

# DOES INSTITUTIONAL QUALITY SHAPE THE LAFFER CURVE? EVIDENCE FROM SELECTED EU ECONOMIES

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This paper examines whether institutional quality shapes the relationship between capital taxation and public revenues within the Laffer curve framework. Using tax revenues as a percentage of GDP as the dependent variable, and the Effective Average Tax Rate (EATR) on capital, government effectiveness, and rule of law as key determinants, the analysis explores how institutional capacity conditions fiscal performance. The sample comprises nine EU economies: Denmark, the Netherlands, Sweden, Estonia, Portugal, the Czech Republic, Greece, Bulgaria, and Romania, over the period 2004–2023. Employing the Pooled Mean Group (PMG) estimator, the results indicate a positive long-run effect of EATR on revenues and a negative coefficient on its squared term, confirming a non-linear Laffer-type relationship. Institutional indicators are positively and significantly associated with revenues, while the error correction term confirms stable long-run adjustment. Overall, stronger institutions shape the nonlinear revenue response, contributing to greater fiscal sustainability.

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## 1 Introduction

The relationship between taxation and public revenue has long occupied a central position in fiscal economics. One of the most influential theoretical frameworks explaining this relationship is the Laffer curve, which describes the nonlinear relationship between tax rates and tax revenues. According to this framework, tax revenues initially increase with higher tax rates due to the arithmetic effect (Beljić et al. 2023), but beyond a certain threshold, further increases reduce revenues as behavioral responses shrink the tax base. While the theoretical intuition of the Laffer curve is well established (Blinder, 1981; Agell & Persson, 2001; Lin & Jia, 2019), empirical evidence regarding its magnitude, symmetry, and policy relevance remains mixed (Brill & Hassett, 2007; Trabandt & Uhlig, 2011). Most empirical research concentrate primarily on identifying the revenue-maximizing tax rate, typically focusing on marginal income taxation. However, less attention has been devoted to the role of institutional quality in shaping the position and slope of the Laffer curve, particularly in the context of capital taxation. This omission is substantively important. If tax avoidance, compliance behavior, enforcement capacity, and taxpayer trust are shaped by institutional structures, then the revenue effects of capital taxation cannot be fully understood without accounting for institutional quality (Horodnic, 2018).

Recent literature suggests that revenue responses to taxation are strongly influenced by tax morale and administrative capacity rather than solely by real economic adjustments (Saez & Stantcheva, 2018). In institutional environments characterized by weak enforcement and low trust, higher tax rates may primarily stimulate avoidance and evasion rather than productive responses. Conversely, in countries with effective governments and strong rule of law, higher statutory or effective tax rates may not necessarily erode the tax base to the same extent. This perspective implies that institutional quality may shift the peak of the Laffer curve and affect the range within which tax rates increase revenues.

Against this backdrop, this study investigates the long-run relationship between public revenues and capital taxation, emphasizing whether institutional quality shapes the Laffer curve. Using tax revenues as a percentage of GDP as the dependent variable and the Effective Average Tax Rate (EATR) on capital, a measure of the effective corporate tax burden that accounts for statutory tax rates

and relevant tax allowances and reliefs, as the core explanatory variable, alongside government effectiveness and the rule of law, which capture the quality of public administration and the strength of legal and institutional frameworks, the analysis examines how institutional trust conditions the revenue effects of taxation.

The empirical research focuses on nine EU economies: Denmark, the Netherlands, Sweden, Estonia, Portugal, the Czech Republic, Greece, Bulgaria, and Romania, representing heterogeneous levels of institutional trust and administrative capacity. This heterogeneity provides a suitable framework for assessing whether stronger institutions allow countries to maintain higher effective capital tax rates without shifting into the revenue-reducing portion of the Laffer curve. By employing the Pooled Mean Group (PMG) method over the period 2004–2023, this paper contributes to the literature in three main ways. **First**, it provides long-run evidence of a nonlinear relationship between capital taxation and revenue generation, confirming the existence of a Laffer-type effect. **Second**, it explicitly integrates institutional quality into the Laffer framework, moving beyond purely rate-based analyses. **Third**, it offers policy-relevant insights for EU fiscal governance by demonstrating that institutional strength allows countries to maintain effective capital taxation without undermining revenue performance. Rather than treating the Laffer curve as a purely mechanical relationship between tax rates and revenues, this paper conceptualizes it as institutionally conditioned. It redirects the debate from whether the Laffer curve exists to how institutional quality affects its empirical relevance.

Therefore, the hypotheses tested in this paper are:

*H1: The relationship between effective average tax rate and tax revenues is nonlinear, consistent with a Laffer-type mechanism, and this nonlinear effect is more pronounced in economies with higher institutional quality.*

*H2: Institutional quality, measured by government effectiveness and rule of law, significantly shapes the short- and long-run relationship between capital taxation and tax revenues, enhancing revenue performance in higher-quality institutional environments*

The remainder of the paper is structured as follows. Following the Introduction, Section 2 reviews the relevant empirical literature. Section 3 provides a descriptive overview of developments in tax revenues, effective average tax rates, the rule of law, and government effectiveness in the selected EU economies over the observed period. Section 4 outlines the data and methodological framework, while Section 5 presents and discusses the empirical results. The final section concludes and highlights the main implications of the findings.

## 2 Literature review

A substantial body of empirical research identifies **Effective Average Tax Rates (EATR)** as a more appropriate measure of the effective tax burden than statutory rates, particularly in analyses of tax revenues. By incorporating deductions, allowances, and tax provisions, EATR captures the actual tax base conditions under which capital income is generated (Devereux & Sørensen, 2006; Barrios et al., 2014). As Devereux and Sørensen indicate, reliance on statutory rates alone may distort assessments of fiscal capacity and revenue potential. Empirical evidence confirms that effective taxation measures are systematically linked to economic decisions that directly determine the size of the tax base. Egger et al. (2009) show that investment allocation responds to effective rather than statutory taxation, implying that EATR is more closely aligned with realized tax revenues. Cross-country analyses within the EU further document substantial variation in effective capital taxation, suggesting that revenue performance cannot be evaluated independently of effective tax burdens (Feldstein, Dicks-Mireaux & Poterba, 1983).

A substantial strand of the literature argues that the **Laffer curve** should not be interpreted as a universal structural constant, but rather as a context-dependent relationship between tax rates and revenues. Its empirical shape is shown to reflect underlying economic and institutional conditions that influence how changes in effective taxation translate into adjustments in the tax base. Monissen (1999) argues that the existence and position of a revenue-maximizing rate depend on the institutional environment in which taxation operates (Brill & Hassett, 2007). In weak institutional settings, higher effective tax rates may primarily erode the tax base; in stronger institutional environments, an interior revenue maximum is more likely to emerge (Fernández-Rodríguez, García-Fernández, & Martínez-Arias, 2021). Empirical evidence confirms nonlinear tax–revenue relationships while highlighting

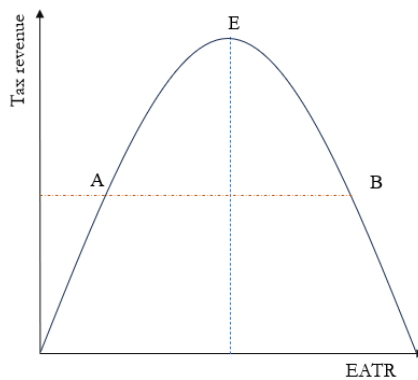
substantial variation in estimated turning points (Akgun, Bartolini, & Cournède, 2017). Hsing (1996) demonstrates that the revenue-maximizing rate is sensitive to structural and policy conditions. Heijman and van Ophem (2005) further show that increases in tax rates may shift activity toward the informal sector, implying that revenue declines may reflect institutional limitations in enforcement rather than purely real economic contraction. Panel evidence from European economies reveals pronounced cross-country heterogeneity in both the slope and the revenue-maximizing point of the tax–revenue relationship (Ferreira-Lopes, Martins & Espanhol, 2020). General equilibrium analyses similarly indicate that the peak of the Laffer curve varies with structural characteristics of the economy (Lin & Jia, 2019). The absence of a common turning point across countries suggests that the nonlinear relationship between effective taxation and revenue is conditioned by country-specific structural and institutional factors.

Recent research increasingly recognizes **institutional quality** as a fundamental determinant of fiscal performance. Empirical evidence indicates that governance dimensions such as regulatory effectiveness, corruption control, and rule of law exert measurable effects on tax revenue performance (Hussain & Ilahi, 2016). Institutional capacity influences compliance behavior, enforcement efficiency, and the credibility of fiscal policy, thereby affecting the elasticity of the tax base (Carbonara et al. 2024). Sojoodi and Alamdari (2026) document a bidirectional relationship between institutional quality and tax revenue, suggesting that institutions not only shape fiscal outcomes but are themselves reinforced by revenue capacity. Cross-country evidence further indicates that the effect of institutional quality, particularly rule of law, varies with the level of economic development (Günel & Didinmez, 2022). This heterogeneity implies that institutional strength may condition the responsiveness of tax revenues to changes in effective taxation. Moreover, Castiglione, Infante, and Smirnova (2015) demonstrate that institutional development and income levels are mutually reinforcing, underscoring the mediating role of governance in shaping macroeconomic performance. Taken together, this body of literature indicates that institutional quality may affect not only the level of tax revenues but also the structural characteristics of the taxation–revenue relationship. Within a Laffer framework, stronger institutions can reduce avoidance and informality, potentially influencing the position or curvature of the revenue-maximizing relationship.

Although effective taxation, nonlinear revenue effects, and institutional quality have been extensively studied, these strands of literature remain largely disconnected. This paper bridges this gap by integrating EATR and its squared term with institutional indicators within a unified nonlinear panel framework to examine whether institutional quality conditions the existence and positioning of the Laffer curve in EU economies.

### 3 Empirical Setting and Descriptive Evidence

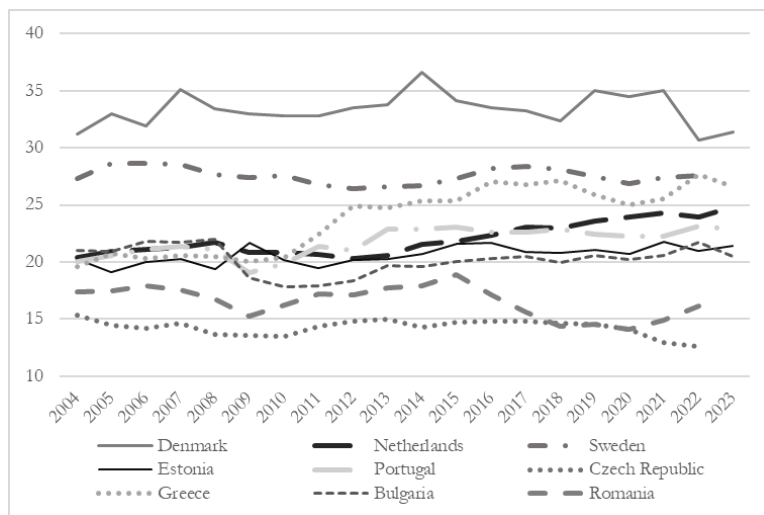
This section provides a graphical and descriptive assessment of the relationship between capital taxation and tax revenues in the selected EU economies over the period 2004–2023. The aim is to explore preliminary patterns in the data, with particular attention to potential nonlinearities consistent with the Laffer framework and cross-country differences in institutional quality. Figure 1 presents a stylized representation of the Laffer curve, illustrating the theoretical nonlinear relationship between tax rates and tax revenues, whereby revenues initially rise with higher taxation but may decline beyond a certain threshold. The inclusion of the squared EATR term in the empirical model directly tests this nonlinearity. Point E denotes the revenue-maximizing tax rate, which should not be confused with the socially optimal rate that minimizes economic distortions. Owing to the theoretical symmetry of the curve, two different tax rates, one relatively low (point A) and one relatively high (point B), may generate identical revenue levels (Brill *ii* Hassett, 2007; Trabandt *ii* Uhlig, 2011).



**Figure 1: Laffer curve**

Source: Authors' presentation based on Laffer (2004).

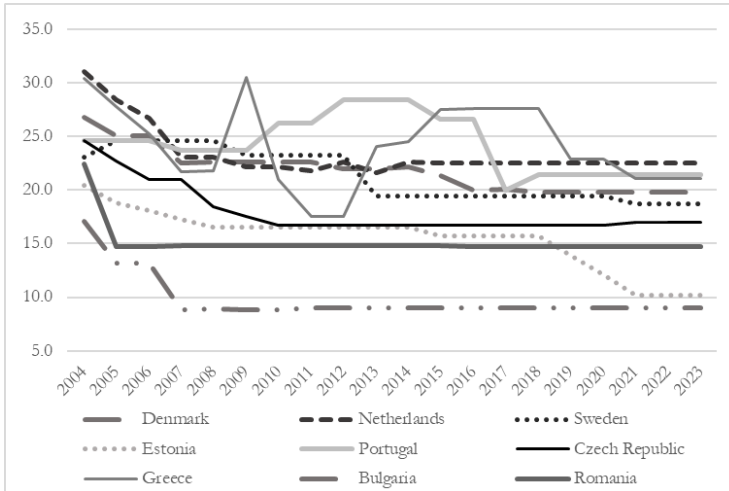
The evolution of tax revenues over the sample period is presented to provide preliminary descriptive evidence on cross-country dynamics and to assess their consistency with the theoretical predictions of the Laffer framework.



**Figure 2: Tax revenue trend in selected EU economies.**  
Source: Authors' own presentation based on World Bank data.

Empirical evidence for the selected EU economies indicates stable to moderately positive trends in tax revenues over the observed period (Figure 2). Estonia, Sweden, and Portugal exhibit the greatest stability in tax revenues as a percentage of GDP. Denmark recorded a noticeable peak in 2014, reflecting restrictive fiscal measures implemented to support post-crisis recovery following the 2008 financial shock (Glavaški, Beker Pucar & Stojkov, 2022). Greece experienced a substantial increase in tax revenues, from 19.6% to 26.6%, particularly after 2011, which may be associated with fiscal consolidation measures introduced under successive bailout programs (Beljić & Glavaški, 2021). In contrast, the Czech Republic displayed a declining trend, with tax revenues decreasing from 15.3% to 12.6% over the same period. From a Laffer curve perspective, such cross-country heterogeneity suggests that economies may operate at different segments of the tax rate–revenue relationship, where institutional capacity and compliance conditions potentially influence the effectiveness of taxation in generating public revenues.

The following figures present the evolution of EATR and tax revenues (as a percentage of GDP) across the selected EU countries, highlighting cross-country differences and potential nonlinear revenue responses consistent with the Laffer framework. Empirical evidence for the selected EU economies indicates a general downward trend in the EATR over the period 2004–2023 (Figure 3). Economies characterized by higher levels of institutional quality reduced their EATR by approximately 6 percentage points (pp). Portugal, however, exhibited a temporary deviation from this pattern following the Global Financial Crisis of 2008, increasing its EATR from 23.7% to 28.4%. This upward adjustment proved short-lived, as Portugal subsequently aligned with the broader EU trend, reducing its EATR to 21.4%. Among economies with lower institutional quality, Bulgaria and Romania significantly reduced their EATRs shortly after EU accession (2005). Notably, their current EATR levels, 9% and 14.5%, respectively, remain below the OECD/G20 BEPS minimum threshold of 15%. Estonia similarly records an EATR below the proposed minimum, at 10.2%.



**Figure 3: EATR trend in selected EU economies.**  
Source: Authors’ own presentation based on OECD data.

Finally, the evolution of institutional indicators, government effectiveness and rule of law, are presented. The graphical evidence reveals substantial heterogeneity in institutional quality across the selected EU economies. These differences provide an initial indication that revenue performance may not depend solely on tax rates but

also on institutional capacity, which could influence compliance, enforcement, and overall fiscal effectiveness. Empirical evidence (Figure 4a) indicates that Denmark, the Netherlands, and Sweden consistently exhibit the highest levels of rule of law among the selected EU economies, although Sweden has recorded a slight decline since 2018, reaching 93.3. The most pronounced improvements over the observed period were achieved by Estonia and the Czech Republic, whose rule of law indicators increased from 76.9 to 89.6 and from 70.2 to 84.4, respectively, positioning them among the strongest institutional performers. Bulgaria and Romania remain the lowest-ranked countries in this dimension, despite observable improvements over time. In contrast, Greece is the only selected economy that experienced a substantial deterioration in rule of law, with its index declining from 77.4 to 57.7.

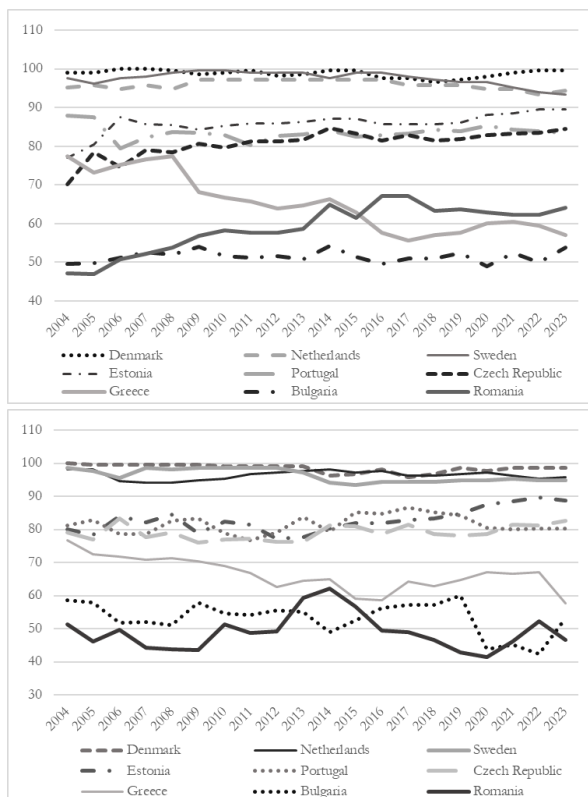


Figure 4: Rules of Law (a) and Government effectiveness (b) trends in selected EU economies.

Source: Authors' own presentation based on World Bank data.

Regarding the government effectiveness index (Figure 4b), Denmark records the highest value (98.6), followed by the Netherlands and Sweden. Portugal also displays a stable performance. Estonia and the Czech Republic demonstrate significant improvements, increasing from 80 to 88 and from 79 to 83, respectively. Conversely, Greece, Bulgaria, and Romania show declines in government effectiveness, with Greece experiencing the most pronounced reduction, from 76.6 to 57.4. Such institutional divergence is particularly relevant in the context of the Laffer framework, as stronger governance capacity may enhance tax administration, compliance, and the overall responsiveness of revenues to changes in tax policy.

#### 4 Methodology and Model Specification

The econometric framework, based on macro panel data, allows for the analysis of both short-run and long-run relationships over time and across the selected EU economies between the dependent variable, tax revenue (as a percentage of GDP), and the key explanatory variables: the Effective Average Tax Rate (EATR), EATR<sup>2</sup> (the quadratic specification of EATR which enables an empirical assessment of the Laffer-type nonlinearity), rule of law, and government effectiveness. The dataset constitutes a relatively large macro panel comprising nine EU economies ( $N = 9$ ). The sample is heterogeneous and can be divided into three subgroups: economies with high institutional quality (Denmark, the Netherlands, Sweden), medium institutional quality (Estonia, Portugal, Czech Republic), and low institutional quality (Greece, Bulgaria, Romania). The observation period spans 2004–2023 ( $T = 19$ ). The period was defined based on the 2004 EU enlargement and the availability of consistent EATR data across all selected economies. Accordingly, this study employs estimation techniques suitable for large- $T$  dynamic panels to test the proposed hypotheses (H1–H2), primarily through the comparison of Mean Group (MG) and Pooled Mean Group (PMG) estimators, alongside additional robustness checks using Panel Corrected Standard Error (PCSE).

PMG estimator, introduced by Pesaran, Shin, and Smith (1999), is designed for dynamic panel data models with large time dimensions. It allows short-run parameters, error variances, and adjustment dynamics to vary across cross-sectional units, while imposing homogeneity on the long-run coefficients. This specification is particularly suitable for heterogeneous panels in which economies may differ in short-run behavior but share a common long-run relationship. The Mean Group

(MG) estimator allows full heterogeneity across cross-sectional units, permitting both short-run dynamics and long-run coefficients to differ across panels. The Hausman test could be used to distinguish whether to use the MG or PMG estimator (Hausman, 1978). In the context of EU member states, the PMG framework enables convergence toward a homogenous long-run equilibrium, while permitting differences in the speed of adjustment across countries. As those methods are defined as panel error-correction models, the model could be described as:

$$\Delta y_{it} = \Phi_i(\Phi_i y_{i,t-1} - \theta x_{i,t-1}) + \sum_{j=1}^{p-1} \Lambda_{ij} \Delta y_{i,t-1} + \sum_{j=0}^{q-1} \gamma_{ij} \Delta x_{i,t-1} + u_{it} \quad (1)$$

where  $y_{it}$  is the dependent variable for economy  $i$  and time  $t$ ;  $\theta$  represents the common long-run relationship between observation units, while  $\Phi_i$  in the form of a model with equilibrium error correction represents the error correction parameter that captures the speed of adjustment towards the long-run equilibrium,  $\Lambda_{ij}$  represents the short-run coefficients of the lagged dependent variable, and  $\gamma_{ij}$  represents the short-run coefficients of the lagged independent variables.

Using the specification described, we estimated the following model:

$$\begin{aligned} \Delta taxrev_{it} = & \Phi_i(\Phi_i taxrev_{i,t-1} - \theta eatr'_{1i,t-1} - \theta eatr2'_{1i,t-1} - \theta law_{2i,t-1} - \\ & \theta goveff_{2i,t-1}) + \sum_{j=1}^{p-1} \Lambda_{ij} \Delta taxrev_{i,t-1} + \sum_{j=0}^{q-1} \gamma_{ij} \Delta eatr'_{1i,t-1} + \\ & \sum_{j=1}^{p-1} \Lambda_{ij} \Delta eatr2'_{1i,t-1} + \sum_{j=0}^{q-1} \gamma_{ij} \Delta law_{2i,t-1} + \sum_{j=0}^{q-1} \gamma_{ij} \Delta goveff_{i,t-1} + u_{it} \end{aligned} \quad (2)$$

where the dependent variable is *taxrev* which represents the tax revenue as percentage of GDP, in 9 EU economies (source: World Bank database), while the model also includes four independent variables: *eatr* shows the effective average tax rates for each EU economies, based on the Devereux/Griffith methodology available in the paper by Spengel et al. (2020) and OECD data base. This provided accurate data on the effective average tax rates, which we identified to be more reliable for our analysis than corporative tax rates ( $\beta_1 > 0$ ). *eatr2* is quadratic specification which is introduced to test for nonlinear revenue effects and to examine whether the tax–revenue relationship exhibits a Laffer-type functional form ( $\beta_2 < 0$ ). *law* represents rule of law index which captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as

well as the likelihood of crime and violence. Percentile rank indicates the country's rank among all countries covered by the aggregate indicator, with 0 corresponding to lowest rank, and 100 to highest rank (source: World bank database). *goveff* measures perceptions of the quality of public services, the quality of the civil service and its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to its policies (source: World bank database).

#### 4.1 Robustness Check – Panel-Corrected Standard Errors (PCSE)

Given that the baseline specification does not explicitly account for cross-sectional dependence, Panel-Corrected Standard Errors (PCSE) are employed to assess the robustness of the PMG results. Following the recommendation of Beck and Katz (1995), this approach is particularly suitable for panel settings characterized by heteroskedasticity and contemporaneous correlation across units. By correcting the variance–covariance matrix, PCSE produces more reliable and efficient standard errors (Castañeda Rodríguez, 2018). Specifically, the method addresses two key econometric concerns: (i) heteroskedasticity, reflected in unit- and time-specific error variance, and (ii) cross-sectional dependence, arising from contemporaneous correlation of disturbances due to common shocks or spillover effects. The empirical model can be formally expressed as follows:

$$y_{it} = b_0 + b_1X_{it} + b_2D_i + \mu_i + \Lambda_t + u_{it} \quad (3)$$

where  $X_{it}$  represents the independent determinants for  $i$  at time  $t$ ;  $D_i$  is a dummy variable in the model used to group economies and/or deviations in the empirical data;  $\mu_i$  represents individual effects; time effects are represented by  $\Lambda_t$ , while  $u_{it}$  represents stochastic disturbances. Thus, the model allows for accurate model estimates in the presence of heteroscedasticity and cross-sectional dependence (CSD).

Using the specification described, we estimated the following model:

$$taxrev_{it} = \alpha + b_1eatr_{1it} + b_2eatr_{2it} + b_3law_{3it} + b_4goweffe_{3it} + u_{it} \quad (4)$$

The econometric procedure follows a standard sequential approach. First, cross-CSD is tested. Second, given the presence of CSD, second-generation panel unit root tests are applied to determine the order of integration. Third, the Westerlund cointegration test is conducted to examine the existence of a long-run relationship among non-stationary variables. Subsequently, PMG and MG estimators are employed to estimate long-run and short-run dynamics, while the Hausman test is used to identify the preferred specification. Finally, robustness is assessed using the PCSE approach.

## **5 Empirical Results and Discussion**

The empirical analysis proceeds by examining both the short-run and long-run dynamic interactions among EATR, EATR<sup>2</sup> (its squared term), government effectiveness, rule of law, and tax revenue. Given the availability of EATR data, the panel covers nine EU economies over the period 2004–2023. As a preliminary step, CSD is tested using the Pesaran CD test. The results, reported in Table 1, reject the null hypothesis of cross-sectional independence for EATR, EATR<sup>2</sup>, government effectiveness, and tax revenue, indicating the presence of cross-sectional dependence in the panel. Such interdependencies are consistent with the high level of economic and institutional integration within the EU, which generates spillover effects across member states (Glavaški et al., 2022). Given the presence of cross-sectional dependence, the second-generation Pesaran (2007) CIPS panel unit root test was applied. The results indicate that the null hypothesis of a unit root cannot be rejected at levels, implying that EATR, EATR<sup>2</sup>, government effectiveness, rule of law, and tax revenue are non-stationary in levels. However, when first differences are considered, the null hypothesis of non-stationarity is rejected for all variables, confirming that they are stationary in the first differences (Table 1). Considering the detected cross-sectional dependence, cointegration was examined using the robust Westerlund test. The test results reject the null hypothesis of no cointegration, thereby supporting the existence of a long-run equilibrium relationship among the variables. Given the properties of the data, both the PMG and the MG estimators are suitable for estimating the dynamic panel model. The PMG estimator allows for heterogeneous short-run dynamics and adjustment speeds across economies while imposing homogeneity on the long-run coefficients, whereas the MG estimator permits full heterogeneity in both the short and long run. This framework is well suited to the structure of EU economies, which may differ in short-term responses

but may share common long-run fiscal relationships. Accordingly, both estimators are applied, and the appropriate specification is subsequently determined based on formal testing procedures (Table 2).

**Table 1: Pesaran CD test, Pesaran CIPS test and Westerlund cointegration test.**

	Pesaran CD test	$\rho$ -values	Lags	CIPS test; level	$\rho$ -values	CIPS test; first differences	$\rho$ -values	Westerlund cointegration test	$\rho$ -values
<b>Sample: 9 EU economies; period 2004-2023</b>									
<b>Tax revenue</b>	3.23	0.001	0	-0.821	0.206	-	0.001	Gt -2.357	0.001
			1	-0.394	0.347	-	0.000		
			2	1.518	0.936	0.475	0.000		
<b>EATR</b>	11.35	0.000	0	-2.023	0.022	-	0.049	Ga -0.778	0.000
			1	-0.276	0.391	-	0.036		
			2	-1.088	0.138	-	0.008		
<b>EATR<sup>2</sup></b>	13.60	0.000	0	-2.253	0.012	-	0.016	Ga -0.778	0.000
			1	-1.466	0.071	-	0.006		
			2	-2.033	0.021	-	0.031		
<b>Government effectiveness</b>	-2.32	0.020	0	-0.430	0.334	-	0.023	Pt -2.745	0.000
			1	0.700	0.758	-	0.006		
			2	0.703	0.759	-	0.007		
<b>Rule of Law</b>	-0.86	0.391	0	-1.902	0.029	-	0.012	Pa -0.385	0.002
			1	-1.262	0.103	-	0.006		
			2	1.836	0.967	-	0.031		

Source: Authors' own calculations based on Stata 15.

The MG estimator does not yield evidence of a statistically significant long-run relationship between EATR, EATR<sup>2</sup>, government effectiveness, and rule of law on tax revenue. By contrast, the PMG estimates indicate a positive and statistically significant ( $p < 0.05$ ) long-run relationship between tax revenue and EATR, while the negative coefficient on the squared term (EATR<sup>2</sup>) supports the existence of a Laffer curve (confirmation of the Hypothesis H1). Based on the PMG long-run estimates, the implied revenue-maximizing EATR is approximately 16.8%, calculated as  $\hat{\tau} = -\beta_1 / (2\beta_2)$ , where  $\beta_1$  and  $\beta_2$  denote the coefficients on EATR and

its squared term (EATR<sup>2</sup>), respectively. This represents the turning point of the estimated Laffer-type relationship, beyond which further increases in the effective capital tax burden are associated with declining tax revenues. The result provides a clear policy-relevant threshold for tax design within the analyzed EU economies. Government effectiveness and the rule of law also enter positively and significantly ( $p < 0.05$ ), reinforcing the role of institutional quality in sustaining public revenues. The Hausman test ( $p = 0.5959$ ) favors the PMG specification, indicating that the restriction of homogeneous long-run coefficients is not rejected, an outcome consistent with a common monetary framework in the euro area combined with coordinated, albeit heterogeneous, national tax policies.

**Table 2: PMG and MG estimator results for homogeneous coefficient for 9 EU economies for the period 2004-2023.**

Source: 9 EU economies for period 2004 to 2023.									
Dependent variable: Tax revenue		Long-Run ( $\theta$ )		Error-Correction ( $\Phi_i$ )		Constant		Short-Run Equilibrium	
		Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
MG	EATR	13.465	0.358	-	0.000	1.501	0.960	-	0.244
	EATR <sup>2</sup>	-0.607	0.334					2.494	0.227
	Government effectiveness	0.140	0.590					0.014	0.767
	Rule of Law	-0.732	0.087					0.093	0.551
PMG	EATR	1.145	0.050	-	0.010	3.722	0.031	-	0.021
	EATR <sup>2</sup>	-0.034	0.039					3.366	0.024
	Government effectiveness	0.249	0.000					-	0.077
	Rule of Law	0.212	0.000					0.048	0.052
Hausman test		$\chi^2$				p-value			
		2.78				0.5959			

Source: Authors' own calculations based on Stata 15.

Table 3: PMG and MG estimator results for heterogenous coefficient for 9 EU economies for the period 2004–2023.

Source: 9 EU economies for the period 2004 to 2023												
PMG	Error-Correction		EATR		EATR <sup>2</sup>		Government effectiveness		Rule of law		Constant	
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
<b>High institutional quality</b>												
Denmark	-0.782	0.000	3.155	0.067	-0.046	0.006	0.457	0.018	0.673	0.036	16.141	0.026
Netherlands	-0.421	0.050	1.168	0.096	-0.022	0.019	0.037	0.007	-0.143	0.312	0.266	0.776
Sweden	-0.667	0.026	4.771	0.042	-0.112	0.035	0.014	0.005	0.092	0.048	2.641	0.324
<b>Medium institutional quality</b>												
Estonia	-0.522	0.018	-2.799	0.024	-0.099	0.117	0.174	0.034	0.083	0.048	4.873	0.347
Portugal	0.047	0.006	0.124	0.039	-0.002	0.052	0.026	0.089	0.100	0.048	-0.423	0.073
Czech Republic	-0.073	0.018	0.039	0.077	-0.006	0.043	0.074	0.061	0.038	0.062	0.159	0.790
<b>Low institutional quality</b>												
Greece	-0.126	0.037	-0.281	0.659	0.005	0.665	-0.020	0.782	-0.081	0.385	1.967	0.175
Bulgaria	-0.149	0.024	-0.581	0.586	0.022	0.576	-0.054	0.209	-0.054	0.625	1.498	0.306
Romania	-0.552	0.000	-19.959	0.033	0.543	0.029	-0.113	0.001	0.010	0.008	6.381	0.212

Source: Authors' own calculations based on Stata 15.

In line with the Hausman test results, the PMG estimator is retained as the efficient specification, therefore cross-country heterogeneity in short-run coefficients and error-correction terms, are reported in Table 3. The error correction term is negative and statistically significant in all observed economies, confirming the existence of a long-run equilibrium and validating the PMG framework. The speed of adjustment varies considerably across countries. Denmark and Sweden, representing economies with high institutional quality, exhibit the fastest adjustment toward the long-run equilibrium (75.2% and 66.7%, respectively). The higher speed of adjustment observed in these economies may reflect stronger institutional capacity, more efficient tax administration, and higher levels of compliance, which facilitate a faster correction of short-run deviations from the long-run equilibrium.

In high institutional quality economies (Denmark, the Netherlands, and Sweden), the results provide the strongest evidence of a Laffer-type relationship. The coefficient on EATR is positive and statistically significant (3.155, 1.168, 4.771; respectively), whereas the squared term (EATR<sup>2</sup>) is negative and significant (-0.046, -0.022, -0.112; respectively). This confirms a concave revenue–tax relationship, consistent with the existence of a revenue-maximizing tax rate. Moreover, government effectiveness and rule of law display positive and statistically significant effects in Denmark and Sweden, indicating that stronger institutional frameworks enhance tax compliance and revenue performance. These findings suggest that high-quality economies can sustain relatively higher EATR without triggering revenue erosion, implying an outward shift of the Laffer curve and a higher revenue-maximizing threshold (Hypothesis H1).

The medium institutional quality group (Estonia, Portugal, and the Czech Republic) exhibits a more heterogeneous pattern. Portugal shows evidence consistent with a Laffer structure, as the linear EATR term is positive and significant (0.124) and the quadratic term negative and marginally significant (-0.002). The results for the Czech Republic indicate the presence of nonlinear revenue dynamics, although the linear component is relatively modest. In contrast, Estonia displays a negative and significant linear term (-2.799), suggesting proximity to or positioning beyond the revenue-maximizing rate. Institutional indicators are less robust in this subgroup, implying that governance quality plays a limited role in shaping revenue responsiveness to capital taxation. Overall, the Laffer mechanism appears present but structurally weaker and more sensitive to governance constraints.

In low institutional quality economies (Greece, Bulgaria, and Romania), the revenue response to EATR is weakest and least stable. Greece and Bulgaria show no statistically significant relationship between EATR and revenues. Romania, however, presents a negative and significant coefficient for EATR ( $-19.959$ ) and a positive coefficient for its squared term ( $0.543$ ), suggesting a convex relationship between capital taxation and tax revenues. This result indicates that increases in capital taxation are initially associated with declining revenues, reflecting a pattern that differs from the concave Laffer-type relationship observed in some other economies. Such a pattern may be associated with weaker compliance, higher levels of informality, and institutional inefficiencies that limit the effectiveness of capital taxation. Institutional indicators in this group are generally insignificant, reinforcing the interpretation that weak governance structures undermine fiscal capacity.

Overall, the findings provide empirical support for Hypothesis H2, indicating that institutional quality conditions the revenue effects of capital taxation in both the short- and long-run. Higher governance effectiveness and rule of law are associated with greater revenue responsiveness, whereas weaker institutional environments appear to constrain fiscal capacity.

### **5.1 Robustness check (PCSE)**

To verify the stability of the findings, a robust analysis is conducted using the PCSE estimator. The preceding results indicate that EATR,  $EATR^2$ , government effectiveness, and the rule of law are non-stationary but cointegrated, while the panel exhibits heterogeneity and cross-sectional dependence. Under such conditions, conventional panel estimators may yield inefficient inference. Beck and Katz (1995) advocate the PCSE approach in panels characterized by heteroskedasticity, autocorrelation, and contemporaneous correlation across units. Accordingly, PCSE is implemented to examine whether the main results remain robust to alternative variance-covariance corrections.

The PCSE estimates (Table 4) reinforce the baseline PMG results, confirming a positive and statistically significant long-run relationship between EATR and tax revenue. Quantitatively, an increase in EATR ( $0.226$ ;  $p < 0.05$ ) is associated with higher revenue performance across EU economies over the 2004–2023 period. The negative and significant coefficient on the squared term,  $EATR^2$  ( $-0.008$ ;  $p < 0.05$ )

provides robust evidence of a Laffer-type nonlinearity, indicating diminishing marginal revenue effects at higher effective tax rates. Institutional quality, proxied by government effectiveness and the rule of law, also exerts a positive and statistically significant influence (0.300 and 0.146, respectively;  $p < 0.05$ ), underscoring the role of institutional strength in sustaining fiscal capacity.

**Table 4: Results estimated using the PCSE method for 9 EU economies from 2004 to 2023 to check the robustness of the results.**

Dependent variable: Tax revenue	Robust check – 9 EU economies; period 2004-2023		
	Coefficient $\beta'_i$	Standard error	<i>p</i> -value
EATR	0.226	0.291	0.037
EATR <sup>2</sup>	-0.008	0.007	0.029
Government effectiveness	0.300	0.049	0.000
Rule of law	0.146	0.054	0.007
Cons	11.541	1.966	0.000
R <sup>2</sup>	0.3408		
Wald chi2	631.60		
Number of obs.	177		

Source: Authors' own calculations based on Stata 15.

## 5.2 Limitations

Despite its contributions, this analysis is subject to several limitations. First, the relatively small cross-sectional dimension ( $N = 9$ ) may limit the generalizability of the findings and increase the sensitivity of the results to country-specific characteristics. Second, while the PMG and MG estimators allow for heterogeneity in short-run dynamics, they rely on assumptions that may not fully capture structural differences across EU economies. In particular, both estimators are potentially affected by cross-sectional dependence arising from common shocks and strong economic interlinkages within the EU, which may bias the estimated coefficients if not explicitly accounted for. To partially mitigate this issue, robustness checks were conducted using PCSE, which help control for cross-sectional correlation and heteroskedasticity. Future research could address these limitations by extending the sample to a larger set of countries and by applying more advanced panel techniques that explicitly account for cross-sectional dependence. Although the analysis provides evidence of heterogeneous patterns in the tax–revenue relationship across institutional contexts based on coefficient comparisons, a formal statistical test of coefficient equality across country groups (e.g., Wald tests) could not be

implemented due to limitations related to model specification within the dynamic panel framework. Therefore, differences across institutional groups are interpreted based on the magnitude and statistical significance of the estimated coefficients.

## 6 Conclusion

This paper shows that the relationship between capital taxation and public revenues in the selected nine EU economies is nonlinear and institutionally conditioned. The PMG estimates indicate a positive long-run effect of the EATR on revenues and a negative coefficient on its squared term ( $EATR^2$ ), consistent with a concave Laffer-type relationship. The significant error-correction term confirms stable long-run equilibrium with heterogeneous short-run adjustments across countries. The analysis further identifies a revenue-maximizing EATR of approximately 16.8%, providing a clear policy-relevant threshold for capital taxation in the studied EU economies.

The findings further suggest that institutional quality influences the strength and pattern of the revenue response. In high-quality economies such as Denmark, the Netherlands, and Sweden, stronger governance frameworks are associated with greater revenue resilience and a more conventional concave Laffer-type relationship between capital taxation and tax revenues. In contrast, in lower-quality institutional environments such as Romania, institutional constraints appear to limit fiscal capacity and weaken the effectiveness of higher capital taxation, consistent with the convex revenue patterns identified in the empirical results. Medium-quality economies exhibit intermediate and more heterogeneous dynamics.

From a policy perspective, the findings suggest that the effectiveness of capital taxation depends critically on institutional quality. In well-governed economies, moderate increases in effective capital taxation may remain revenue-supportive. In contrast, in weaker institutional environments, raising tax rates alone is unlikely to improve revenues, highlighting the need to strengthen tax administration, enforcement, and legal frameworks. These results imply that tax policy design should be adapted to country-specific institutional conditions rather than applied uniformly across economies.

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