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The Impact of Fiscal Decentralization on Income Inequality

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Kurzfassung

Diese Arbeit untersucht den Zusammenhang zwischen fiskalischer Dezentralisierung und Einkommensungleichheit, wobei analysiert wird, wie sich verschiedene Dimensionen der fiskalischen Dezentralisierung – Einnahmen- und Ausgaben-Dezentralisierung – auf entwickelte und Entwicklungsländer auswirken. Die Analyse umfasst 30 entwickelte und 19 Entwicklungsländer im Zeitraum von 2005 bis 2020. Es werden verschiedene Modelltypen verwendet: lineare, nichtlineare sowie Interaktionsmodelle, und außerdem werden Probleme der Endogenität berücksichtigt. Die Ergebnisse zeigen ein gemischtes Bild. In entwickelten Ländern deutet vieles auf einen U-förmigen Zusammenhang zwischen Dezentralisierung und Ungleichheit hin. Für Entwicklungsländer hingegen sind die Ergebnisse nicht schlüssig, da sich über die Modelle hinweg kein konsistentes Muster erkennen lässt.

Abstract

Looking at 30 developed countries and 19 developing countries during a time span of 2005–2020, this paper investigates the relationship between fiscal decentralization and the overall level of income inequality across countries. It analyzes how different dimensions of fiscal decentralization—revenue and expenditure decentralization—affect both developed and developing countries, considering different model types: linear, nonlinear, and interaction models, while also addressing endogeneity concerns. The results show mixed findings, suggesting that in developed countries, fiscal decentralization tends to affect income inequality in a U-shaped way. For developing countries, however, the findings are not conclusive, with no consistent pattern emerging across models.

The student confirms that AI tools, specifically ChatGPT by OpenAI, were used to support language refinement and table formatting in this thesis. No AI-generated content was submitted without review or modification, and all analysis and academic interpretations were carried out independently by the author.

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1. Introduction

Governments worldwide face the challenge of balancing centralized control with regional autonomy, particularly in managing public finances and resource allocation. A key strategy to address this governance challenge is decentralization. "Decentralization includes the transfer of power and resources away from the central government" (Schneider, 2003). In this way, decentralization can be understood through three core dimensions: political, fiscal, and administrative decentralization. (Schneider, 2003).

Political decentralization explains to what extent decision-making power is transferred to elected local representatives. Whereas administrative decentralization involves the transfer of administrative tasks to the regional level, while decision-making power remains at the national level. Finally, fiscal decentralization aims to redistribute financial authority by giving subnational governments control over revenue collection and public spending. While decentralization englobes multiple aspects, this study focuses solely on fiscal decentralization and its effect on income inequality.

Fiscal decentralization involves the devolution of financial responsibilities from the central government to subnational administrative units, allowing local governments to make independent financial decisions regarding both revenue generation and public expenditure allocation (Oates, 1972/1999). On the one hand, revenue decentralization grants subnational governments the authority to collect taxes and levies, such as property taxes or local business fees, ensuring a degree of financial independence. Expenditure decentralization, on the other hand, gives local governments the power to allocate resources according to regional priorities, such as funding education, infrastructure, and healthcare. Over the past few decades, fiscal decentralization has gained traction as a governance strategy in many countries. In Canada, for instance, subnational governments account for 54.32% of total revenues and for 66.51% of total expenditures. Similarly, in Sweden, local authorities control 30.91% of total revenues and 48.64% of total expenditures, demonstrating the significant role of fiscal decentralization in developed nations. However, many developing countries are still in the early stages of this transition. For example, in Costa Rica, these figures stand at 4.30% and 4.35% (OECD, 2022). These disparities underline a key challenge in fiscal decentralization. While many countries are shifting toward greater fiscal decentralization, developing nations tend to give subnational governments only limited collecting and spending powers. Crucial questions arise considering the broader implications of fiscal decentralization, particularly regarding its effects on income inequality. Understanding these dynamics is essential for assessing whether fiscal decentralization

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serves as a mechanism for reducing disparities or, conversely, contributes to widening them.

Although numerous studies have been undertaken, the connection between fiscal decentralization and income inequality remains ambiguous. Therefore, the main goal of this research is to contribute to the growing literature on fiscal decentralization by bringing in new perspectives. The main research question of this paper is: *"How does fiscal decentralization affect the overall income inequality in a country?"* This question will be addressed through a comparative analysis of developed and developing countries, distinguishing between revenue and expenditure decentralization while considering the moderating role of economic development, institutional quality, and government size.

While previous studies have examined individual aspects of fiscal decentralization, such as revenue vs. expenditure decentralization, developed vs. developing country comparisons, and moderating institutional factors, no study has systematically combined all these dimensions into a single empirical analysis. In that sense, the contribution of this study lies in providing a comparative analysis of how fiscal decentralization affects income inequality in both developed and developing countries, addressing the lack of cross-country perspectives. This research differentiates between revenue and expenditure decentralization, recognizing that these two dimensions may have distinct effects. The study examines the moderating role of governance quality, government size, and economic development. Furthermore, it tests for nonlinear effects, exploring whether fiscal decentralization follows a threshold pattern in its impact on inequality, which has been largely overlooked in previous research. By using more recent and comprehensive data ranging from 2005 to 2020, it ensures greater relevance and robustness in its findings. Through these contributions, this research aims to provide a clearer and more nuanced understanding of the relationship between fiscal decentralization and income inequality, addressing the ambiguities and inconsistencies in the existing literature on this topic.

The structure of this thesis is as follows. The second chapter presents a literature review, separately examining theoretical foundations and empirical studies. This section highlights the ambiguities and mixed findings in the academic literature. The third chapter outlines the empirical strategy and describes the data used in the analysis. The fourth and fifth chapters interpret the results and draw conclusions.

2. Literature Review

2.1. Theoretical Literature

The theoretical basis for fiscal decentralization is significantly rooted in Oates' Decentralization Theorem (1972; revisited in 1999), which posits that the transfer of fiscal responsibilities to subnational governments promotes higher efficiency in public service delivery. Oates' main point is that local governments are better suited to balance resources and tailor policies to their citizens' preferences because they are closer to them. In other words, local governments have more information on local preferences and conditions, allowing them to design policies and allocate resources more effectively than a centralized government. This idea about efficiency has been extended to claim that fiscal decentralization can also mitigate income inequality. If subnational governments have more control over their own finances, they can implement redistributive policies more effectively, allowing for the redistribution of resources to prevent growing regional imbalances. Furthermore, decentralization encourages competition between local governments, stimulating innovation and enhancing economic growth. However, Oates' theorem relies on key assumptions: household preferences must vary between territorial units, there must be no significant external effects, and the marginal and average costs of public goods provision must be uniform across all regions. These conditions are critical for fiscal decentralization to yield efficient outcomes.

Weingast's (2009) Second Generation Fiscal Federalism goes beyond Oates' theorem, recognizing that decentralization creates incentive structures. Weingast's paper shifts the focus from purely economic efficiency to the institutional and political incentives that shape fiscal decentralization outcomes. Although his theorem aligns with that of Oates, stating that fiscal decentralization is said to improve efficiency, he also argues that fiscal decentralization leads to an improvement of transparency and responsibility by increasing the responsibility of local governments for their fiscal policies. However, in Weingast's opinion, the impact of fiscal decentralization on income inequality depends on the design of intergovernmental fiscal relations. If local governments lack proper fiscal autonomy or if decentralization occurs in the absence of institutional checks and balances, it may increase regional and income disparities rather than reduce them.

In that way, Weingast (2009) already shows us that fiscal decentralization does not come without challenges. Prud'homme (1995) provides a major theoretical critique of

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Oates' Decentralization Theorem. He argues that decentralization in all of its dimensions has a different effect on developing countries due to their pre-existing high regional inequalities. In that sense, decentralization could lead to an increase in income inequality in developing countries because wealthier regions have greater administrative capacity and fiscal resources to deliver better public services, while poorer regions struggle to meet basic needs. As a result, according to Prud'homme (1995), disparities in governance structures and revenue-generating capacity among local governments may result in growing regional inequalities.

Similar to Weingast (2009), Bird & Zolt (2005) argue that fiscal decentralization can worsen income inequality if the right tax policies are not in place. Their statement relies on the fact that local governments often do not have strong tax systems, especially in developing countries, leading them to rely on regressive taxes, such as sales and consumption taxes. These kinds of taxes, however, hit poorer people harder, as they have to spend a larger portion of their income on basic goods. This is why local governments need progressive taxes, like income taxes, where richer people pay more, or financial support from the central government, to help poorer regions avoid struggling to raise enough money for essential public services.

Therefore, although the theoretical literature shows that fiscal decentralization is used as a tool to improve efficiency, its effect on income inequality is ambiguous and very contextual, depending on the governance environment and the institutional structure.

2.2. Empirical Literature

Many studies have focused on the relationship of fiscal decentralization on income inequality. However, these existing studies vary significantly from each other in terms of methodology, measurement of fiscal decentralization, countries, and time periods covered. Most papers employ a linear panel data approach, such as fixed effects or random effects models (Sacchi & Salotti, 2014), while others utilize nonlinear regression techniques (Canare et al., 2019). Some studies focus exclusively on OECD countries (Stossberg et al., 2016), others on non-OECD countries (Siburian, 2020), and some combine both in a broader cross-country analysis. Similarly, while some papers examine only the revenue side of fiscal decentralization (Neyapti, 2006), others focus on expenditure decentralization (Sepulveda & Martinez-Vazquez, 2011), and some consider both dimensions of fiscal decentralization (Tselios et al., 2012). These methodological and contextual differences contribute to the mixed and ambiguous findings, which can be categorized into three groups.

On the one hand, several studies have concluded that fiscal decentralization can indeed reduce income inequality. Stossberg et al. (2016) analyzed the effect of revenue and expenditure decentralization on the Gini coefficient in OECD countries. They found that

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when subnational governments have greater control over revenues, inequality decreases. However, expenditure decentralization does not appear to have a significant direct effect on inequality. This finding was further confirmed by Neyapti (2006), who examined the effect of revenue decentralization on income disparities in a group of developed and developing countries. Similarly, Tselios et al. (2012) concluded that a higher degree of fiscal decentralization reduces regional inequality within countries.

On the other hand, there exist papers that conclude that fiscal decentralization has an increasing effect on income inequality. In that way, Beramendi (2003) states that a higher level of decentralization allows regions to make independent decisions about redistribution. As a result, some regions may choose to invest more in public services and social support, while others may not, leading to a more unequal income distribution across the country. Moreover, Sacchi & Salotti (2014) figured out that tax decentralization worsens income inequality, while expenditure decentralization shows no significant effect on inequality. Furthermore, Morelli & Seaman (2007) observe positive estimates in their regressions analyzing the effect of fiscal devolution on overall income inequality in the UK. However, since the coefficients were not statistically significant, they draw no definitive conclusions.

Lastly, some studies find mixed effects or suggest that the relationship between income inequality and fiscal decentralization depends on contextual factors. In this regard, Bojanic & Collins (2019) found that in developing countries, fiscal decentralization generally tends to reduce income inequality. However, this effect weakens and eventually reverses as economic development increases. Regarding developed countries, they do not find a clear relationship. Similarly, Goerl & Seiferling (2014) and Sepulveda & Martinez-Vazquez (2011) found that fiscal decentralization increases income disparities only when government size is small. If government size is large, exceeding 20% of GDP, according to Sepulveda & Martinez-Vazquez (2011), it has a positive effect, decreasing the income gap within a country.

These mixed findings show the need for further investigation into the complex relationship between fiscal decentralization and income inequality, proving the significance of this study.

3. Methodology

This section outlines the methodology of this study to examine the effect of fiscal decentralization on income inequality. The study works with a panel data approach to capture country-specific characteristics as well as fluctuations over time. The analysis proceeds in three stages: (1) a baseline linear model, (2) a nonlinear model adding a quadratic term for fiscal decentralization, and (3) an interaction model to examine moderating effects.

3.1. Regression Model

As a first step, a baseline regression model inspired by Sacchi & Salotti (2014) will be applied. Building on their methodology, this study aims to estimate the regression using either a fixed-effects or random-effects model. A fixed-effects model controls for unobserved heterogeneity across countries and regions that remains constant over time. It captures the impact of changes in fiscal decentralization within each country. A random-effects model accounts for both within-country and between-country variations under the assumption that unobserved country-specific factors are uncorrelated with the explanatory variables. The choice between a fixed-effects or random-effects model will be based on the outcome of the Hausman test.

In this context, the following baseline model will be employed:

$$\text{Inequality}_{it} = \alpha + \beta_1 \cdot \text{DEC}_{it} + \gamma \cdot X_{it} + u_i + \epsilon_{it} \quad (3.1)$$

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Table 3.1.: List of Variables Used in the Regression Analysis

Variable	Description
Dependent Variable	
Income Inequality (Inequality_{it})	The Gini coefficient, measuring the overall income inequality in a country.
Key Independent Variables	
Fiscal Decentralization Indicators (DEC_{it})	Revenue Decentralization: The ratio of subnational government revenue to total general government revenue.
	Expenditure Decentralization: The ratio of subnational government spending to total general government spending.
Control Variables ($\mathbf{X}_{it}$)	
Log Gdp per Capita	The natural logarithm of GDP per capita, which serves as a proxy for overall income levels.
Urban Population	Share of the population living in urban areas; often linked to wage dispersion.
Government Effectiveness	Measures the quality of governance, including public services, administrative capacity, and policy implementation. The indicator ranges from -2.5 (less effective) to 2.5 (more effective).
Trade Openness	The sum of exports and imports as a percentage of GDP; indicates the extent of a country's integration into the global economy.
Human Development Indicator (HDI)	Proxy for economic development; A composite measure of health (life expectancy), education (mean and expected years of schooling), and income per capita; reflects the overall quality of life and standard of living. It ranges from 0 to 1, with higher values indicating higher levels of human development.
Government Size	The share of government expenditure in GDP; often associated with redistribution policies and public service provision.
Unemployment	The percentage of the labor force that is unemployed but actively seeking work; indicates labor market conditions and economic health.
Additional Components	
Intercept (α)	The constant term representing the baseline level of income inequality when all other variables are zero.
Unobserved heterogeneity (u_i)	Time-invariant characteristics specific to each country or region, such as cultural or historical factors, absorbed by the fixed-effects model.
Idiosyncratic error (ϵ_{it})	The random error term accounting for unobserved factors that vary across time and entities.

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In a second step, the study will include a quadratic term in the baseline model in order to investigate whether fiscal decentralization has a nonlinear effect on income inequality:

$$\text{Inequality}_{it} = \alpha + \beta_1 \cdot \text{DEC}_{it} + \beta_2 \cdot \text{DEC}_{it}^2 + \gamma \cdot X_{it} + u_i + \epsilon_{it} \quad (3.2)$$

where DEC_{it}^2 captures potential threshold effects.

In the third step, the baseline model will be extended to include interaction or moderator terms, enabling an empirical examination of whether and how the effect of one variable on another depends on the presence or magnitude of a third variable. This approach may give better insight into possible contextual factors that shape the relationship between the main variables of interest.

$$\text{Inequality}_{it} = \alpha + \beta_1 \cdot \text{DEC}_{it} + \beta_2 \cdot \text{Moderator}_{it} + \beta_3 \cdot (\text{DEC}_{it} \times \text{Moderator}_{it}) + \gamma \cdot X_{it} + u_i + \epsilon_{it} \quad (3.3)$$

This regression will be conducted for three specific moderator variables: Government Size, Government Effectiveness, and the Human Development Index. The interaction terms are grounded in findings from previous studies: Sepulveda and Martinez-Vazquez (2011) and Goerl & Seiferling (2014) for the role of Government Size, Neyapti (2006) for Government Effectiveness, and Bojanic & Collins (2019) for the Human Development Index, all of which underscore the significance of institutional and economic contexts in shaping the outcomes of fiscal decentralization. It is also important to note that if fiscal decentralization exhibits a nonlinear relationship with income inequality, as tested in the previous model, then the equation (3.3) will be further augmented with a quadratic term for fiscal decentralization and its interaction with the moderator variable.

Endogeneity

Endogeneity presents a common challenge in panel data analysis and must be addressed to ensure valid statistical inference (Barros et al., 2020). Endogeneity arises when the independent variable, in this case fiscal decentralization, is correlated with the error term. In this way, endogeneity violates the OLS assumptions, leading to biased estimates. That is why it is important to address this concern, which is often sourced from omitted variables, simultaneity, and measurement error. Regarding the topic of fiscal decentralization, the main concern lies in simultaneity, as well as the potential influence of omitted variables. The existing literature presents mixed findings on endogeneity concerns. While almost every study acknowledges the issue, some papers, such as Bojanic & Collins (2019), conclude that fiscal decentralization is exogenous and does not pose a major concern. In contrast, others, such as Stossberg et al. (2016), argue that fiscal decentralization is

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endogenous and significantly affects income inequality. To address this major endogeneity concern, this paper will, on the one hand, use a control function (CF) approach, as it also accounts for heteroskedasticity and nonlinearity, unlike other instrumental variable approaches. In general, a CF approach consists of including the estimated residuals from the first-stage regression as additional control variables in the second-stage equation, thus correcting for endogeneity by explicitly modeling the correlation between the endogenous explanatory variable and the error term. On the other hand, this study will use a two-stage least squares method, implementing one-period lagged values of all regressors as instruments, inspired by Bojanic & Collins (2019). This serves as a robustness check that confirms the validity of the endogeneity issue. Both approaches will be applied to all regression equations. If the results show no signs of endogeneity, it will still serve as a robustness check to confirm the validity of the findings. If evidence of endogeneity is detected, the study will rely on the corrected results for its conclusions.

3.2. Data & Variables

The dataset for this study covers a balanced panel of 49 countries, including 30 developed and 19 developing countries, observed over the period from 2005 to 2020.

3.2.1. Dependent Variable: Income Inequality

In this analysis, the country-year level measurement of national income inequality serves as the dependent variable. In order to ensure a comprehensive understanding, the study uses the Gini coefficient, as it is the most widely used empirical measure for inequality.

The Gini coefficient measures the level of inequality in the income distribution relative to the hypothetical situation of perfect equality. It ranges from 0, where income is equally distributed among everyone, to 1, where all income is held by one person. An increasing Gini coefficient indicates growing income disparity. In this study, the Gini Index is multiplied by 100 to increase the precision of the values.

The boxplot in Figure 3.1 and summary statistics in Tables 3.2 and 3.3 show evident differences between developing and developed countries regarding income inequality. The average Gini coefficient of developed countries (32.03) is lower than that of developing countries (41.0), showing that developed countries have an overall lower income disparity. The spread in Gini coefficients is also considerably larger in developing than developed countries, as can be observed from the lower standard deviation (4.11 as opposed to 11.1) and the interquartile range from the boxplot. In contrast, developing countries show not only higher average inequality but also greater volatility, with a wide range from 15.2 to 74.2, suggesting that some developing countries experience extreme levels of income inequality. Outliers in the developing country group further highlight the uneven income

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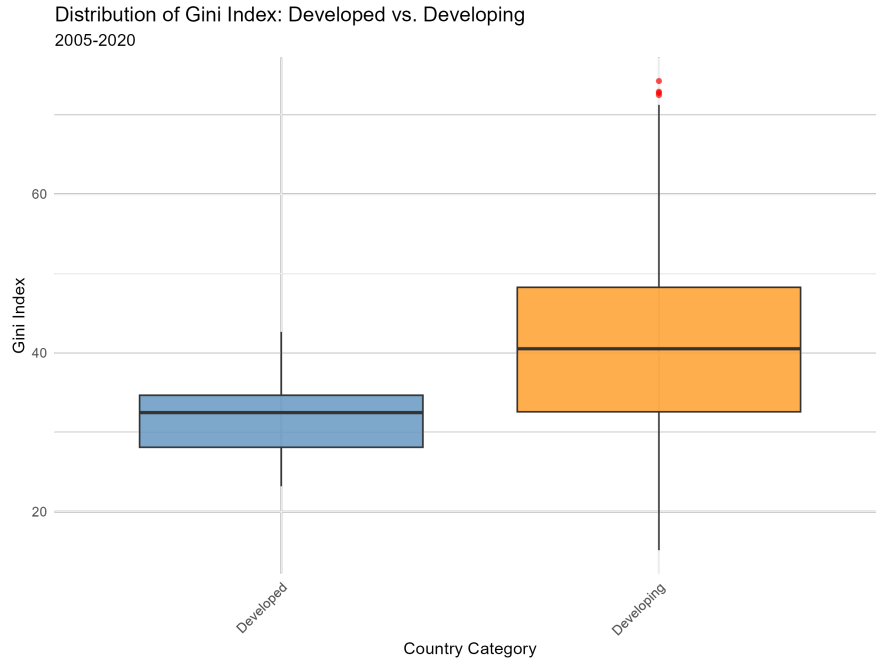


Figure 3.1.: Boxplot of Gini Index Distribution for Developed and Developing Countries (2005–2020)

distributions in specific nations, whereas no significant outliers are observed for developed countries.

However, it is worth noting that the lower volatility of Gini coefficients in developed countries may pose challenges for regression analysis, as it could reduce the explanatory power, shown by the R^2 and so the overall significance of the regression model.

All dependent variables, namely the Gini coefficient as well as the percentile ratios, are derived from the World Income Inequality Database (WIID).

3.2.2. Independent Variables: Fiscal Decentralization

The main independent variable in this study is fiscal decentralization, which refers to the degree to which subnational governments have control over their own finances. This paper explores this concept by examining the two dimensions of fiscal decentralization separately, as identified by Schneider (2003):

- **Expenditure Decentralization:** This refers to the proportion of total public expenditure directly managed by subnational governments. It excludes funds transferred to other government levels and focuses on spending decisions controlled by

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local or state governments. The expenditure decentralization indicator is calculated as the ratio of subnational government spending to total general government spending in a given country.

- **Revenue Decentralization:** This indicates the share of total government revenue generated or managed by subnational governments. It excludes revenues that subnational governments receive as transfers or grants from higher government levels or international organizations. The revenue decentralization indicator is calculated as the ratio of subnational government revenue to total general government revenue in a given country.

For developing countries, both indicators are sourced from the IMF Fiscal Decentralization Dataset, which applies standardized formulas in line with international norms established by the Government Finance Statistics Manual (GFSM) 2014. To address a small number of missing values in the IMF dataset, interpolation techniques were applied to maintain data continuity and comparability between countries. For developed countries, data are sourced from the OECD, which measures decentralization as the combined share of local and state government fiscal activity, excluding the share of the central government. Comparing both datasets, no significant differences were observed between the OECD and IMF datasets.

Table 3.2.: Summary Statistics: Developing Countries

Variable	Mean	Std Deviation	Minimum	Maximum
GINI Index	41.0	11.1	15.2	74.2
Urban Population (%)	64.1	14.2	37.4	87.7
Government Effectiveness	-0.0882	0.628	-1.21	1.50
Trade (% of GDP)	87.2	31.8	22.1	185.0
Government Size (% of GDP)	14.8	3.62	6.73	23.8
Unemployment (%)	8.59	7.15	0.249	31.1
GDP per Capita (Log)	8.67	0.716	6.90	10.9
Revenue Decentralization (%)	14.4	19.0	0.284	89.1
Expenditure Decentralization (%)	24.2	19.7	1.90	81.6
Human Development Index (HDI)	0.754	0.0517	0.632	0.933
<i>Note:</i> All variables have 304 observations unless otherwise specified.				

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Table 3.3.: Summary Statistics: Developed Countries

Variable	Mean	Std Deviation	Minimum	Maximum
GINI Index	32.03	4.11	23.77	42.65
Urban Population (%)	77.06	11.20	51.53	98.08
Government Effectiveness	1.35	0.49	0.12	2.35
Trade (% of GDP)	103.02	58.80	23.08	382.35
Government Size (% of GDP)	20.07	3.35	10.42	28.07
Unemployment (%)	7.60	4.11	2.02	27.69
GDP per capita (Log)	10.50	0.58	8.89	11.72
Revenue Decentralization (%)	19.73	14.17	2.49	56.40
Expenditure Decentralization (%)	30.88	15.65	5.60	69.10
Human Development Index (HDI)	0.90	0.03	0.807	0.963

Note: All variables have 480 observations unless otherwise specified.

Tables 3.2 and 3.3 show that developing countries exhibit lower average levels of revenue decentralization (14.4%) and expenditure decentralization (24.2%) compared to developed countries (19.73% and 30.88%, respectively). These differences reflect the more centralized fiscal structures in developing economies.

3.2.3. Control Variables

This study includes control variables to isolate the unique effect of fiscal decentralization on income inequality. The control variables address omitted variable bias and confounding factors, which helps to better clarify the impact of fiscal decentralization on income inequality. Theoretical and empirical literature both suggest that the relationship between income inequality and fiscal decentralization is highly contextual, mediated by factors such as governance quality, institutional frameworks, and levels of economic development. Therefore, the control variables in this study are carefully selected to account for these contextual factors. Moreover, to minimize the risk of multicollinearity and preserve the interpretability and robustness of the results, this study limits the selection to seven control variables, all of which are consistent with existing research.

One of the most prominent contextual factors is economic development, as wealthier countries typically exhibit lower income inequality and greater capacity for fiscal decentralization. Therefore, the GDP per capita, the trade openness, and the Human Development Index are included as control variables. Oates (1999) highlights the link between fiscal decentralization and economic capacity, stressing the interplay between economic development and governance structures. This relationship is further substantiated by Sepulveda & Martinez-Vazquez (2011), who empirically demonstrate that a higher GDP per capita is positively associated with fiscal decentralization and negatively associated with income inequality, marking it as a key confounder. Another important confounding factor in this

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relationship is governance and institutional quality. To account for this, the study includes government effectiveness, which measures governance quality and administrative efficiency, and government size, which indicates the extent of government involvement in the economy through public spending, as control variables. Both variables are recognized in the literature as key determinants of fiscal decentralization, as they improve the efficiency of public service delivery and enhance redistributive policies, which, in theory, should significantly reduce inequality. Finally, this study also considers socioeconomic factors as key control variables, as they directly influence income distribution and can shape the impact of fiscal decentralization on income inequality. In this context, urban population and unemployment are included as control variables. Urbanization is a crucial factor, as the concentration of economic activity in urban areas can both reduce and exacerbate income inequality, depending on the level of economic development and social policies in place. Additionally, unemployment is a critical determinant, as higher unemployment rates typically increase inequality by reducing income opportunities, particularly for lower-income groups. By including these socioeconomic factors, the study accounts for variations in income inequality that arise from different social and economic conditions.

This study relies on data from the World Bank Development Indicators for all control variables, except for the Human Development Index, which is sourced from the Human Development Reports website.

4. Results

4.1. Diagnostics

To refine specifications and test for validity, the study will first look at some important diagnostics.

Hausmann

As stated in Section 3.1, this study performs a Hausman test to determine whether a fixed-effects or random-effects model is more appropriate. For all baseline models, the Hausman test yields a χ^2 statistic of 18.259 ($p = 0.03228$) for developing countries and 19.382 ($p = 0.02213$) for developed countries, consistently rejecting the null hypothesis, indicating that the fixed-effects model is statistically preferred. As such, the study will concentrate from now on on the fixed-effects model for further analysis.

Multicollinearity

The study assesses multicollinearity by analyzing the correlation matrices and using variance inflation factors. The high correlation between independent variables increases the standard errors of the coefficients, making it harder to detect significant relationships.

The correlation matrices for developing countries and developed countries are given in Table A.2 and Table A.3. As shown, revenue decentralization and expenditure decentralization are highly correlated in both cases, suggesting the potential for multicollinearity problems. Thus, this shows the necessity of taking both separately, as independent variables, in the regression models to avoid biased estimates. Explanatory variables do not seem to show signs of multicollinearity, as correlation coefficients among them remain within acceptable limits.

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Table 4.1.: Variance Inflation Factors (VIF): Developed and Developing Countries

Variable	Developing (Revenue)	Developing (Expenditure)	Developed (Revenue)	Developed (Expenditure)
Revenue Decentralization	3.58	-	1.72	-
Expenditure Decentralization	-	1.79	-	1.44
Log(GDP per capita)	4.60	3.52	4.46	4.47
Urban Population	2.16	1.75	1.92	1.87
Trade	2.85	1.79	1.27	1.27
Unemployment	1.61	1.58	1.36	1.36
Government Effectiveness	2.05	1.98	3.10	3.17
Government Size	1.35	1.34	1.36	1.41
Human Development Index	2.39	2.30	3.93	3.93

Note: VIF values indicate multicollinearity among variables.

From Table 4.1, the VIF values for both developing and developed nations are below 5. This indicates that in any of the regression models, multicollinearity is not a problem. Hence, the relationship of each independent variable with the dependent variable can be considered without the threat of collinearity among predictors driving the interpretation of the results.

Time-Fixed Effects

Time-fixed effects account for macroeconomic trends, global crises, or policy shifts that impact all countries in the dataset simultaneously, such as, for example, the financial crisis in 2008. The implementation of time-fixed effects is done by several studies, such as Stossberg et al. (2016), to control for unobserved time-specific shocks that could influence both decentralization and income inequality.

To formally assess whether adding time-fixed effects improves the model, this study conducted a Wald test. Since the p-value is very high ($\gg 0.05$) in all settings, the Wald test fails to reject the null hypothesis, indicating that adding time-fixed effects does not provide a significant improvement. Furthermore, the model with time-fixed effects did not show notable differences in the estimates or in the R^2 value. Given the stability of the estimates and the Wald test results, this study opts to exclude time-fixed effects for the sake of simplicity.

The results of the time-fixed effects regressions can be seen in tables A.9-A.11.

Heteroskedasticity, Serial Correlation & Cross-Sectional Dependence

Heteroskedasticity, serial correlation, and cross-sectional dependence are considered to be the central challenges in panel data regression as they impact the statistical inference of the model. According to the methodology paper by Hoechle (2007):

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- Heteroskedasticity of the residuals refers to unequal variances of the residuals of the dependent variable.
- Serial correlation, also named autocorrelation, refers to a positive or negative correlation of residuals with one another.
- Cross-sectional dependence, also known as serial correlation, refers to the correlation between the residuals of different cross-sectional units at the same point in time.

Each of these three misspecification problems leads to biased standard errors, affecting the reliability of statistical inference. To address these typical challenges in panel data, this study employs the tests proposed by Hoechle (2007). The results of these tests, shown in Table 4.2, confirm the presence of heteroskedasticity, serial correlation, and cross-sectional dependence in both developed and developing countries under the fixed-effects baseline model.

Table 4.2.: Results of Diagnostic Tests for Developed and Developing Countries

Test and Metric	Developing Countries	Developed Countries
Breusch-Pagan Test for Heteroskedasticity		
Test Statistic (BP)	101.41	47.829
Degrees of Freedom (df)	9	9
p-value	< 2.2e-16	< 2.749e-07
Breusch-Godfrey Test for Serial Correlation		
Test Statistic (LM)	239.73	359.56
Degrees of Freedom (df)	1	1
p-value	< 2.2e-16	< 2.2e-16
Breusch-Pagan LM Test for Cross-Sectional Dependence		
Test Statistic (Chi-Sq)	530.66	1512.5
Degrees of Freedom (df)	171	435
p-value	< 2.2e-16	< 2.2e-16

Considering the detection of heteroskedasticity, serial correlation, and cross-sectional dependence, this study uses Driscoll-Kraay standard errors to conduct robust inference in the regression analysis. This is consistent with Hoechle (2007), who examined the effectiveness of Driscoll-Kraay standard errors. Unlike other covariance matrix estimators, this method not only addresses serial correlation and heteroskedasticity but also cross-sectional dependence, making it the most optimal for minimizing these problems (Hoechle, 2007).

Note that Driscoll-Kraay standard errors can only be used for fixed-effects models with balanced panels. Regarding the endogeneity approaches (CF and 2SLS), standard errors clustered at the country level are used instead.

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4.2. Fixed-Effects Regression Results

The results of the linear baseline model (Equation 3.1), the nonlinear baseline model (Equation 3.2) and the expanded baseline model (Equation 3.3) are presented in Tables A.4 - A.8. Before examining the exact estimates in these tables, this study will first briefly discuss the goodness of fit of the different regression models. The R-squared value for developing countries lies between 0.472 and 0.501 in all tables, indicating a moderate to strong explanatory power of the models. However, the R-squared for developed countries lies between 0.138 and 0.164, which indicates a much weaker explanatory power. This is likely due to the low variation in the Gini coefficient in developed countries during the analyzed time period, as already explained in Section 3.2.1.

a. Baseline Effects

Recap of Key Fixed-Effects Results (from Table A.4)

Decentralization Coeff.	Developing Countries		Developed Countries	
	Revenue	Expenditure	Revenue	Expenditure
Estimate	0.222***	0.059***	0.050*	0.043

Table A.4 shows broadly similar patterns for both developed and developing countries. In both cases, fiscal decentralization, in its revenue and expenditure forms, significantly increases income inequality. However, this effect is considerably stronger and more statistically significant in developing countries. Moreover, when comparing revenue and expenditure decentralization, revenue decentralization appears to have a greater impact on increasing inequality in both contexts, though the effect is again stronger in developing economies. These baseline results already show that without proper redistribution mechanisms, fiscal decentralization can lead to an increase in income inequality. The results also align with the empirical findings of Sacchi & Salotti (2014), which analyze only OECD countries and conclude that revenue decentralization has a significant increasing effect on overall income inequality, while the effect of expenditure decentralization appears weaker and less significant.

Regarding the control variables, while some are more statistically significant for developed countries (log GDP per capita) and some are more significant for developing countries (HDI), the size of the government is the only variable with no statistical significance. This statistical significance confirms that the selected control variables capture key economic and institutional factors influencing income inequality and are therefore well chosen. Unsurprisingly, a higher GDP per capita, a larger urban population, lower unemployment, reduced trade openness, and higher human development all contribute to reducing income

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inequality across countries, as already shown by the literature (see section 3.2.3). However, an interesting finding is that while government effectiveness reduces income inequality in developing countries, it appears to increase inequality in developed countries. This aligns with the study by Ahrlind (2021), which concludes that as government effectiveness improves in developed countries, income inequality tends to increase as higher income groups may benefit more from its improving effect on economic efficiency.

b. Nonlinear Effects

Recap of Key Fixed-Effects Nonlinear Results from Table A.5

Variable	Developing Countries		Developed Countries	
	Rev. Decent.	Exp. Decent.	Rev. Decent.	Exp. Decent.
<i>Linear Term</i>	0.234***	0.118*	0.276***	0.099*
<i>Squared Term</i>	-0.00025	-0.00118	-0.00464***	-0.00087

Table A.5 examines the potential nonlinear effect of fiscal decentralization on income inequality, presenting the estimates of equation (3.2). In both cases, fiscal decentralization significantly increases income inequality, with revenue decentralization again appearing to have a stronger effect. The quadratic terms in the equations for developing countries are statistically insignificant, indicating no strong evidence of a nonlinear relationship. This suggests that decentralization consistently increases inequality without exhibiting a threshold beyond which the effect reverses. Similarly, expenditure decentralization in developed countries follows a strictly linear pattern. However, for revenue decentralization in developed countries, the significant negative coefficient on the quadratic term suggests that beyond a certain threshold, further decentralization begins to reduce inequality. Based on the results of Table A.5, the regression of the extended interaction model (equation 3.3) would be carried out linearly for developing countries and for decentralization of expenditures in developed countries. However, for revenue decentralization in developed countries, the presence of nonlinearity necessitates a modification of the model, leading to the following adjusted specification:

$$\begin{aligned}
GINI_{it} = & \alpha + \beta_1 \cdot \text{RevenueDecent}_{it} + \beta_2 \cdot \text{RevenueDecent}_{it}^2 \\
& + \beta_3 \cdot \text{Moderator}_{it} + \beta_4 \cdot (\text{RevenueDecent}_{it} \times \text{Moderator}_{it}) \\
& + \beta_5 \cdot (\text{RevenueDecent}_{it}^2 \times \text{Moderator}_{it}) + \gamma \cdot \mathbf{X}_{it} + u_i + \epsilon_{it}
\end{aligned} \tag{4.1}$$

Table A.7 presents the results of the nonlinear revenue decentralization interaction terms. However, given that the increase in R^2 is marginal and that the evidence for nonlinearity is

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only observed in one of the three specification models, this thesis concludes that imposing an inverted U-shaped relationship is not justified. As this nonlinearity is likely not robust or economically meaningful, the estimates in Table A.7 can be ignored from now on.

c. Interaction Effects

Recap of Key Fixed-Effects Interaction Results from Tables A.6 and A.8

Interaction	Developing Countries			Developed Countries		
	HDI	Gov Size	Gov Eff.	HDI	Gov Size	Gov Eff.
<i>Rev. Decent. Coef.</i>	0.342***	0.237***	0.241***	-0.373*	0.161**	0.170***
<i>Interaction Term</i>	-0.177*	-0.002	0.049*	0.469*	-0.009*	-0.088**
<i>Exp. Decent. Coef.</i>	0.608***	0.134*	0.072*	-0.705***	0.083	0.062*
<i>Interaction Term</i>	-0.766***	-0.058*	0.045*	0.827***	-0.002	-0.017**

Tables A.6 and A.8 present the impact of fiscal decentralization on income inequality with interaction terms for developing and developed countries, respectively.

On the one hand, Table A.6 shows again that fiscal decentralization on its own leads to a significant increase in income inequality in developing countries. Regarding the interaction terms, HDI appears to significantly mitigate this inequality-increasing effect. Similarly, government size seems to buffer the effect, but with low statistical significance. In contrast, government effectiveness appears to amplify the inequality-increasing impact of decentralization, with the interaction term being statistically significant and positive, suggesting that better institutional quality may, paradoxically, reinforce inequality under decentralization in these settings.

On the other hand, Table A.8 shows more mixed and less intuitive patterns for developed countries. Fiscal decentralization tends to increase income inequality when government size and effectiveness are low. However, it appears to reduce inequality when HDI is low. Looking specifically at the interaction terms, HDI tends to weaken the inequality-reducing effect of decentralization, while government size and government effectiveness generally dampen the inequality-increasing effect. These interaction effects are more robust for HDI and government effectiveness.

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d. Overview of FE Results

Summary of Main Fixed-Effects Findings

Aspect	Developing Countries	Developed Countries
Effect of Fiscal Decent.	Significantly increases inequality	Mixed; weakly positive effect
Nonlinear Pattern	No robust nonlinear pattern observed	No robust nonlinear pattern observed
HDI Interaction	Buffers or reverses inequality effects	Reverses decreasing effect at high HDI
Gov. Size Interaction	Buffers or reverses inequality effects (weak sign.)	Buffers or reverses inequality effects (weak sign.)
Gov. Eff. Interaction	May reinforce inequality	Buffers or reverses inequality effects
Rev. vs. Exp.	No differences in the direction of the effects; Revenue has stronger effect than expenditure	No differences in the direction of the effects; Revenue has stronger effect than expenditure

To summarize the findings from the previous tables, fiscal decentralization tends to significantly increase income inequality in developing countries, while the effects in developed countries appear to be more ambiguous and less consistent. In both cases, revenue decentralization consistently exhibits a stronger influence on inequality than expenditure decentralization. A possible explanation for this is that government expenditure ultimately depends on the level of revenues. This could also explain why some papers, such as Stossberg et al. (2016) and Sacchi & Salotti (2014), find robust results for revenue decentralization but do not observe clear effects for expenditure decentralization.

Moreover, the size of the government tends to decrease the increasing effect, indicating that while a larger government may help buffer against decentralization-induced inequality, the evidence remains relatively weak. This aligns with the results of Goerl & Seiferling (2014) and Sepulveda & Martinez-Vazquez (2011), who concluded that at low levels of government size, fiscal decentralization tends to increase inequality, while at higher levels of government size, fiscal decentralization reduces inequality. This is probably due to larger governments being linked to enhanced fiscal and administrative capabilities, enabling them to carry out redistributive policies and intergovernmental transfers that assist in addressing regional inequalities. They also have better policy coordination and fairer delivery of public services. These mechanisms assist in reducing the risks of inequality associated with decentralization, highlighting the significance of equalization systems (Prud'homme, 1995) and robust institutions (Weingast, 2009).

Furthermore, there appear to be opposite effects in both cases with regard to HDI. In developing countries, the inequality-increasing effect of fiscal decentralization weakens and may even reverse as HDI increases. This again supports the theoretical literature

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emphasizing the importance of economic development for successful decentralization, as higher levels of human development are typically associated with better local capacity, improved service delivery, and stronger institutions (Prud'homme, 1995; Weingast, 2009). In developed countries, however, the results of the fixed-effects models are in line with the findings of Bojanic & Collin (2019), who state that fiscal decentralization reduces income inequality in low-HDI settings and, as HDI increases, the inequality-reducing effect of decentralization weakens. Bojanic & Collin (2019) clarify this by indicating that after reaching a specific level of development, the additional advantages of decentralization for decreasing inequality lessen and could potentially turn negative. As HDI increases, populations tend to shift their focus from redistribution toward demands for efficiency and local control, which may deprioritize equalizing policies.

Lastly, the role of government effectiveness differs between the two country groups. In developing countries, higher government effectiveness tends to exacerbate inequality under fiscal decentralization, while in developed countries, it helps cushion the impact. In both cases, these interaction effects are statistically significant. This finding partially aligns with Neyapti (2006), who suggests that revenue decentralization reduces inequality when governance quality is high, though his conclusion is based on an aggregate sample with a greater share of developed countries. Once again, this aligns with the theoretical literature and the criticisms of fiscal decentralization, highlighting the importance of strong institutions.

4.3. Control Function Approach & Two-Stage-Least-Squares

Now turning to the endogeneity-corrected models, the following section analyzes the results from the Control Function (CF) and Two-Stage-Least-Squares (2SLS) approaches. Tables A.12 - A.15 show the results of the Control Function (CF) approach, while tables A.16 - A.19 show them for the Two-Stage-Least-Squares (2SLS).

a. Baseline Effects

Before analyzing the estimated results, it is important to check for weak instruments, as they can lead to biased estimates. In both approaches, the study analyzed the F-statistics in the first stages of the regressions, and they were extremely high and well above the threshold of 10, which indicates strong instruments. In the case of 2SLS, the study further examines the Kleibergen-Paap statistics. A significant statistic ($p\text{-value} < 0.05$) suggests strong instruments. In this study, the Kleibergen-Paap test results show significant statistics for all models, indicating that the instruments are strong and valid for the 2SLS estimation.

4. Results

Recap of Baseline Results from Control Function (Table A.12) and 2SLS (Table A.16)

Model	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
<i>CF Estimate</i>	0.0642	-0.1599*	-0.0759***	-0.0516***
<i>2SLS Estimate</i>	-0.0509**	0.0337	-0.0522***	-0.0511***

The results in both Tables A.12 (CF) and A.16 (2SLS) are consistent for developed countries, showing that both revenue and expenditure decentralization significantly reduce income inequality, while again revenue decentralization shows a stronger impact. However, with regard to developing countries, the approaches yield opposite results. In the CF approach, revenue decentralization appears to have an increasing effect, while expenditure decentralization seems to have a decreasing effect. In contrast, the 2SLS approach suggests the inverse.

In that way, a first glance at the baseline results reveals significant differences in the estimated coefficients for revenue and expenditure decentralization compared to the fixed-effect estimations presented in Table A.4. Additionally, the R^2 values in these models are notably higher, especially for developed countries, when compared to the fixed-effect models. Furthermore, the control function residuals in Table A.12 are all statistically significant. Taken together, these observations point to a potential endogeneity concern.

To assess which model, either the CF and 2SLS approach or the fixed-effects model, is preferred and better captures the relationship between the Gini index and fiscal decentralization, this study applies the Hausman test to the baseline models. The Hausman test prefers the 2SLS and CF approaches over the fixed-effects model in all specifications of the baseline model. All of this shows that endogeneity is a major concern in analyzing the relationship between fiscal decentralization. This was also concluded by Sepulveda & Martinez-Vazquez (2011), who noted that income inequality can also influence the degree of fiscal decentralization, creating reverse causality. This simultaneity arises because higher inequality may incentivize governments to decentralize services in an effort to improve redistribution, while wealthier subnational units may demand greater fiscal autonomy, thereby influencing both expenditure and revenue sharing.

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b. Nonlinear Models

Recap of Key Nonlinear Results from CF (Table A.13) and 2SLS (Table A.17)

Model	Developing Countries		Developed Countries	
	Rev. Decent.	Exp. Decent.	Rev. Decent.	Exp. Decent.
<i>CF: Linear Term</i>	0.172	0.240	-0.315***	-0.135***
<i>CF: Squared Term</i>	-0.0017	-0.0056	0.0046***	0.0012**
<i>2SLS: Linear Term</i>	0.233*	0.181***	-0.253***	-0.126**
<i>2SLS: Squared Term</i>	-0.0053	-0.0110*	0.0032***	0.0018**

Regarding the nonlinear baseline model, there appears to be a common result in developed countries, as shown by Tables A.13 (CF) and A.17 (2SLS). Both approaches suggest, through positive significant coefficients, that in developed countries, the relationship between fiscal decentralization and income inequality is U-shaped. This means that higher fiscal decentralization does not infinitely reduce income disparities. Instead, there seems to be a threshold at which further increases in fiscal decentralization lead to rising income inequality.

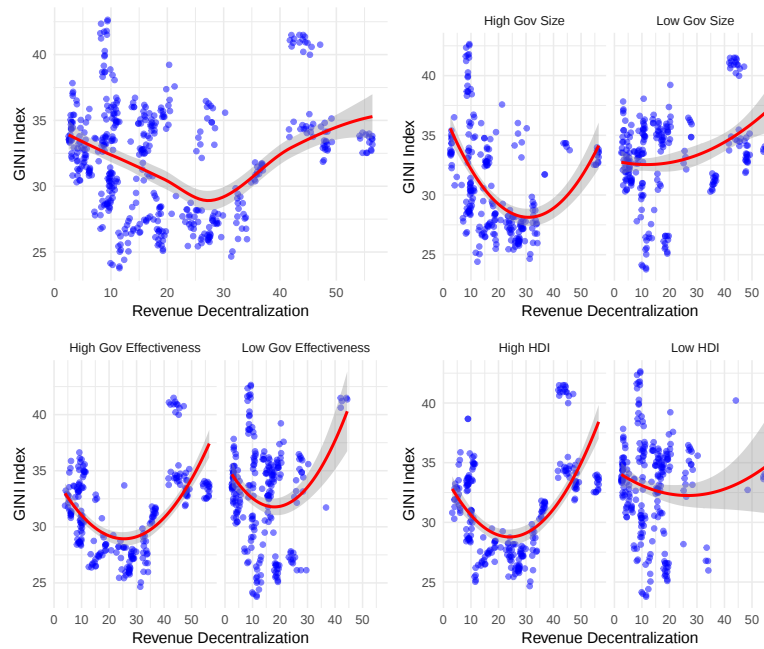


Figure 4.1.: GINI vs. Revenue Decentralization (Developed Countries)

4. Results

The following figures 4.1 and 4.2 further illustrate the U-shaped relationship between the Gini coefficient and the fiscal decentralization indicators across all analyzed specification models. Therefore, the study confirms the existence of a threshold effect in developed countries and will incorporate squared terms in the estimation of equation (3.3) for these countries.

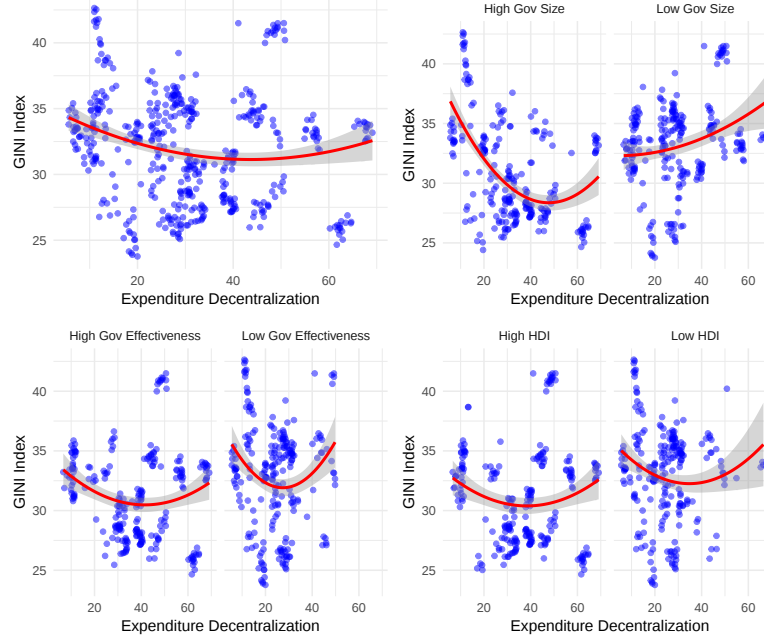


Figure 4.2.: GINI vs. Expenditure Decentralization (Developed countries)

Regarding developing countries, both the CF and 2SLS approaches also suggest a nonlinear relationship between fiscal decentralization and income inequality. Specifically, the linear term of fiscal decentralization has a positive coefficient, while the squared term has a negative coefficient. This indicates an inverse U-shaped relationship, meaning that at lower levels of decentralization, inequality initially increases, but beyond a certain threshold, further decentralization reduces inequality. However, since the coefficients are not statistically significant, this pattern should be interpreted with caution. Additionally, the following figures illustrate this inverse U-shaped relationship. However, the trend does not appear to be robust, particularly in the case of revenue decentralization, where the pattern is less clear.

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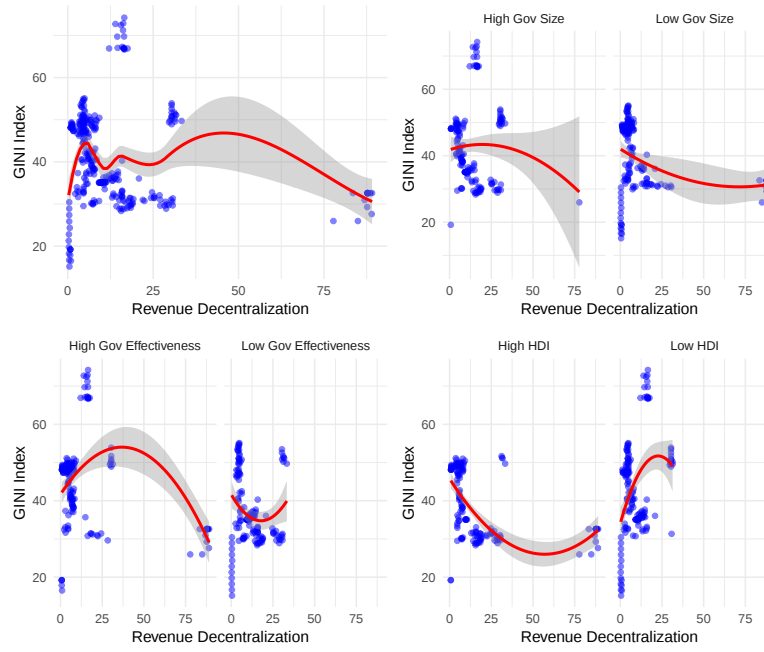


Figure 4.3.: GINI vs. Revenue Decentralization (Developing countries)

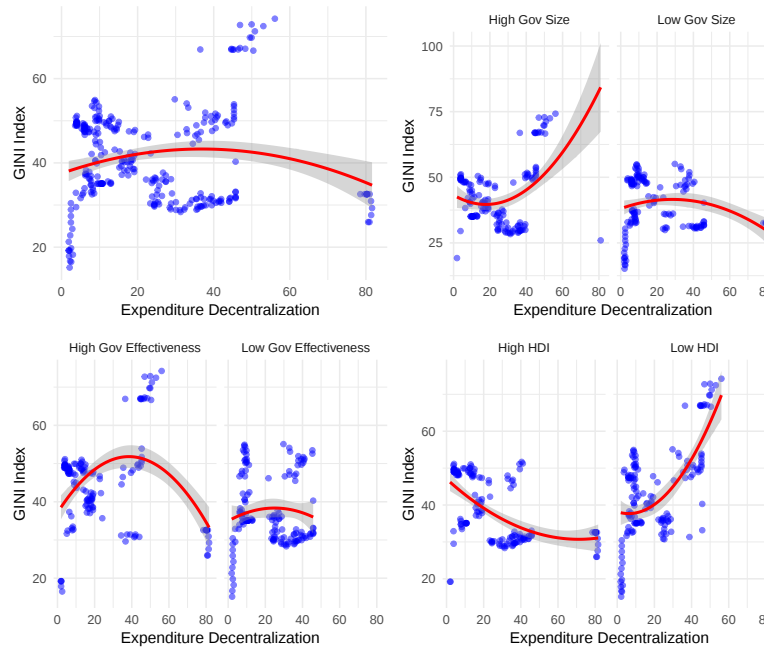


Figure 4.4.: GINI vs. Expenditure Decentralization (Developing countries)

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In this context, for developing countries, the study will not include squared terms in the interaction specification equations (3.3) and does not infer a nonlinear relationship.

c. Interaction Effects

Recap of Key Interaction Results from Tables A.14 to A.19 (CF and 2SLS)

Interaction	Developing Countries			Developed Countries		
	HDI	Gov Size	Gov Eff.	HDI	Gov Size	Gov Eff.
<i>Rev. Decent. Coef. (CF)</i>	0.6219	-0.0392	0.1064	-0.1472	-0.3270***	-0.1055**
<i>Interaction Term (CF)</i>	-0.6908*	0.0083	-0.0666	0.5249*	0.006	-0.2483***
<i>Exp. Decent. Coef. (CF)</i>	0.9627**	-0.3904***	0.1317	-0.1388	-0.1267*	-0.0543
<i>Interaction Term (CF)</i>	-1.4099**	0.0178*	-0.0465	0.0045*	0.0005	-0.1484**
<i>Rev. Decent. Coef. (2SLS)</i>	0.8642	-0.3896**	-0.0664	-0.1327	-0.3185***	-0.0895*
<i>Interaction Term (2SLS)</i>	-1.2729	0.0177	-0.1374	0.4907**	0.0010	-0.2531***
<i>Exp. Decent. Coef. (2SLS)</i>	2.1747**	-0.3841	0.0738	-0.1134	-0.1258**	-0.0483
<i>Interaction Term (2SLS)</i>	-2.7910**	0.0302	-0.01054*	0.0187	0.0002	-0.1482**

Tables A.15 (CF) and A.19 (2SLS) demonstrate the interaction results for developed countries. In all specifications, fiscal decentralization has negative coefficients and the squared term is positive, with most of them being statistically significant. This further confirms the robustness of the inequality-reducing U-shaped effect of fiscal devolution. Regarding the interaction terms, HDI appears to weaken and potentially even reverse the inequality-reducing effect of fiscal decentralization in both endogeneity approaches. Similarly, a larger government size also tends to buffer this effect, though the significance levels are weak. Finally, government effectiveness shows a clear moderating role: higher levels of effectiveness significantly reinforce the inequality-reducing impact of fiscal decentralization.

Moving to the interaction results for developing countries, which are shown in Tables A.14 (CF) and A.18 (2SLS). In the HDI specifications, fiscal decentralization has positive coefficients, while it is negative for government size. The effect is mixed for government effectiveness, with inconsistent significance levels and directions across models. Regarding the interaction terms, HDI consistently shows negative coefficients, especially for expenditure decentralization, and these are statistically significant in both models. This suggests that higher levels of human development help reduce the inequality-increasing impact of decentralization. Government size also shows a positive but just weakly significant interaction term. Combined with its negative main coefficient, this implies that a larger government weakens the inequality-reducing effects of decentralization. However, government effectiveness plays a less consistent role, with interaction effects that are mostly

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small and only occasionally significant.

d. Overview of CF and 2SLS Results

Summary of Main CF and 2SLS Findings

Aspect	Developing Countries	Developed Countries
Effect of Fiscal Decent.	Mixed and unclear	Significantly decreases inequality
Nonlinear Pattern	No robust nonlinear pattern observed	U-shaped strong significance
HDI Interaction	Tends to mitigate inequality	Reverses decreasing effect at high HDI
Gov. Size Interaction	Reverses decreasing effect at high gov. size (weak sign.)	Reverses decreasing effect at high gov. size (not sign.)
Gov. Eff. Interaction	Buffers or reverses inequality-increasing effect (not sign.)	Supports inequality-reducing effect
Rev. vs. Exp.	No big differences in the signs; Revenue has stronger effect than expenditure	No big differences in the signs; Revenue has stronger effect than expenditure

Overall, the findings of both endogeneity approaches show very different outcomes for developed and developing countries.

In developed countries, the relationship between the Gini coefficient and fiscal decentralization is robustly and significantly negative and nonlinear. In that way, the CF and 2SLS results support the group of literature that found fiscal decentralization generally reduces income inequality, such as Stossberg et al. (2016) and Neyapti (2006). However, this thesis finds that the relationship is U-shaped, which contrasts with papers like Canare et al. (2019), who also investigated potential nonlinearities but did not find sufficient evidence to confirm them. Moreover, to the best of this study's knowledge, there is no existing paper that empirically confirms this negative U-shaped relationship, highlighting the need for further research.

By contrast, in developing countries, the results are more mixed. Fiscal decentralization does not consistently reduce income inequality and even appears to increase it in some cases. This finding supports the criticisms raised in the theoretical literature by Weingast (2009), Prud'homme (1995), and Bird & Zolt (2005), who argue that fiscal decentralization can only reduce income disparities effectively if certain conditions are met. These include high institutional quality, strong administrative capacity, low levels of corruption, and the use of progressive rather than regressive taxation. Such conditions are often lacking in developing countries.

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Regarding the interaction terms, there appears to be one clear similarity between both country groups, which is the effect of government size, while the results for HDI and government effectiveness differ substantially. Government size seems to weaken the inequality-reducing effect of fiscal decentralization. This finding clearly contradicts the results from the fixed effects models, as well as the conclusions drawn by Goerl & Seiferling (2014) and Sepulveda & Martinez-Vazquez (2011). However, it is important to note that the evidence remains relatively weak. In developed countries, higher HDI weakens the inequality-reducing effect (cf. Bojanic & Collins, 2019), while in developing countries, it mitigates the inequality-increasing effect (same as in FE). Government effectiveness further strengthens the inequality-reducing effect in developed countries and does not have a significant interpretable effect in developing countries, suggesting that government effectiveness consistently enhances the beneficial impact of fiscal decentralization. This would, again, similar to the fixed-effects results, align to some extent with the findings of Neyapti (2006), who argues that fiscal decentralization can effectively reduce income inequality when government effectiveness is high.

Possible Mechanisms Behind the U-Shaped Relationship in Developed Countries

Possible explanations for this U-shaped relationship can be found in the theoretical literature. First, in developed countries, as the degree to which subnational governments control their own finances increases, there are significant changes in tax jurisdictions and public service provision. Wealthier individuals and firms, in response, may relocate to low-tax, high-service areas, leading to spatial income segregation and rising inequality between regions. For instance, in the United States, a highly fiscally decentralized country, regions such as Silicon Valley in California have become some of the wealthiest due to their concentration of high-income residents and booming economic sectors. In contrast, low-income groups tend to remain in poorer regions with fewer fiscal resources. This dynamic is commonly referred to in the literature as “voting with their feet” (Tiebout, 1956).

Secondly, as decentralization increases, the central government’s role in redistributing income and coordinating equalization mechanisms tends to diminish. This happens because more fiscal authority is delegated to subnational governments, which may prioritize local interests over national equity goals. As a result, nationwide redistribution programs, such as progressive taxation, intergovernmental transfers, or social safety nets, become harder to implement uniformly. Poorer regions might not receive adequate support if wealthier regions retain more of their own revenues, thereby weakening efforts to reduce inequality across the country.

Thirdly, if there is an extremely high degree of fiscal decentralization, the risk increases that local elites (e.g., powerful businesspeople or political figures in a region) may influence how public funds are spent or how services are distributed. In such cases, they often

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seek to benefit themselves or their networks, rather than addressing broader inequality or public needs. This phenomenon is called "elite capture" (Bardhan & Mookherjee, 2000) and can, in that sense, lead to misallocation of resources, reinforce existing inequalities, and undermine the intended redistributive effects of fiscal decentralization.

4.4. Key Takeaways

By comparing all approaches, this study finds these main points:

- **Endogeneity concern:** Multiple indicators (significant control function residuals, the Hausman test, and higher R^2) suggest that the relationship between fiscal decentralization and income inequality is highly endogenous, likely due to simultaneity (cf. Sepulveda & Martinez-Vazquez, 2011). Therefore, greater emphasis should be placed on the CF and 2SLS results.
- **Developed countries:** Both revenue and expenditure decentralization significantly decrease income inequality; however, this effect appears to have a threshold beyond which it reverses.
 - **HDI:** Same results across all approaches. HDI weakens the inequality-reducing effect of fiscal decentralization (cf. Bojanic & Collins, 2019).
 - **Government size:** The results differ between models and are mostly statistically insignificant. Therefore, no clear conclusion can be drawn.
 - **Government effectiveness:** The results are largely consistent, showing that higher government effectiveness strengthens the inequality-reducing effect of fiscal decentralization, in line with Neyapti (2006).
- **Developing countries:** The results are quite mixed. Fiscal decentralization does not consistently decrease income inequality and even increases it in some settings. These findings are in that way consistent with the theoretical literature stating that fiscal decentralization can harm income equality in developing countries.
 - **HDI:** A higher level of HDI weakens and may reverse the inequality-increasing effect in developing countries across all approaches.
 - **Government effectiveness and size :** Generally not robust and differ between the fixed-effects and endogeneity-corrected models, making it difficult to draw firm conclusions.
- **Revenue vs. Expenditure:** Coefficient signs are generally consistent across models. Revenue decentralization tends to have a stronger impact on income

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inequality than expenditure decentralization, likely because subnational expenditures are inherently dependent on revenue levels.

5. Conclusion

Employing a panel dataset of developed and developing countries spanning from 2005 to 2020, this study analyzes the impact of fiscal decentralization on overall income inequality. Unlike previous research, this study conducts a more comprehensive analysis by comparing different dimensions of fiscal decentralization while utilizing a more recent and complete dataset.

The principal findings indicate that fiscal decentralization is highly endogenous. One possible reason for this is simultaneity between income inequality and fiscal decentralization, meaning that both influence each other, leading to biased OLS estimates.

The results differ for revenue decentralization and expenditure decentralization when comparing developed and developing countries. In developed countries, both dimensions of fiscal decentralization tend to reduce income inequality. However, this effect is non-linear and follows a U-shaped pattern, meaning that at lower levels of decentralization, increasing decentralization reduces income inequality. However, at higher levels, further decentralization starts to increase income inequality again. Thus, finding the optimal level of decentralization is crucial. Moreover, this inequality-reducing effect is further strengthened by higher institutional quality but appears to be weakened by greater levels of human development.

In developing countries, the effects of fiscal decentralization on income inequality appear to be less clear. While some specifications show a positive effect, others indicate a negative one. This aligns with criticisms in the theoretical literature, such as those by Prud'homme (1995), who argues that fiscal decentralization has different effects in developed and developing countries. Developing countries may lack the institutional capacity and governance structures necessary to ensure an equitable distribution of revenue across regions and already have pre-existing high income inequality. As Weingast (2009) already explained, without strong institutions, decentralization may exacerbate inequality rather than reduce it. However, there seems to be a clear sign that this inequality-increasing effect can be weakened and may even be reversed by a higher level of human development, again proving the importance of economic development as a necessary condition for decentralization to have equitable outcomes. Regarding the other interaction terms for developing countries, the results are more mixed, leading to no clear conclusion.

Nevertheless, in both country categories, revenue decentralization consistently has a stronger impact, making it a more sensitive policy tool. This may be because expenditure

5. *Conclusion*

decentralization is directly influenced by revenue decentralization, since expenditure decentralization ultimately depends on the amount of resources that revenue decentralization would provide.

In this way, the thesis has shown that the relationship between fiscal decentralization and income inequality is complex and complicated. Fiscal decentralization is not a one-size-fits-all policy tool. To gain a clearer understanding of these dynamics, further research is needed, particularly with larger and more detailed datasets that enable a deeper investigation of its effects in developing countries, where results remain unclear and inconsistent.

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A. Tables

Table A.1.: Countries Included in the Analysis (2005-2020)

Developing Countries		Developed Countries	
1	Armenia	1	Australia
2	Azerbaijan	2	Austria
3	Belarus	3	Belgium
4	Bosnia and Herzegovina	4	Canada
5	Brazil	5	Czechia
6	Chile	6	Denmark
7	Costa Rica	7	Estonia
8	El Salvador	8	Finland
9	Georgia	9	France
10	Kazakhstan	10	Germany
11	Mauritius	11	Greece
12	Moldova	12	Hungary
13	Mongolia	13	Iceland
14	Paraguay	14	Ireland
15	Peru	15	Israel
16	South Africa	16	Italy
17	Thailand	17	Latvia
18	Ukraine	18	Lithuania
19	United Arab Emirates	19	Luxembourg
		20	Netherlands
		21	New Zealand
		22	Norway
		23	Poland
		24	Portugal
		25	Slovenia
		26	Spain
		27	Sweden
		28	Switzerland
		29	United Kingdom
		30	United States

Table A.2.: Correlation Matrix: Developing Countries

Variable	Revenue Decentralization	Expenditure Decentralization	Log(GDP per capita)	Urban Population	Government Effectiveness	Trade Openness	Unemployment	Government Size	HDI
Revenue Decentralization	1.000	0.852	0.653	0.477	0.314	0.410	-0.166	-0.079	0.462
Expenditure Decentralization	0.852	1.000	0.526	0.434	0.196	0.184	-0.082	-0.019	0.315
Log(GDP per capita)	0.653	0.526	1.000	0.469	0.641	0.094	-0.131	-0.207	0.672
Urban Population	0.477	0.434	0.469	1.000	0.212	-0.229	-0.135	-0.098	0.327
Government Effectiveness	0.314	0.196	0.641	0.212	1.000	0.177	0.019	-0.170	0.515
Trade Openness	0.410	0.184	0.094	-0.229	0.177	1.000	-0.347	-0.139	0.343
Unemployment	-0.166	-0.082	-0.131	-0.135	0.019	-0.347	1.000	0.455	-0.214
Government Size	-0.079	-0.019	-0.207	-0.098	-0.170	-0.139	0.455	1.000	-0.143
HDI	0.462	0.315	0.672	0.327	0.515	0.343	-0.214	-0.143	1.000

Table A.3.: Correlation Matrix: Developed Countries

Variable	Revenue Decentralization	Expenditure Decentralization	Log(GDP per capita)	Urban Population	Government Effectiveness	Trade Openness	Unemployment	Government Size	HDI
Revenue Decentralization	1.000	0.850	0.339	0.268	0.422	-0.386	-0.155	-0.081	0.419
Expenditure Decentralization	0.850	1.000	0.308	0.244	0.447	-0.304	-0.172	0.081	0.388
Log(GDP per capita)	0.339	0.308	1.000	0.517	0.767	0.109	-0.408	0.021	0.831
Urban Population	0.268	0.244	0.517	1.000	0.503	-0.066	-0.168	0.435	0.532
Government Effectiveness	0.422	0.447	0.767	0.503	1.000	0.002	-0.462	0.150	0.735
Trade Openness	-0.386	-0.304	0.109	-0.066	0.002	1.000	-0.109	-0.228	-0.048
Unemployment	-0.155	-0.172	-0.408	-0.168	-0.462	-0.109	1.000	0.046	-0.435
Government Size	-0.081	0.081	0.021	0.435	0.150	-0.228	0.046	1.000	0.107
HDI	0.419	0.388	0.831	0.532	0.735	-0.048	-0.435	0.107	1.000

Table A.4.: Fixed-Effects Baseline Regression: Developing and Developed Countries

Variable	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
Decentralization Coeff.	0.222*** (0.027)	0.059*** (0.018)	0.050* (0.020)	0.043 [·] (0.023)
Government Size	-0.014 (0.091)	-0.009 (0.095)	0.023 (0.053)	0.030 (0.049)
Log(GDP per capita)	-0.860 (0.576)	-0.942 [·] (0.510)	-0.955*** (0.257)	-1.003** (0.267)
Urban Population	-0.177* (0.081)	-0.137 [·] (0.077)	-0.093* (0.047)	-0.083 [·] (0.046)
Trade Openness	0.020** (0.006)	0.018** (0.007)	0.009 (0.007)	0.009 (0.007)
Unemployment	0.055** (0.021)	0.063** (0.020)	0.096*** (0.025)	0.105*** (0.025)
Government Effectiveness	-1.919*** (0.373)	-1.633*** (0.344)	0.773** (0.263)	0.826*** (0.258)
HDI	-33.184*** (3.092)	-33.919*** (3.053)	-3.138 (4.693)	-2.362 (5.007)
Observations	304	304	480	480
R^2	0.493	0.472	0.138	0.141

Notes: Standard errors in parentheses are Driscoll-Kraay corrected. Significance codes: *** 0.001, ** 0.01, * 0.05, [·] 0.1.

Table A.5.: Fixed-Effects Regression Results for Nonlinear Model (Developing and Developed Countries)

Variable	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
Decentralization Coeff.	0.2343*** (0.0508)	0.1180* (0.0740)	0.2755*** (0.0514)	0.0985* (0.0541)
Decentralization ² Coeff.	-0.00025 (0.00094)	-0.00118 (0.00145)	-0.00464*** (0.00107)	-0.00087 (0.00063)
Government Size	-0.0168 (0.0948)	-0.0048 (0.0913)	0.0104 (0.0524)	0.0249 (0.0477)
Log(GDP per capita)	-0.8557 (0.5822)	-0.9067* (0.5304)	-0.8348** (0.2350)	-1.0123** (0.2610)
Urban Population	-0.1767* (0.0808)	-0.1361* (0.0754)	-0.0715 (0.0480)	-0.0782* (0.0450)
Trade Openness	0.0192*** (0.0054)	0.0190*** (0.0066)	0.0106 (0.0075)	0.0099 (0.0069)
Unemployment	0.0551** (0.0206)	0.0555** (0.0232)	0.0949*** (0.0248)	0.1042*** (0.0258)
Government Effectiveness	-1.925*** (0.3731)	-1.572*** (0.3015)	0.7436* (0.3243)	0.7664** (0.2871)
HDI	-33.3881*** (3.4004)	-35.3767*** (3.1136)	-4.4182 (4.7632)	-2.2789 (5.0990)
Observations	304	304	480	480
R^2	0.493	0.473	0.153	0.143

Notes: Standard errors in parentheses are Driscoll-Kraay corrected. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.6.: Fixed-Effects Interaction Results: Developing Countries

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	0.3427*** (0.076)	0.2372*** (0.033)	0.2417*** (0.019)	0.6077*** (0.106)	0.1434* (0.054)	0.0725* (0.033)
Interaction Term	-0.1766* (0.091)	-0.0020 (0.0017)	0.0490* (0.018)	-0.7659*** (0.138)	-0.0058* (0.0025)	0.0452* (0.022)
HDI	-28.5702*** (5.086)	-31.8678*** (4.117)	-34.2706*** (2.902)	-3.2339 (9.223)	-29.7130*** (6.784)	-34.5916*** (6.437)
Government Size	-0.0070 (0.087)	0.0212 (0.092)	-0.0302 (0.090)	0.0051 (0.067)	0.1404 (0.103)	-0.0248 (0.069)
Government Effectiveness	-1.8288*** (0.368)	-1.8564*** (0.383)	-2.7711*** (0.497)	-1.5402** (0.513)	-1.5277** (0.531)	-2.9219*** (0.833)
Urban Population	-0.1808* (0.082)	-0.1796* (0.079)	-0.1825* (0.080)	-0.1716* (0.062)	-0.1527* (0.064)	-0.1312* (0.064)
Trade Openness	0.0220** (0.006)	0.0221** (0.006)	0.0156** (0.006)	0.0262** (0.010)	0.0236** (0.010)	0.0157** (0.010)
Unemployment	0.0562** (0.021)	0.0539* (0.022)	0.0644** (0.024)	0.0865** (0.047)	0.0560** (0.048)	0.0755** (0.048)
Log(GDP per capita)	-1.0252 ^ˆ (0.603)	-0.9482 ^ˆ (0.629)	-0.7732 ^ˆ (0.584)	-1.7811** (0.541)	-1.2575** (0.548)	-0.8950** (0.524)
R^2	0.495	0.494	0.501	0.509	0.480	0.480
Observations	304	304	304	304	304	304

Notes: Standard errors in parentheses are Driscoll-Kraay corrected. Significance codes: *** 0.001, ** 0.01, * 0.05, ^ˆ 0.1.

Table A.7.: Fixed-Effects Interaction Results: Developed Countries (Nonlinear)

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	0.1061 (0.6526)	-0.0206 (0.1461)	0.5940*** (0.1261)	-0.7059*** (0.197)	0.0834 (0.048)	0.0623* (0.028)
Decentralization ² Coeff.	-0.0117 (0.0101)	0.0029 (0.0021)	-0.0107*** (0.0026)	— —	— —	— —
Interaction Term	0.2132 (0.7291)	0.0137* (0.0062)	-0.2844*** (0.0699)	0.8269*** (0.225)	-0.0020 (0.0026)	-0.0173 (0.0221)
Interaction Term ²	0.0073 (0.0109)	-0.00036** (0.00011)	0.0048*** (0.0013)	— —	— —	— —
HDI	-15.2644 (14.9782)	-1.7377 (4.372)	-5.1473 (4.968)	-34.7975** (12.790)	-1.7881 (6.204)	-2.9384 (6.204)
Government Size	-0.0061 (0.0479)	-0.0556 (0.0904)	0.0182 (0.0502)	0.0111 (0.047)	0.0829 (0.081)	0.0267 (0.046)
Government Effectiveness	0.8938** (0.3627)	0.6961** (0.2979)	3.6656*** (0.9336)	1.1255** (0.312)	0.7892* (0.383)	1.3651* (0.784)
Urban Population	-0.0413 (0.0515)	-0.0841 (0.0472)	-0.0654 (0.0491)	-0.0349 (0.061)	-0.0806 (0.061)	-0.0782 (0.061)
Trade Openness	0.0125 (0.0085)	0.0097 (0.0079)	0.0109 (0.0075)	0.0122* (0.008)	0.0090 (0.007)	0.0090 (0.007)
Unemployment	0.0938*** (0.0243)	0.0966*** (0.0250)	0.1017*** (0.0253)	0.1007*** (0.020)	0.1073*** (0.020)	0.1065*** (0.020)
Log(GDP per capita)	-0.7389*** (0.2394)	-0.8644*** (0.2317)	-0.9198*** (0.2292)	-0.6879 (0.273)	-0.9810** (0.270)	-0.9995*** (0.258)
R^2	0.1618	0.1611	0.1751	0.164	0.142	0.142
Observations	480	480	480	480	480	480

Notes: Standard errors in parentheses are Driscoll-Kraay corrected. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.8.: Fixed-Effects Interaction Results: Developed Countries (Linear)

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	-0.3732* (0.310)	0.1610** (0.053)	0.1700*** (0.041)	-0.7059*** (0.197)	0.0834 (0.048)	0.0623* (0.028)
Interaction Term	0.4687* (0.342)	-0.0049* (0.0022)	-0.0884** (0.025)	0.8269*** (0.225)	-0.0020 (0.0026)	-0.0173** (0.0221)
HDI	-14.6639 (10.741)	-1.7377 (4.372)	-5.1473 (4.968)	-34.7975** (12.790)	-1.7881 (6.204)	-2.9384 (6.204)
Government Size	0.0093 (0.049)	0.0955 (0.077)	0.0166 (0.050)	0.0111 (0.047)	0.0829 (0.081)	0.0267 (0.046)
Government Effectiveness	0.9122** (0.315)	0.7064** (0.267)	2.3975*** (0.624)	1.1255** (0.312)	0.7892* (0.383)	1.3651* (0.784)
Urban Population	-0.0695 (0.053)	-0.0961* (0.049)	-0.0845 (0.048)	-0.0349 (0.061)	-0.0806 (0.061)	-0.0782 (0.061)
Trade Openness	0.0104 (0.008)	0.0092 (0.007)	0.0103 (0.008)	0.0122* (0.008)	0.0090 (0.007)	0.0090 (0.007)
Unemployment	0.0965*** (0.025)	0.0966*** (0.026)	0.0966*** (0.025)	0.1007*** (0.020)	0.1073*** (0.020)	0.1065*** (0.020)
Log(GDP per capita)	-0.8515*** (0.201)	-0.9598*** (0.261)	-1.0514*** (0.227)	-0.6879 (0.273)	-0.9810** (0.270)	-0.9995*** (0.258)
R^2	0.144	0.143	0.155	0.164	0.142	0.142
Observations	480	480	480	480	480	480

Notes: Standard errors in parentheses are Driscoll-Kraay corrected. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.9.: Fixed + Time Fixed-Effect Baseline Regression: Developing and Developed Countries

Variable	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
Decentralization Coeff.	0.235*** (0.031)	0.055*** (0.016)	0.045 (0.029)	0.037 (0.026)
Government Size	0.038 (0.092)	0.038 (0.096)	0.091 (0.056)	0.088 (0.049)
Urban Population	-0.128 (0.093)	-0.101 (0.095)	-0.098 (0.063)	-0.096 (0.054)
Government Effectiveness	-1.549*** (0.457)	-1.354*** (0.475)	0.848*** (0.275)	0.921*** (0.297)
Trade Openness	0.017 (0.009)	0.018* (0.009)	0.010 (0.008)	0.010 (0.007)
Unemployment	0.053* (0.025)	0.062*** (0.023)	0.127*** (0.032)	0.134*** (0.031)
Log(GDP per capita)	-0.428 (0.842)	-0.398 (0.723)	-0.401 (0.392)	-0.493 (0.396)
HDI	-18.207 (11.033)	-23.958 (14.296)	-8.542 (9.054)	-9.059 (10.168)
R-Squared	0.509	0.485	0.163	0.164
Observations	304	304	480	480

Notes: Driscoll-Kraay standard errors are in parentheses. Significance codes: *** 0.01, ** 0.05, * 0.1.

Table A.10.: Fixed + Time Fixed-Effects Interaction Results: Developing Countries

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	0.4348*** (0.0718)	0.2609*** (0.0378)	0.2566*** (0.0183)	0.7317*** (0.1069)	0.1610** (0.0468)	0.0691* (0.0161)
Interaction Term	-0.2842** (0.0810)	-0.0031 (0.0017)	0.0507* (0.0229)	-0.9337*** (0.1392)	-0.0072* (0.0026)	0.0449* (0.0199)
HDI	-7.1306 (7.3532)	-14.2510 (10.9624)	-18.7956 (11.5363)	27.1517 (14.2920)	-14.1791 (14.2576)	-24.4542 (15.3441)
Government Size	0.0506 (0.0879)	0.0949 (0.0863)	0.0191 (0.0923)	0.0558 (0.0899)	0.2276** (0.0847)	0.0208 (0.0945)
Government Effectiveness	-1.3365** (0.4181)	-1.4093** (0.4647)	-2.4212*** (0.5496)	-1.0115** (0.3768)	-1.1199* (0.4576)	-2.6487*** (0.7475)
Urban Population	-0.1243 (0.0906)	-0.1268 (0.0900)	-0.1340 (0.0943)	-0.1016 (0.0869)	-0.1068 (0.0848)	-0.0950 (0.0967)
Trade Openness	0.0196* (0.0085)	0.0212* (0.0082)	0.0126 (0.0079)	0.0197* (0.0081)	0.0234** (0.0084)	0.0142 (0.0081)
Unemployment	0.0520* (0.0248)	0.0499 (0.0268)	0.0619* (0.0275)	0.0810*** (0.0218)	0.0517* (0.0245)	0.0742** (0.0260)
Log(GDP per capita)	-0.7826 (0.8378)	-0.5478 (0.8872)	-0.3614 (0.8220)	-2.1378* (1.0229)	-0.8451 (0.8670)	-0.4719 (0.7291)
R^2	0.514	0.511	0.518	0.531	0.496	0.493
Observations	304	304	304	304	304	304

Notes: Standard errors in parentheses are Driscoll-Kraay corrected. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.11.: Fixed + Time Fixed-Effects Interaction: Developed Countries

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	-0.3033 (0.3249)	0.1397 [·] (0.0601)	0.1638** (0.0446)	-0.6744** (0.2359)	0.0659 (0.0503)	0.0609 [·] (0.0330)
Interaction Term	0.3871 (0.3570)	-0.0042 (0.0023)	-0.0884*** (0.0259)	0.7890** (0.2716)	-0.0015 (0.00197)	-0.0222 (0.0149)
HDI	-16.7280 (16.0192)	-7.6254 (8.3825)	-11.8968 (9.4683)	-39.7231* (19.1733)	-8.7380 (9.8086)	-10.7932 (10.6290)
Government Size	0.0772 (0.0546)	0.1476 [·] (0.0782)	0.0792 (0.0536)	0.0567 (0.0488)	0.1251 [·] (0.0942)	0.0848 [·] (0.0475)
Government Effectiveness	0.9349** (0.3321)	0.7900** (0.2732)	2.5171*** (0.6845)	1.1905** (0.3752)	0.8892** (0.2954)	1.6270* (0.6720)
Urban Population	-0.0734 (0.0645)	-0.1006 (0.0643)	-0.0981 (0.0599)	-0.0480 (0.0670)	-0.0938 (0.0555)	-0.0933 (0.0553)
Trade Openness	0.0114 (0.0083)	0.0103 (0.0078)	0.0112 [·] (0.0076)	0.0137 (0.0086)	0.0100 (0.0075)	0.0099 [·] (0.0072)
Unemployment	0.1281*** (0.0317)	0.1271*** (0.0328)	0.1245*** (0.0309)	0.1306*** (0.0304)	0.1353*** (0.0326)	0.1353*** (0.0314)
Log(GDP per capita)	-0.2720 (0.3421)	-0.3921 (0.4001)	-0.6470 [·] (0.3715)	-0.1281 (0.4499)	-0.4607 (0.4105)	-0.5003 (0.3990)
R^2	0.166	0.166	0.179	0.184	0.165	0.166
Observations	480	480	480	480	480	480

Notes: Standard errors in parentheses are Driscoll-Kraay corrected. Significance codes: *** 0.001, ** 0.01, * 0.05, [·] 0.1.

Table A.12.: Control Function Baseline Regression

Variable	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
Decentralization Coeff.	0.0642 (0.0489)	-0.1599* (0.0333)	-0.0759*** (0.0137)	-0.0516*** (0.0113)
Government Size	0.3391** (0.1222)	0.4382*** (0.1218)	-0.9090*** (0.0462)	-0.8253*** (0.0426)
Urban Population	0.0648 (0.0430)	0.1794*** (0.0368)	0.1799*** (0.0150)	0.1660*** (0.0147)
Government Effectiveness	9.4798*** (0.8891)	7.8390*** (0.8647)	-0.3142 (0.4351)	-0.3374 (0.4431)
Trade Openness	-0.1304*** (0.0230)	-0.0714*** (0.0166)	-0.0393*** (0.0026)	-0.0356*** (0.0024)
Unemployment	0.1402* (0.0680)	0.2038** (0.0668)	0.1710*** (0.0340)	0.1646*** (0.0340)
Log(GDP per capita)	1.0470 (1.2780)	5.1226*** (1.0614)	1.6913*** (0.4361)	1.6761*** (0.4370)
HDI	-119.0917*** (11.5917)	-136.5168*** (11.2378)	-56.6898*** (6.9486)	-58.6980*** (6.9197)
Control Function Residuals	-0.6039*** (0.0767)	0.4770*** (0.0523)	0.0746** (0.0235)	0.0014* (0.0195)
Observations	304	304	480	480
R^2	0.657	0.657	0.599	0.599

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.13.: Control Function Regression Results with Nonlinear Effects

Variable	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
Decentralization Coeff.	0.1721 (0.0931)	0.2403 (0.1325)	-0.3152*** (0.0344)	-0.1348*** (0.0338)
Decentralization ² Coeff.	-0.0017 (0.0012)	-0.0056 (0.0018)	0.0046*** (0.0006)	0.0012** (0.0004)
Government Size	0.2393 (0.1424)	0.1788 (0.1461)	-0.7807*** (0.0469)	-0.8095*** (0.0427)
Urban Population	0.0689 (0.0430)	0.1850*** (0.0363)	0.1768*** (0.0142)	0.1624*** (0.0147)
Log(GDP per capita)	1.7460 (1.3760)	7.1060*** (1.2240)	1.7110*** (0.4125)	1.5310*** (0.4379)
Government Effectiveness	9.8250*** (0.9233)	8.6260*** (0.8888)	-0.4620 (0.4121)	-0.3618 (0.4405)
Trade Openness	-0.1150** (0.0256)	-0.0312 (0.0208)	-0.0400*** (0.0024)	-0.0362*** (0.0023)
Unemployment	0.1570* (0.0690)	0.2866*** (0.0709)	0.1512*** (0.0323)	0.1468*** (0.0344)
HDI	-124.4000*** (12.2200)	-154.4000*** (12.4800)	-57.7600*** (6.5740)	-57.2700*** (6.8990)
Control Function Residuals	-0.5488*** (0.0867)	0.3072*** (0.0749)	0.0635** (0.0223)	0.0089* (0.0195)
R^2	0.6592	0.6680	0.6423	0.6050
Observations	304	304	480	480

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, . 0.1.

Table A.14.: Control Function Regression Results with Interaction Effects: Developing Countries

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	0.6219 (0.3550)	-0.0392 (0.1034)	0.1064 (0.0544)	0.9627** (0.3417)	-0.3904*** (0.0849)	-0.1317 (0.0411)
Interaction Term	-0.6908* (0.4355)	0.0083 (0.0073)	-0.0666 (0.0384)	-1.4009** (0.4244)	0.0178* (0.0060)	-0.0465 (0.0399)
HDI	-112.56*** (12.27)	-121.40*** (11.76)	-123.47*** (11.82)	-104.91*** (14.63)	-136.60*** (11.09)	-140.51*** (11.74)
Government Size	0.2813* (0.1272)	0.1947 (0.1763)	0.2445 (0.1334)	0.3151* (0.1255)	-0.0230 (0.1975)	0.3748* (0.1333)
Government Effectiveness	9.611*** (0.8907)	9.599*** (0.8948)	10.500*** (1.0632)	7.805*** (0.8505)	7.783*** (0.8538)	8.950*** (1.2860)
Urban Population	0.0720 (0.0431)	0.0593 (0.0432)	0.0643 (0.0428)	0.1901*** (0.0364)	0.1596*** (0.0369)	0.1784*** (0.0368)
Trade Openness	-0.1170** (0.0244)	-0.1244** (0.0236)	-0.1207** (0.0236)	-0.0399* (0.0189)	-0.0602** (0.0168)	-0.0618** (0.0184)
Unemployment	0.1505* (0.0681)	0.1511* (0.0686)	0.1606* (0.0687)	0.1977** (0.0657)	0.2128** (0.0659)	0.2295** (0.0703)
Log(GDP per capita)	1.2606 (1.2819)	1.3580 (1.3060)	1.4268 (1.2923)	5.1555*** (1.0440)	5.8460*** (1.0760)	5.3482*** (1.0782)
Control Function Residuals	-0.5819*** (0.0778)	-0.5887*** (0.0788)	-0.5687*** (0.0791)	0.3587*** (0.0627)	0.4379*** (0.0533)	0.4298*** (0.0661)
R^2	0.6600	0.6585	0.6605	0.6693	0.6669	0.6586
Observations	304	304	304	304	304	304

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.15.: Control Function Regression Results with Interaction Effects: Developed Countries

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	-0.1472 (0.3461)	-0.3270*** (0.0570)	-0.1055** (0.0390)	-0.1388 (0.2911)	-0.1267* (0.0509)	-0.0543 (0.0344)
Decentralization ² Coeff.	0.0049*** (0.0007)	0.0046*** (0.0006)	0.0083*** (0.0007)	0.0012* (0.0005)	0.0012* (0.0005)	0.0033*** (0.0005)
Interaction Term	0.5249* (0.3908)	0.0006 (0.0024)	-0.2483*** (0.0269)	0.0045* (0.3292)	0.0005 (0.0024)	-0.1484*** (0.0219)
Interaction Term ²	0.0814*** (0.0251)	0.00049** (0.00023)	0.00166 (0.00169)	0.0849*** (0.0196)	0.00060** (0.00019)	0.00296* (0.00120)
HDI	-48.08*** (9.75)	-57.84*** (6.59)	-55.91*** (6.06)	-57.40*** (11.42)	-57.17*** (6.92)	-54.84*** (6.60)
Government Size	-0.778 (0.047)	-0.799*** (0.084)	-0.706*** (0.044)	-0.809*** (0.043)	-0.788*** (0.110)	-0.741*** (0.042)
Government Effectiveness	-0.516 (0.414)	-0.462 (0.412)	3.691*** (0.590)	-0.361 (0.443)	-0.354 (0.442)	3.870*** (0.753)
Urban Population	0.176** (0.014)	0.177** (0.014)	0.167** (0.013)	0.162*** (0.015)	0.162*** (0.015)	0.146** (0.014)
Trade Openness	-0.040** (0.002)	-0.040** (0.003)	-0.039** (0.002)	-0.036** (0.002)	-0.036** (0.003)	-0.037** (0.002)
Unemployment	0.147** (0.032)	0.151** (0.032)	0.178*** (0.029)	0.146** (0.035)	0.147** (0.035)	0.156** (0.033)
Log(GDP per capita)	1.648** (0.415)	1.715*** (0.413)	1.322*** (0.382)	1.531** (0.438)	1.528*** (0.438)	1.289** (0.419)
Control Function Residuals	0.064** (0.022)	0.063** (0.022)	0.049** (0.021)	0.009 (0.020)	0.009 (0.020)	0.011 (0.019)
R^2	0.6436	0.6423	0.6970	0.6050	0.6051	0.6403
Observations	480	480	480	480	480	480

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.16.: 2SLS Baseline Regression Results

Variable	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
Decentralization Coeff.	- 0.0509** (0.0628)	0.0337 (0.0955)	-0.0522*** (0.0114)	-0.0511*** (0.0087)
Government Size	0.4316 (0.5495)	0.3475 (0.5485)	-0.8749*** (0.0391)	-0.8251*** (0.0363)
Urban Population	0.2031* (0.1006)	0.0846 (0.0809)	0.1748*** (0.0166)	0.1660*** (0.0159)
Government Effectiveness	7.8429** (2.5288)	9.3065** (2.8733)	-0.5606 (0.3606)	-0.3441 (0.3593)
Trade Openness	-0.0420 (0.0293)	-0.1148** (0.0355)	-0.0368*** (0.0032)	-0.0356*** (0.0028)
Unemployment	0.2183 (0.2039)	0.1516 (0.1655)	0.1673*** (0.0335)	0.1645*** (0.0331)
Log(GDP per capita)	5.7006. (3.0241)	1.6641 (2.6784)	1.7540*** (0.4258)	1.6780*** (0.4230)
HDI	-138.3424** (43.4115)	-121.5251** (38.8052)	-58.7567*** (6.8685)	-58.7373*** (6.5925)
Observations	304	304	480	480
R^2	0.578	0.543	0.584	0.593

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.

Table A.17.: 2SLS Regression Results with Nonlinear Effects

Variable	Developing Countries		Developed Countries	
	Revenue Decent.	Expenditure Decent.	Revenue Decent.	Expenditure Decent.
Decentralization Coeff.	0.2330*	0.1813***	-0.2534***	-0.1256**
	(0.3076)	(0.2812)	(0.0375)	(0.0459)
Decentralization ² Coeff.	-0.0053	-0.0110	0.0032***	0.0018**
	(0.0033)	(0.0037)	(0.0008)	(0.0005)
Government Size	0.0874	-0.0966	-0.7807***	-0.8095***
	(0.3807)	(0.4149)	(0.0469)	(0.0427)
Urban Population	0.1758	0.1616**	0.1768***	0.1624***
	(0.0907)	(0.0622)	(0.0142)	(0.0147)
Log(GDP per capita)	6.570*	7.949**	1.7110***	1.5310***
	(3.1003)	(2.5049)	(0.4125)	(0.4379)
Government Effectiveness	9.415**	9.824***	-0.4620	-0.3618
	(3.3548)	(2.8663)	(0.4121)	(0.4405)
Trade Openness	-0.0189	-0.0061	-0.0400***	-0.0362***
	(0.0398)	(0.0410)	(0.0024)	(0.0023)
Unemployment	0.2489	0.3498*	0.1512***	0.1468***
	(0.1958)	(0.1363)	(0.0323)	(0.0344)
HDI	-149.72***	-167.00***	-57.760***	-57.270***
	(32.544)	(33.627)	(6.574)	(6.899)
Observations	304	304	480	480
R^2	0.6125	0.6490	0.6423	0.6050

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, . 0.1.

Table A.18.: 2SLS Regression Results with Interaction Effects: Developing Countries

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	0.8642 (1.2647)	-0.3896** (0.1469)	-0.0644 (0.1490)	2.1747** (0.7518)	-0.3841 (0.2408)	0.0738 (0.0925)
Interaction Term	-1.2739 (1.4878)	0.0177 (0.0118)	-0.1374 (0.1215)	-2.7910** (0.9170)	0.0302 (0.0143)	-0.2054* (0.0951)
HDI	-125.00** (46.55)	-142.27*** (40.71)	-145.07*** (38.81)	-65.96* (32.14)	-123.75*** (33.05)	-145.74*** (33.18)
Government Size	0.3187 (0.4819)	0.1168 (0.7122)	0.2251 (0.4293)	0.1469 (0.4300)	-0.4222 (0.8663)	0.1069 (0.4455)
Gov. Effectiveness	8.1958** (2.8511)	8.1865*** (2.4209)	10.1451* (4.4917)	8.5135** (2.6622)	9.0078** (2.6015)	13.5722* (4.7219)
Urban Population	0.2071* (0.0922)	0.1839 (0.1006)	0.1854* (0.0759)	0.1527* (0.0640)	0.0642 (0.0716)	0.1216 (0.0662)
Trade Openness	-0.0234 (0.0373)	-0.0341 (0.0238)	-0.0327 (0.0280)	-0.0307 (0.0444)	-0.0897** (0.0330)	-0.0537 (0.0389)
Unemployment	0.2321 (0.1850)	0.2374 (0.1958)	0.2510 (0.1761)	0.1651 (0.1178)	0.1741 (0.1404)	0.2878* (0.1207)
Log(GDP per capita)	5.7811* (2.8790)	6.1172* (2.9918)	5.9242* (2.9260)	3.4383 (2.3095)	3.3724 (2.8113)	4.1720 (2.3224)
R^2	0.595	0.592	0.601	0.632	0.590	0.609
Observations	304	304	304	304	304	304

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, . 0.1.

Table A.19.: 2SLS Regression Results with Interaction Effects: Developed Countries

	Revenue Decentralization			Expenditure Decentralization		
	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.	HDI Interact.	Gov. Size Interact.	Gov. Eff. Interact.
Decentralization Coeff.	-0.1327 (0.3293)	-0.3185*** (0.0445)	-0.0895* (0.0402)	-0.1134 (0.2917)	-0.1258** (0.0381)	-0.0483 (0.0310)
Decentralization ² Coeff.	0.0051*** (0.0005)	0.0047*** (0.0006)	0.0085*** (0.0006)	0.0011** (0.0004)	0.0011** (0.0004)	0.0033*** (0.0005)
Interaction Term	0.4907** (0.3559)	0.0010 (0.0020)	-0.2531*** (0.0210)	0.0187 (0.3231)	0.0002 (0.0019)	-0.1482*** (0.0224)
Interaction Term ²	0.0643*** (0.0187)	0.00033* (0.00019)	0.00281** (0.00109)	0.0776** (0.0241)	0.00041** (0.00016)	0.00189* (0.00105)
HDI	-50.51*** (8.50)	-59.66*** (6.50)	-57.25*** (6.13)	-57.03*** (10.07)	-57.52*** (6.57)	-55.17*** (6.75)
Government Size	-0.745*** (0.039)	-0.777*** (0.067)	-0.680*** (0.036)	-0.809*** (0.037)	-0.799*** (0.090)	-0.740*** (0.035)
Government Effectiveness	-0.728 (0.358)	-0.673. (0.361)	3.606*** (0.472)	-0.404 (0.372)	-0.401 (0.370)	3.817*** (0.690)
Urban Population	0.172*** (0.015)	0.173*** (0.015)	0.163*** (0.014)	0.162*** (0.015)	0.162*** (0.015)	0.146*** (0.015)
Trade Openness	-0.038*** (0.003)	-0.038*** (0.003)	-0.038*** (0.003)	-0.036*** (0.003)	-0.036*** (0.003)	-0.037*** (0.003)
Unemployment	0.143*** (0.035)	0.147*** (0.035)	0.176*** (0.028)	0.147*** (0.034)	0.147*** (0.034)	0.157*** (0.030)
Log(GDP per capita)	1.706*** (0.406)	1.770*** (0.405)	1.356*** (0.401)	1.547*** (0.429)	1.546*** (0.428)	1.308*** (0.452)
R^2	0.6373	0.6362	0.6933	0.6049	0.6049	0.6401
Observations	480	480	480	480	480	480

Notes: Standard errors in parentheses are clustered at the country level. Significance codes: *** 0.001, ** 0.01, * 0.05, · 0.1.