i,t}$ is Government Effectiveness, the proxy variable for measuring the public service quality; γ is the estimated threshold value; β_1 andβ_2 are the estimated threshold coefficients corresponding to the different values of the threshold variable; $x_{i,t}$ is the vector of control variables comprising: general government expenditure on education as a share of GDP (*GovEduc)*, general government expenditure on health as a share of GDP (*GovHealth*), general government expenditure on social protection as a share of GDP (*GovSocPro*), real GDP per capita (*GDPcap)*, local government (administration) index (*LocGovInd*) and local autonomy (*LocAut)*; α_1, α_2, α_3, α_4, α_5 and α_6 are the estimated coefficients corresponding to the control variables; and $\mu_{i,t}$ is a fixed effect to capture the heterogeneity in the growth of the public service quality across countries under varying conditions. The error term $\varepsilon_{i,t}$ is a white noise process under $\varepsilon_{it} \sim iid(0, \sigma^2)$; *i* stands for the different states considered in the model, and *t* refers to a given time period.

The single-threshold model can also be expressed by the following regression formula presented in equations 2 and 3.

$$GovEf_{i,t} = \mu_i + \beta_1 AggLd_{i,t} I(AggLd_{it} \le \gamma) + \beta_2 AggLd_{i,t} I(AggLd_{it} > \gamma) + \alpha' x_{i,t} + \varepsilon_{it} \quad (2)$$

Let *I(-)* be an indicator function:

$$GovEf_{i,t} = \mu_i + \beta'^{AggLd_{i,t}(\gamma)} + \alpha' x_{i,t} + \varepsilon_{it}, \quad \beta = (\beta_1, \beta_2) \quad (3)$$

Thus, observations are divided into two regimes depending on whether the threshold variable $AggLd_{i,t}$ is smaller or larger than the threshold value (γ).

In this study, a threshold effect is assumed between the intensity of disaggregated local decentralisation and the public service quality. When the intensity of disaggregated local decentralisation is less than the threshold value, the public service quality improves as the share of local public expenditures in overall public expenditures increases, but once the intensity of disaggregated local decentralisation exceeds the threshold value, further increases in local public expenditures do not bring positive results. Of course, it is important to determine whether the threshold effect is statistically significant. The null hypothesis and the alternative hypothesis can be represented as in equation 4.

$$H_0: \beta_1 = \beta_2, H_1: \beta_1 \neq \beta_2 \quad (4)$$

When the null hypothesis holds, there is equality between the coefficients $\beta_1 = \beta_2$, so the regression equation degenerates into a single general regression equation, which means that the threshold effect between the intensity of disaggregated local decentralisation and the public service quality does not exist. But when the alternative hypothesis holds, i.e. $\beta_1 \neq \beta_2$, it means that the threshold effect does exist, and in the two intervals there will be different interpretations of the phenomenon.

5. Results and discussion

5.1 Application of the Pooled Ordinary Least Squares - POLS and Fixed Effects (FE) regression models

Regarding the condition of stationarity of the data sets, if this is not met, then the problem of spurious regression may arise and the estimated parameters may be biased. This study used the Levin-Lin-Chu ADF (Levin et al., 2002) panel-based unit root test. The results of the test showed that the dependent variable (public service quality GovEf), the independent variables (LDEduc, LDHealth, LDSocPro, LDOther) and the control variables are all at the 10% and 1% significance levels. This implies that the null hypothesis of unit roots is rejected, indicating that all variables are stationary. This study can proceed with the panel regression models.

The key assumption of the POLS model is that there are no unique attributes of individuals within the measurement set and no universal effects over time. The POLS regression model is applied to the entire sample of states, neglecting the cross-sectional and time-series nature of the data. In this regression, the R^2 value is 0.84, with an adjusted R^2 of 0.83, which corresponds to a very strong relationship between the variables. Regarding the parameters of the independent variables, most of them are statistically relevant, except for two variables, disaggregated local decentralisation in social protection and general public expenditure on social protection as a share of GDP. While in general this model satisfies the adequacy conditions, the main problem with this model is that it does not distinguish between

countries in the sample, and by combining all countries in this pooled panel it rejects heterogeneity or individuality that may exist between countries.

The key assumption of the fixed effects model is that there are unique attributes of individuals that do not vary over time. These attributes may or may not be correlated with the dependent variables. Therefore, a fixed effects regression model that takes into account heterogeneity or individuality across countries in the sample is applied. The term fixed effects is due to the fact that although the constant may differ across countries under the influence of various specific factors, it does not vary over time and is considered time invariant.

The following empirical model is estimated:

$$GovEf_{it} = \beta_0 + \beta_1 LDEduc_{it} + \beta_2 LDHealth_{it} + \beta_3 LDSocPro_{it} + \beta_4 LDOther_{it} + \beta_5 X_{it} + \mu_t + \varepsilon_{it} \quad (5)$$

where: i and t refer to countries and years, respectively, *LDEduc* is the local decentralisation of education expenditure, *LDHealth* is the local decentralisation of health expenditure, *LDSocPro* is the local decentralisation of social protection expenditure, *LDOther* is the local decentralisation of other expenditure, X is a vector of control variables and ε is the error term. The period fixed effects are included to account for the impact of time-varying factors affecting all countries (μt).

The values of R^2 and adjusted R^2 correspond to a very strong relationship between the variables. The F-test in the regression yielded a test statistic of 183.77 with an associated probability (p) value of 0, which leads us to conclude that the model coefficient estimates are statistically significant at the 1% level.

5.2 Comparison of the POLS model with the FE model

In order to choose which model is more appropriate, the *Reduntant likelihood* test is applied. The results of this test are presented in Table 2.

Table 2. Redundant Fixed Effects Tests

Effects Test	Statistic	d.f.	Prob.
Cross-section F	35.889850	(26,150)	0.0000
Cross-section Chi-square	373.649336	26	0.0000

Source: Authors' own calculations.

Since the associated cross-section probability F is 0 (less than 0.05), the conclusion of the test is that the fixed-effects (FE) model is more appropriate for the sample data in this study than the POLS model, because country-specific characteristics are present, constant over time.

5.3 Application of the Random Effects (RE) regression model

The key assumption of this model is that there are unique, time-constant attributes of individuals that are uncorrelated with individual regressors. Random effects adjust for the serial correlation induced by unobserved time constant

attributes. In this regression, the value of R^2 is 0.23 and the adjusted R^2 is 0.18, which corresponds to a very weak relationship between the variables. The *F*-test in the regression yielded a test statistic of 4.61 with an associated probability (*p*) value of 0, which leads us to conclude that the model coefficient estimates are statistically significant at the 1% level.

To test whether fixed effects or random effects are required, the Hausman test is applied. Since the *p*-value is 0, the fixed effects model is the appropriate model for the sample data in this study.

5.4 Fixed effects model testing: validity, statistical significance, and interpretation of parameters

The independence of errors (residuals) is present in the fixed effects model, measured by the Durbin-Watson statistic of 1.33. The variables do not exhibit correlations greater than 0.7; therefore, the data set does not exhibit multicollinearity. To test the assumption of normality of residuals, the histogram of standardised residuals and the Jarque-Bera test are used. After analysis, the test *p*-value of 0.36 indicates that the null hypothesis that the residuals are normally distributed is accepted.

The direction of influence of statistically significant independent variables is presented as follows. LDOther and GovOther are positively related to the dependent variable, public service quality. In contrast, an increase in LDHealth, GovSocPro, and real GDP per capita are associated with a decrease in the public service quality. The fact that disaggregated local decentralisation in health is negatively associated with an increase in the quality of services is a confirmation of the results of other studies. The authors Kyriacou and Roca-Sagalés (2019) obtained similar results when explaining that externalities may arise at the local level and that the procurement of medicines and medical equipment at this level does not benefit from economies of scale (centralised procurement increases bargaining power), undermining the efficient delivery of health policies by local governments. One explanation for why increases in general government spending on social protection as a share of GDP do not implicitly lead to increases in the quality of services could be that an increase in spending in general does not automatically lead to an increase in the quality of services. This is the case in countries where, despite increased government spending in several sectors, the perceived quality of services has not improved, possibly due to a lack of outcome indicators. One justification for associating an increase in real GDP per capita with a decline in the public service quality is that economic growth may shift the orientation of fiscal policy towards tax cuts or incentives for businesses and high-income earners, reducing the revenue available for public services. This shift may lead to budget cuts or stagnant funding for essential services, degrading their quality (Misi Lopes et al., 2023).

The results suggest that an increase in the local decentralisation of other public expenditure as well as an increase in the rest of general public expenditure as a share of GDP lead to an increase in the public service quality. Since both LDOther and

GovOther indicators were obtained by subsuming the remaining 7 different COFOG expenditure functions (general public services; defense; public safety and order; economic actions; environmental protection; housing and community facilities; recreation, culture, religion), at this point a spending function cannot be isolated from the 7 listed that could lead to an increase in the public service quality and may be the subject of future analysis.

5.5 Application of the panel threshold model and empirical results

The empirical analysis carried out is based on the sample of 27 EU member countries, also used in the previous study, and includes annual data for each variable for the period 2014-2020. In this study, the following indicators from Table 1 are selected: for the dependent variable, the Government Effectiveness (GovEf) is used as a proxy for the public service quality. The threshold independent variable is the disaggregated local decentralisation (AggLd), calculated as the share of local public expenditure in overall public expenditure. The following control variables are selected: GovEduc; GovHealth; GovSocPro; GDPcap; LocGovInd and LocAut.

The study uses bootstrapping to examine the *F*-statistic approximations and to compute *p*-values, the results of the single and double threshold effects of disaggregated local decentralisation intensity are presented in Table 3. In the single threshold case, the bootstrapping of the sample is repeated 500 times, yielding an *F*-statistic of 9.6250 and a *p*-value of 0.0920. The threshold value for the single threshold model is 12.00, which is significant at the 10% level.

The observed values are then divided into two segments, comprising values that exhibit an asymmetric nonlinear relationship, above and below; in other words, when different parameter estimates β_1 and β_2 occur both above and below the threshold values. The test for double threshold effects reveals an *F*-statistic of 6.3781 and a *p*-value of 0.142, neither of which is significant at the 10% level. Therefore, the null hypothesis cannot be rejected, which means that the model has no double threshold effects.

Table 3. Tests for threshold effects between disaggregated local decentralisation intensity and public service quality[a]

	Threshold value[b]	***F*-statistic**	***p***
Public service quality			
Single threshold effect test	12.00	9.6250*	0.0920
Test for double threshold effect	12.00	6.3781	0.2340
	24.00		

Source: Authors' own calculations.

[a]*p*-value and *F*-statistic are obtained by repeating the bootstrap procedures 500 times for each of the two tests.

[b]the critical *F*-statistic values for the single threshold effect are 9.4345, 10.9612 and 16.2779 at the respective levels of 10%, 5% and 1%; the critical values for the double threshold effect are 8.5817, 9.5593 and 13.3348
at the respective levels of 10%, 5% and 1%.

* indicates significance at the 10% level.

When the model has a single threshold effect, the regression model can be expressed as:

$$GovEf_{i,t} = \begin{cases} \mu_i + \beta_1 AggLd_{i,t} + \alpha' x_{i,t} + \varepsilon_{it}, \ if\ AggLd_{it} \leq 12.00 \\ \mu_i + \beta_2 AggLd_{i,t} + \alpha' x_{i,t} + \varepsilon_{it}, \ if\ AggLd_{it} > 12.00 \end{cases} \quad (6)$$

The pattern can also be expressed as:

$$GovEf_{i,t} = \mu_i + \beta_1 AggLd_{i,t} I(AggLd_{it} \leq 12.00) + \beta_2 AggLd_{i,t} I(AggLd_{it} > 12.00) + \alpha' x_{i,t} + \varepsilon_{it} \quad (7)$$

The observed values are divided into two segments, with the threshold value, γ = 12.00 serving as the cut-off point. As shown in Table 4, in the first segment, when the intensity of disaggregated local decentralisation is less than the threshold value ($AggLd_{it} < 12.00$), the coefficient β_1 is 2.170; when homogeneous (heterogeneous) standard deviations are taken into account, the *t* statistic is 2.403 (2.627). At this point, the intensity of disaggregated local decentralisation and the increase in the public service quality have a positive and significant correlation, showing that they increase in tandem, which means that the increase in the share of local public expenditure in overall public expenditure has a significant influence on the increase in the public service quality.

Table 4. Estimation of disaggregated local decentralisation intensity coefficients

	Estimated values	OLSse[a]	t_{OLS}	White se[a]	t_{White}
β_1	2.170	0.903	2.403***	0.826	2.627***
β_2	-0.178	0.082	-2.170**	0.063	-2.825***

Source: Authors' own calculations.

[a]OLS se (White se) refers to homogeneous (heterogeneous) standard deviations.

[b] β_1 (β_2) indicates that the coefficient estimates are lower (higher) than the threshold value.

**indicates significance at 5% level; ***indicates significance at 1% level.

In the second segment, when the intensity of disaggregated local decentralisation is higher than the threshold value ($AggLd_{it} > 12.00$), the coefficient β_2 is -0.178. When homogeneous (heterogeneous) standard deviations are taken into account, the *t* statistic is -2.170 (-2.825) and falls within the 5% and 1% significance level, respectively. At this point, the intensity of disaggregated local decentralisation and the increase in the public service quality are negatively correlated. In other words, when the share of local public expenditure in overall public expenditure is higher than 12%, an increase in local public expenditure leads to a reduction in the public service quality, implying that any excessive additional local public expenditure may constitute a waste of resources. This result can be justified by the fact that high levels of local public spending can lead to inefficiency and fragmentation in service delivery. Local governments may lack the economies of scale that central governments possess, leading to higher costs and lower efficiency (Halásková et al., 2022). Local governments also often have limited administrative and financial capacity. As the share of local spending increases, these capacity constraints may become more pronounced, leading to reduced efficiency in service delivery (Matos et al., 2023). At the same time, increased local spending

without adequate fiscal transparency and accountability can lead to mismanagement and misuse of funds. Fiscal transparency is essential to ensure that public resources are used efficiently (Caldas Montes et al., 2019).

Considering a threshold value of 12.00, the model can be expressed as follows:

$$GovEf_{i,t} = \mu_i + 2.170\ AggLd_{i,t} I(AggLd_{it} \leq 12.00) - 0.178\ AggLd_{i,t} I(AggLd_{it} > 12.00) + \alpha' x_{i,t} + \varepsilon_{it} \quad (8)$$

The parameter estimates of the control variables (general government expenditure on education as a share of GDP, general government expenditure on health as a share of GDP, general government expenditure on social protection as a share of GDP, real GDP per capita, local governance index, and local autonomy) are summarised in Table 5. If both homogeneous and heterogeneous standard deviations are taken into account, then the coefficients α_1, α_5 and α_6 all meet the 1% significance level and α_4 meets the 10% significance level. These results indicate that overall public spending on education as a share of GDP, real GDP per capita, and local autonomy are negatively correlated with increases in the public service quality. The finding that overall public spending on education as a percentage of GDP is negatively correlated with an increase in the public service quality may be justified by the fact that higher spending does not necessarily equate to better outcomes. If funds are not allocated or used efficiently, additional spending may not translate into improved quality. This inefficiency could be due to bureaucratic obstacles, corruption, or mismanagement (Coman (Nuță) et al., 2023). At the same time, there may be diminishing returns to investment in education. After a certain point, additional spending produces progressively smaller improvements in educational outcomes, thus failing to have a significant impact on the overall public service quality (Tommaso, 2014).

Table 5. Estimation of coefficients of control variables

	Estimated values	OLSse[a]	t_{OLS}	White se[a]	t_{White}
α_1	-0.247	0.094	-2,629***	0.0711	-3,473***
α_2	-0.031	0.085	-0,358	0.0469	-0,650
α_3	-0.013	0.087	-0,150	0.0776	-0,168
α_4	-0.084	0.086	-0,980	0.0459	-1,830*
α_5	0.268	0.093	2,894***	0.0928	2,891***
α_6	-0.227	0.093	-2,430***	0.0789	-2,877***

Source: Authors' own calculations.

[a]OLS se (White se) refers to homogeneous (heterogeneous) standard deviations.

[b]The estimated coefficients are: α_1 for general government expenditure on education as a share of GDP, α_2 for general government expenditure on health as a share of GDP, α_3 for general government expenditure on social protection as a share of GDP, α_4 for real GDP per capita, α_5 for the local governance index and α_6 for local self-government.

*indicates significance at the 10% level; ***indicates significance at the 1% level.

In terms of real GDP per capita, the negative correlation with increased public service quality in the study of the 28 EU countries can be justified on the grounds that in higher-income countries, resources could be allocated to more complex and diverse needs, such as advanced health care, infrastructure, or defence, rather than basic public services. The focus on economic expansion may result in neglecting to improve or maintain public service standards (Nguyen, Le, 2023). This could lead to a relatively lower perceived quality of basic public services compared to countries where such services are the main focus. Richer nations may also face lower returns on investment in public services. As basic quality is already high, additional investment may not significantly improve service quality, leading to the perception that GDP growth is not correlated with better public services.

The finding that local autonomy is negatively correlated with an increase in the public service quality may be justified by the fact that high local autonomy may lead to fragmented governance, where local governments may not have the capacity or resources to effectively deliver high-quality public services. This fragmentation can lead to inconsistencies and inefficiencies in service delivery (Bastianen, Keuffer, 2024). Also, increasing local autonomy can create challenges in coordinating policies and services across different jurisdictions. This can lead to overlapping responsibilities, gaps in service delivery, and inefficient use of resources, negatively impacting the overall public service quality. Halásková et al. (2022) consider that local governance can be strongly influenced by local political dynamics, which do not always align with broader national objectives. Local interests and political pressures can lead to sub-optimal decision-making and resource allocation, affecting the efficiency of public services.

The positive and significant value of the coefficient α_5 shows that the index of local governance, as a control variable, is positively correlated with an increase in the public service quality. This implies that local governments, being closer to the citizens, can identify and respond more effectively to local needs and preferences. This responsiveness can lead to improved public service delivery and an increase in the perceived quality of services (Halásková et al., 2022). Local governments also often have better knowledge of local conditions and can allocate resources more efficiently than central governments. This local knowledge helps tailor services to specific community needs, improving the overall quality of services (Lee, Whitford, 2009).

The coefficients α_2 and α_3 are negative but insignificant, indicating that overall public spending on health and social protection as a share of GDP does not affect the quality of public service quality. This shows that the effectiveness of public services depends not only on the amount spent, but also on the efficiency and effectiveness with which the funds are used. High spending does not guarantee high-quality services if there is inefficiency, mismanagement, or corruption in the allocation and use of funds. Spending on health and social protection can lead to improved outcomes in these specific sectors, without necessarily increasing the overall efficiency of government. For example, better health outcomes do not automatically

translate into better quality public services in other areas such as education or infrastructure.

6. Conclusions and implications

The aim of this study was to provide a better understanding of the influence of local decentralisation on the public service quality in EU member states, more specifically, to determine whether there is an optimal level of disaggregated local decentralisation within which a state can effectively maximise its public service quality. Based on the cross-sectional time-series panel data of 27 EU member countries from 2014 to 2020, this paper employs the fixed effects model and an advanced panel threshold regression model. Our findings indicate that an increase in the local decentralisation of other public expenditures (general public services; defense; public security and public order; economic actions; environmental protection; housing and community facilities; recreation, culture, religion) as well as an increase in the rest of general public expenditures as a share of GDP lead to an increase in the public service quality. Similarly to the current study, previous research on the impact of fiscal and policy decentralisation has shown that decentralisation generally improves the quality of public service provision (in line with Halásková et al., 2022; Diaz-Serrano, Meix-Llop, 2019). Balaguer-Coll et al. (2010) analysed the efficiency and decentralisation of Spanish local governments and found a positive correlation between decentralisation and efficiency, which reflects the findings of the current study. The study highlights that while decentralisation generally improves the quality of services, it negatively affects the health sector and social protection spending, suggesting sector-specific dynamics that have not been explored in depth in previous work. This sector-specific knowledge is essential for targeted policy interventions.

Based on the application of the panel threshold regression model, this study demonstrates that the relationship between the intensity of disaggregated local decentralisation and the public service quality is not linear. Investigating compliance with national standards in decentralised public services, Hegele et al. (2024) argue that decentralisation can improve service quality, provided that appropriate regulatory frameworks are in place. This complements the finding of the current study on the non-linear relationship between decentralisation intensity and service quality. Furthermore, in order to identify the optimal level of disaggregated local decentralisation intensity, this study shows that when the share of local local expenditures in overall public expenditures is below the optimal threshold, there is a positive correlation between increased local spending and increased public service quality. However, when local expenditures exceed the threshold value, excessive spending constitutes a waste of resources, reducing the increase in the public service quality. In contrast to earlier studies, the optimal level of decentralisation identified in the current study expands on these findings by establishing a threshold value at which it can positively improve the public service quality.

The added value of the research lies in the detailed examination of how different sectors of local decentralisation affect the public service quality, distinguishing between different public expenditures. This granularity provides nuanced insights that go beyond general analyses of decentralisation. Another important aspect of the research is that it identifies an optimal threshold for the share of local spending in total public spending, revealing that decentralisation has a positive impact up to a certain point. Beyond this threshold, excessive local spending becomes counterproductive, emphasising the importance of balanced fiscal policies. Applying a fixed effects model and an advanced panel regression model with a threshold helps to understand the non-linear relationship between the intensity of decentralisation and the public service quality, providing a deeper insight into optimal spending levels. By understanding the sectors that benefit from local decentralisation and recognising optimal spending levels, governments can better design fiscal policies to maximise the public service quality.

This research has some limitations, which are mentioned below. In this study, the dependence between the public service quality and indicators related to disaggregated local decentralisation in education, health and social protection is well established in the literature. Therefore, it made complete sense to include these variables in the study, even though they were not statistically relevant in the fixed effects regression model. Additionally, the fact that the sample size over time was insufficient to show the true spectrum of the relationship may be a reason for the lack of statistical significance for these independent variables. The sample used may limit the generalisability of the results of this study, as it may not fully capture long-term trends or recent developments in fiscal decentralisation and public service quality.

Understanding the impact of decentralisation is essential for policy-makers seeking to design effective governance structures. The balance between centralisation and decentralisation can significantly influence the effectiveness of public service delivery, and this research can contribute to evidence-based policy decisions.

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