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# **Revenue Decentralization and the Probability of a Fiscal Crisis: Is There a Tipping Point for Adverse Effects?**

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2 November 2023

Online at <https://mpra.ub.uni-muenchen.de/119032/>  
MPRA Paper No. 119032, posted 06 Nov 2023 07:59 UTC

# **Revenue Decentralization and the Probability of a Fiscal Crisis: Is There a Tipping Point for Adverse Effects?**

November 2, 2023

## **Abstract**

Does government revenue decentralization affect the probability of a fiscal crisis? Is there a tipping point where revenue decentralization worsens the probability of a fiscal crisis? To answer these questions, we use cross-country panel data on 66 countries from 1982 to 2019. The binary choice models show that revenue decentralization is positively associated with crisis probability when countries exceed a certain threshold of decentralization. When more than 16-17 percent of general government revenue is decentralized to local governments, this adverse effect of revenue decentralization occurs. This is consistent with the recent theoretical prediction that tax revenue collection efforts weaken as the government decentralizes revenue more. The adverse effects of revenue decentralization are large in low-income countries. Our finding implies the benefits of revenue centralization, such as economies of scale for revenue agencies, eliminating externalities due to tax competition, and the intergovernmental insurance role of federal transfers against local shocks.

Keywords: Revenue Decentralization; Fiscal Crisis; Binary Choice Model; Federalism;  
Local Government

JEL classification codes: H71; H77

## **1. Introduction**

Government revenue centralization and expenditure decentralization are often thought of as a good fiscal policy mix to maximize the efficacy of public goods provisions. Decentralizing fiscal operations to subnational governments could lead to fiscal indiscipline and unsustainable fiscal policy. A recent study by Nakatani (2023a) shows that spending decentralization is associated with a higher probability of a fiscal crisis, and this effect is prevalent in countries with a higher degree of tax revenue decentralization. However, few studies have examined how much governments can decentralize revenue collection to local governments without endangering the risk of fiscal crises. Therefore, this paper uncovers the maximum limit below which revenue decentralization does not increase the probability of a fiscal crisis.

In contrast to the famous benefits of spending decentralization on the efficiency of public goods provision, theories of local public finance indicate that revenue centralization is preferred over decentralization. This is because revenue decentralization could cause distortions in economic behavior and various problems. For example, revenue decentralization could create economic distortions in terms of economic activity and locations that can result from the decentralized taxation of highly mobile tax bases, especially capital (Gordon 1983; Inman and Rubinfeld 1996). Another distortion caused by revenue decentralization is tax exporting; McLure (1967) pointed out that where jurisdictions have the capacity to export part of their local tax burdens onto residents of other jurisdictions, there will exist incentives to expand the local budget beyond efficient levels. If spillovers of such externalities are high, then a centralized revenue system produces good policy choices (Besley and Coate 2003). Since subnational governments often face *de facto* balanced budget constraints owing to the lack of sufficient financing tools, in these circumstances, states and local governments find that when their revenues decline in a recession, they must respond by cutting expenditures and laying off workers. This only worsens matters in the aggregate, and thus, revenue decentralization weakens the countercyclicality of fiscal policy. In fact, revenue centralization is found to occur when the economy experiences great recessions. Coen-Pirani and Wooley (2018) found that revenue centralization occurred in the United States during the Great Depression because local property taxes declined, and the revenue source was shifted to a general retail sales tax. Moreover, revenue decentralization could worsen local fiscal discipline by weakening the tax collection efforts of local

governments if they expect fiscal bailouts by the central government (soft budget constraints). For instance, if the central government does not precommit to a certain level of transfers that compensate for vertical fiscal imbalance and provides ex post the fiscal needs of local governments under fiscal federalism, fiscal decentralization creates a common pool problem that leads to inefficient local taxation and excessive subnational spending (Sanguinetti and Tommasi 2004).

Coordination of fiscal policies under revenue centralization serves to internalize interjurisdictional interdependencies. Revenue centralization allows a greater coordination of policies such as the internalization of interjurisdictional externalities stemming from tax competition (Oates 2005). There can exist a system of intergovernmental assistance that is sensitive to local shocks by providing additional assistance to jurisdictions that are experiencing negative shocks to their economic and fiscal well-being (Persson and Tabellini 1996). In other words, revenue centralization combined with intergovernmental transfers serves as a mechanism for sharing risk against regional shocks (Lockwood 1999), which is called built-in stability against regional shocks (Boadway and Tremblay 2012). In addition, revenue collection by the central agency could utilize economies of scale by having a large revenue administration capacity to achieve tax compliance. This is manifested by the finding that most subcentral public services do not exhibit economies of scale (Reiter and Weichenrieder 1997).

On the empirical front, Dincecco (2009) found that centralized regimes are associated with significantly higher government revenues than fragmented regimes in the history of Europe. In contrast, Asatryan et al. (2015) found that greater revenue decentralization is associated with an improved subnational government budget balance in OECD countries. Foremny (2014) found that deficits of subnational sectors in federations can be avoided by tax autonomy in 15 EU countries. However, these two studies have three caveats. First, they only covered OECD or EU countries, so they did not study low-income countries, which may be very different from advanced economies. Second, they only studied the effects on subnational deficits/surpluses, but they did not study the effects on the general government's budget balance. Even if the subnational government's budget balances are improved, it does not necessarily imply that the general government's budget balance is improved because subnational budgets may be financed by intergovernmental transfers from the central government, which are originally financed by borrowing at the central government level,

which could eventually cause fiscal crises, including sovereign debt crises. Third, they did not study the effects of revenue decentralization on the probability of a fiscal crisis. Therefore, we contribute to the literature by filling these three gaps.

Using cross-country data on 66 countries from 1982 to 2019, we study the relationship between revenue decentralization and the probability of a fiscal crisis. Our empirical results reveal that revenue decentralization is correlated with a higher probability of a fiscal crisis, consistent with the theories of local public finance. This adverse effect of revenue decentralization on fiscal crises is found to be severe in low-income countries. Thus, policymakers should be careful about the undesirable effects of fiscal devolution on fiscal sustainability when countries decentralize revenue collection to lower-level governments.

The organization of the paper is as follows. In the next section, we briefly discuss the literature. Then, we explain the method and data, followed by the results. Finally, we conclude.

## ***2. Literature Review***

Fiscal decentralization and federalism are often recognized as policy tools for improving the efficacy of public service provision by addressing informational asymmetry. For instance, under administrative federalism, the central state sets quality standards for public projects, and local jurisdictions decide which projects are carried out because the central state cannot distinguish between useful and useless projects (Schwager 1999). However, this argument is usually the case for decentralization on the expenditure side, as Shadbegian (1999) showed that collusion among the different levels of government weakens the disciplining power of fiscal federalism. The collusion hypothesis suggests that the disciplining impact of decentralization can be nullified if revenue decentralization does not keep pace with expenditure decentralization and if there is an increase in dependence on intergovernmental grants (Lalvani 2002). This is the case for many countries because local governments are often unable to mobilize resources in their own jurisdictions to finance an increasing volume of expenditures due to their limited revenue mobilization capacity (De Mello 2001).

On the revenue side, the situation is different. This is because federalism or revenue decentralization could jeopardize economies of scale of revenue administration (McAndrew 2018). Economies of scale are the situation in which an increase in size improves the productivity of services (Nakatani 2023b). Indeed, Feld et al. (2010) found that the overall effect of revenue decentralization leads to fewer tax revenues. Furthermore, tax competition as a result of revenue decentralization induces lower taxes and lower public input provision (Carbonnier 2013). There is also a well-known welfare increase due to risk pooling when the central government collects revenue and redistributes transfers across lower-level jurisdictions (Lohse and Robledo 2013). Moreover, Saptono and Mahmud (2023) found that intergovernmental transfers have crowding-in effects on local tax revenues. Therefore, revenue centralization combined with intergovernmental transfers to local governments seems to be a better policy option than local tax autonomy.

In terms of fiscal sustainability, revenue decentralization could make a nation's fiscal system vulnerable. In fact, the greater transfer of tax revenues to regional governments, associated with a greater devolution of power, has generated greater dependency of fiscal performance on the economic cycle (Argimón and Cos 2012). It is also known that local governments respond to budgetary shocks asymmetrically: Positive shocks hardly affect the income tax rate, whereas negative shocks induce higher tax rates, indicating the presence of a bias toward expansion (Rattsø and Tovmo 2002). Therefore, revenue decentralization to local governments could lead to fiscal indiscipline and eventually result in fiscal crises.

Our research is related to the famous “fiscal trilemma” that states an impossible trinity of equity/fairness (progressivity), efficiency (promotion of long-run economic growth opportunities), and revenue adequacy (fiscal sustainability) (Alm and Sheffrin 2013; Jacobsen et al. 2013), which are related to the three main objectives of fiscal policy: stabilization, redistribution, and sustainable growth (Nakatani 2019). For example, if a fiscal equalization scheme (i.e., fairness) is pursued in a fiscally decentralized system, it is known that an equity-efficiency tradeoff emerges (Widmer and Zweifel 2012). In principle, how much inequality the national government pursues is the societal decision, although revenue decentralization could lead to inefficient and inequitable revenue collection decisions due to underutilization of the revenue potential of politically powerful local groups in the absence of good governance (Neyapti 2006). The effects of revenue decentralization on economic growth are ambiguous because on the one hand, revenue decentralization

may induce economic growth because major taxes for local governments are usually property taxes, which are the least distortive taxes. However, on the other hand, the opposite mechanism occurs when local governments engage in tax competition for corporate taxes, which could distort capital accumulation. In fact, several studies have found that revenue decentralization is negatively associated with economic growth (Aray and Pedauga 2022; Baskaran and Feld 2013; Rodríguez-Pose and Ezcurra 2011). Tax competition and the lack of tax coordination are likely to result in insufficient lower tax revenues, leading to fiscal unsustainability. Baskaran (2012) found that OECD countries could increase the fiscal stability of their public sector by reducing subnational tax autonomy. In other words, if fiscal authorities aim to achieve avoidance of fiscal crises by mobilizing adequate revenues, revenue centralization may be a better option than revenue decentralization.

### **3. Method**

The dates of fiscal crises are taken from Badia et al. (2022). They defined fiscal crises as credit events, exceptionally large official financing, implicit domestic defaults, or loss of market confidence. Revenue decentralization is defined by Equation (1) as the ratio of revenue collected by local governments to revenue collected by the general government.

$$Revenue\ Decentralization_{i,t} = Revenue_{i,t}^{Local\ Government} / Revenue_{i,t}^{General\ Government} \quad (1)$$

We note that subscript  $i$  denotes country, while  $t$  denotes year. Not only fiscal factors but also macroeconomic conditions could affect the probability of a fiscal crisis. Stronger economic activity and higher income could reduce the probability of a crisis. Thus, we include both GDP growth rates and GDP per capita to capture such economic dynamics. External imbalances could also trigger a sovereign debt crisis, as receipts from exports of goods and services can be a source for repayment of sovereign debt denominated in foreign currency. Therefore, we include the current account balance to control for external vulnerabilities. Furthermore, higher government debt and interest rates could also lead to a fiscal crisis. Thus, we also include the level of debt and interest costs of the general government as control variables.

A probit model is commonly used to estimate the probability of a fiscal crisis. The dependent variable is a dummy variable that takes the value of one if a fiscal crisis occurs and zero if not. The explanatory variables include revenue decentralization, general government gross debt as a percent of GDP, net interest expense of general government as a percentage of GDP, annual average consumer price inflation rate, real GDP growth rate, the natural logarithm of real GDP per capita, current account balance as a percent of GDP, the depreciation rate of the exchange rate, banking crisis dummy, currency crisis dummy, and governance quality. For the governance variable, we use the Corruption Perceptions Index by Transparency International, which captures the perceived levels of public sector corruption. A higher score for the governance variable indicates a very clean government, while a lower score means a highly corrupt government. We include the governance variable because the recent studies by Nakatani et al. (2023ab) found that governance quality is a key for achieving better provisions of public services. Dummy variables for banking crises and currency crises are taken from Nugyen et al. (2022). We include these dummies because a banking crisis could lead to a fiscal crisis due to fiscal costs of government intervention such as recapitalization, liquidity support, bailouts, deposit guarantees, and regulatory forbearance (Honohan and Klingebiel 2003), whereas a currency crisis could also occur concurrently with a fiscal crisis if the budget deficit is financed through an unsustainable macroeconomy policy mix (Krugman 1979). A rich array of controls is included in our empirical models, although we do not claim to have an identification strategy resulting in a causal design.

The data sample in this study covers 66 advanced and developing countries from 1982 to 2019. Revenue decentralization data are taken from the IMF's Fiscal Decentralization Dataset 2021 Vintage. Macroeconomic variables are taken from the IMF's World Economic Outlook Database published in October 2022. The summary statistics for each variable are shown in Table 1. Table 2 shows the list of countries included in this study. A classification of country types (i.e., advanced countries, emerging market countries, and low-income countries) in Table 2 is based on the IMF's classification.

#### **4. Results**



The baseline estimation results based on the probit model are shown in Table 3. The area under the receiver operating characteristic curve (AUROC) is approximately 0.8, indicating the good predictive effectiveness of our model. In Column (1), we show the results for all data samples. The statistically significant positive coefficient of revenue decentralization means that revenue decentralization to local governments is associated with a higher probability of a fiscal crisis. This indicates that if government revenues are collected by local governments, a country is more prone to fiscal crisis. In terms of magnitude, we find that the marginal effect of revenue decentralization is the largest among all statistically significant explanatory variables.

Interpretations of control variables are as follows. A higher level of government debt increases crisis probability, while interest cost is not statistically significant. We also find that a stronger GDP growth rate and a higher GDP per capita reduce the probability of a fiscal crisis. Among all control variables, GDP variables (GDP per capita and GDP growth rate) have the second largest marginal effects on the probability of the crisis. This is consistent with economic theory that in rapidly growing and richer economies, economic agents have higher incomes, and it may be easier for them to pay taxes and avoid revenue shortages leading to fiscal crises.

In addition, our results in Table 3 show that a stronger external balance as measured by a larger current account balance reduces the probability of a fiscal crisis. A positive current account balance means that domestic residents receive net income from the rest of the world, which generally correlates positively with the availability of financing for budget purposes; thus, the government will be less likely to default.

Furthermore, better governance is found to be associated with a lower probability of a fiscal crisis. This makes sense because the lower level of corruption of government officials means more efficient operation of the budget, so the nation is likely to avoid overspending and less likely to experience a fiscal crisis.

Finally, we find that banking crisis dummies are highly statistically significant with the largest marginal effects among all control variables. This makes economic sense, as a banking crisis could lead to a fiscal crisis due to fiscal costs of government intervention such as recapitalization, liquidity support, bailouts, deposit guarantees, and regulatory forbearance.

To gauge the tipping point where revenue decentralization increases the probability of a fiscal crisis in a statistically significant way, we performed a rolling regression to estimate the coefficient of revenue decentralization for each degree of decentralization. Column (2) of Table 3 shows the probit estimation results for countries whose degrees of revenue decentralization to local governments are less than 10 percent of general government revenue. The estimated coefficient of revenue decentralization is not statistically significant. In contrast, when we increased this threshold of revenue decentralization up to 15 percent, the coefficient of decentralization became statistically significant at the 10 percent level in Column (3). When we increased the threshold of revenue decentralization to a higher degree, such as 19 percent, the coefficient of revenue decentralization is highly statistically significant at the 1 percent level. More continuous rolling regression results are shown as the statistical significance of the coefficient of revenue decentralization in the blue line of Figure 1. As shown in Figure 1, our empirical results based on the probit model indicate that when the share of local government revenue in general government revenue exceeds 17.4 percent, revenue decentralization is associated with a higher probability of a fiscal crisis at the 5 percent level of statistical significance.

As a robustness check, we also performed the same exercise using the logit model. The regression results are shown in Table 4 and Figure 1. As indicated by Figure 1, the tipping point where revenue decentralization increases the probability of fiscal crisis is 15.8 percent according to the logit analysis. This means that when more than approximately 16 percent of general government revenues are collected by local governments, countries tend to experience a higher probability of a fiscal crisis.

As a final analysis, we explore possible heterogeneous effects of revenue decentralization on the probability of a fiscal crisis using the probit model. We carry out this analysis to uncover potential heterogeneous effects depending on the development level of the countries. For example, revenue decentralization in poorer countries might be even more problematic due to the lack of administrative capacity. Therefore, we classify our sampled countries into three categories: advanced countries, emerging market countries, and low-income countries, following the classifications by the IMF. The estimation results across different types of countries are shown in Table 5. Indeed, we found interesting heterogeneous effects of revenue decentralization. First, revenue decentralization is associated with a higher probability of a fiscal crisis, while

the estimated coefficients of decentralization are statistically significant in advanced countries and low-income countries. Contrastingly, government debt levels are an important determinant of fiscal crises in emerging market countries. Second, the adverse effects of revenue decentralization on fiscal crises are much larger in low-income countries than in other types of economies. This is manifested by the large coefficient of revenue decentralization for low-income countries in Table 5. Therefore, our analysis indicates that policymakers in low-income countries should be very careful about this adverse effect on a nation's fiscal sustainability when decentralizing revenue administration to local governments.

## **5. Conclusion**

This paper studied when revenue decentralization increases the probability of a fiscal crisis. We find that revenue decentralization to local governments increases the probability of a fiscal crisis when more than 16 or 17 percent of general government revenue is collected by local governments. This indicates that a country is less prone to fiscal crisis when the ratio of local governments' revenue to the general government's revenue is low. The results are robust to econometric methods. The adverse effects of revenue decentralization are found to be particularly severe in low-income countries. This finding corroborates the policy argument that revenue centralization is preferable for less-developed countries than industrialized countries because low-income economies are less diversified and therefore more exposed to international fluctuations in commodity prices, natural disasters, wars, worldwide recessions, and so forth, and stabilization is especially important for them (Bahl and Linn 1994). Our findings imply the importance of risk-sharing mechanisms across local governments in different regions against localized shocks, as federal transfers financed by taxes collected by the central government could play a role in interregional insurance.

The main policy implication of our research is that countries should be cautious about the undesirable effects of revenue decentralization to local governments on fiscal crises, especially for low-income countries. Thus, our research indicates that centralizing revenue collection is critical for the nation to avoid a fiscal crisis. In addition to limiting the degree of revenue decentralization below 16 percent of general government, to avoid overborrowing at the central government level, which could lead to a sovereign debt crisis, and

compensate for vertical fiscal imbalance of the local governments, countries should impose a hard budget constraint that forbids bail-out from the federal government, such as what was introduced in the new fiscal responsibility law in Brazil (Facchini and Testa 2008).

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**Table 1. Summary Statistics**

| Variable                 | Mean    | Standard Deviation | Minimum | Maximum |
|--------------------------|---------|--------------------|---------|---------|
| Fiscal Crisis            | 0.1408  | 0.3480             | 0       | 1       |
| Revenue Decentralization | 0.1159  | 0.0944             | 0.0006  | 0.6241  |
| Government Debt          | 54.3111 | 35.3939            | 3.221   | 236.277 |
| Interest Cost            | 1.8656  | 1.5237             | 0.0050  | 10.352  |
| GDP Growth               | 3.2058  | 3.3115             | -15.1   | 20.585  |
| Income Per Capita        | 3.0028  | 0.7853             | 0.5438  | 4.2579  |
| Inflation                | 4.0720  | 5.1095             | -6.811  | 59.218  |
| Current Account Balance  | -1.2880 | 7.1924             | -43.825 | 63.39   |
| Exchange Rate            | 0.0234  | 0.0534             | -0.2181 | 0.5159  |
| Governance               | 26.8658 | 26.3755            | 1.3     | 91      |
| Banking Crisis           | 0.0884  | 0.2841             | 0       | 1       |
| Currency Crisis          | 0.0240  | 0.1532             | 0       | 1       |



**Table 2. Classification of Sampled Countries**

| Advanced Countries | Emerging Market Countries | Low-Income Countries |
|--------------------|---------------------------|----------------------|
| Australia          | Albania                   | Afghanistan          |
| Austria            | Armenia                   | Cambodia             |
| Belgium            | Azerbaijan                | Cavo Verde           |
| Canada             | Belarus                   | Honduras             |
| Czech Republic     | Bosnia and Herzegovina    | Kenya                |
| Estonia            | Brazil                    | Kiribati             |
| Finland            | Chile                     | Kyrgyz Republic      |
| Germany            | China                     | Moldova              |
| Iceland            | Colombia                  | Myanmar              |
| Israel             | Costa Rica                | Nepal                |
| Italy              | Croatia                   | Rwanda               |
| Japan              | El Salvador               | Senegal              |
| Latvia             | Georgia                   | Uganda               |
| Lithuania          | Guatemala                 |                      |
| Netherlands        | Hungary                   |                      |
| New Zealand        | Indonesia                 |                      |
| Portugal           | Iran                      |                      |
| Spain              | Kazakhstan                |                      |
| Sweden             | Mauritius                 |                      |
| Switzerland        | Mexico                    |                      |
| United Kingdom     | Mongolia                  |                      |
|                    | Namibia                   |                      |
|                    | North Macedonia           |                      |
|                    | Paraguay                  |                      |
|                    | Peru                      |                      |
|                    | Russia                    |                      |
|                    | Serbia                    |                      |
|                    | South Africa              |                      |
|                    | Thailand                  |                      |
|                    | Tunisia                   |                      |
|                    | Turkey                    |                      |
|                    | Ukraine                   |                      |

**Table 3. Baseline Results (Probit Model)**

| Data Sample                | All                                 | Revenue<br>Decentralization<br><0.1 | Revenue<br>Decentralization<br><0.15 | Revenue<br>Decentralization<br><0.19 |
|----------------------------|-------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| Revenue Decentralization   | 1.2044**<br>(0.5746)<br>[0.2025]    | 4.8769<br>(3.1235)<br>[0.8059]      | 3.2001*<br>(1.9479)<br>[0.5309]      | 4.2222***<br>(1.5017)<br>[0.7149]    |
| Government Debt            | 0.0036**<br>(0.0018)<br>[0.0006]    | 0.0052<br>(0.0046)<br>[0.0009]      | 0.0076**<br>(0.0037)<br>[0.0013]     | 0.0075**<br>(0.0035)<br>[0.0013]     |
| Fiscal Interest Cost       | -0.0089<br>(0.0383)<br>[-0.0015]    | -0.0248<br>(0.0653)<br>[-0.0041]    | -0.0911*<br>(0.0547)<br>[-0.0151]    | -0.0827<br>(0.0532)<br>[-0.0140]     |
| GDP Growth                 | -0.0900***<br>(0.0183)<br>[-0.0151] | -0.1017***<br>(0.0240)<br>[-0.0168] | -0.1029***<br>(0.0214)<br>[-0.0171]  | -0.1049***<br>(0.0204)<br>[-0.0178]  |
| Real GDP Per Capita        | -0.6942***<br>(0.0885)<br>[-0.1167] | -0.6684***<br>(0.1122)<br>[-0.1104] | -0.7200***<br>(0.1051)<br>[-0.1194]  | -0.7887***<br>(0.1024)<br>[-0.1335]  |
| Inflation                  | 0.0039<br>(0.0213)<br>[0.0007]      | 0.0365<br>(0.0367)<br>[0.0060]      | 0.0103<br>(0.0267)<br>[0.0017]       | 0.0142<br>(0.0262)<br>[0.0024]       |
| Current Account Balance    | -0.0249***<br>(0.0089)<br>[-0.0042] | -0.0074<br>(0.0111)<br>[-0.0012]    | -0.0152<br>(0.0093)<br>[-0.0025]     | -0.0142<br>(0.0090)<br>[-0.0024]     |
| Exchange Rate              | 1.5135<br>(2.2061)<br>[0.2545]      | -4.4147<br>(3.6416)<br>[-0.6853]    | 0.3832<br>(2.7359)<br>[0.0636]       | 0.3830<br>(2.5341)<br>[0.0648]       |
| Governance                 | -0.0087***<br>(0.0031)<br>[-0.0015] | -0.0094**<br>(0.0040)<br>[-0.0016]  | -0.0074**<br>(0.0035)<br>[-0.0012]   | -0.0065**<br>(0.0033)<br>[-0.0011]   |
| Banking Crisis             | 0.6705***<br>(0.1801)<br>[0.1562]   | 0.4729<br>(0.2921)<br>[0.1009]      | 0.4365*<br>(0.2522)<br>[0.0916]      | 0.5423**<br>(0.2120)<br>[0.1206]     |
| Currency Crisis            | 0.0514<br>(0.3159)<br>[0.0089]      | 0.2594<br>(0.5608)<br>[0.0503]      | -0.0791<br>(0.4621)<br>[-0.0125]     | 0.0182<br>(0.4030)<br>[0.0031]       |
| Constant                   | 0.8270***<br>(0.2828)               | 0.5795<br>(0.3644)                  | 0.7565**<br>(0.3079)                 | 0.8125***<br>(0.2992)                |
| Sample Period              | 1982-<br>2019                       | 1982-<br>2019                       | 1982-<br>2019                        | 1982-<br>2019                        |
| Wald Chi-Squared Test (11) | 118.73***                           | 59.92***                            | 83.50***                             | 107.01***                            |
| AUROC                      | 0.7999                              | 0.7748                              | 0.7874                               | 0.8062                               |
| Pseudo R-Squared           | 0.1970                              | 0.1606                              | 0.1708                               | 0.2034                               |
| Log Pseudolikelihood       | -298.9757                           | -170.4534                           | -221.6546                            | -246.6462                            |
| Number of Observations     | 916                                 | 530                                 | 691                                  | 765                                  |

Notes: Robust standard errors in parentheses. Marginal effects in brackets. AUROC stands for area under the receiver operating characteristic curve. \*Significant at 10%, \*\*significant at 5%, and \*\*\*significant at 1%.

**Table 4. Robustness Checks (Logit Model)**

| Data Sample                | All                                 | Revenue<br>Decentralization<br><0.1 | Revenue<br>Decentralization<br><0.15 | Revenue<br>Decentralization<br><0.19 |
|----------------------------|-------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|
| Revenue Decentralization   | 2.2460**<br>(0.9909)<br>[0.1806]    | 9.0075<br>(5.7424)<br>[0.7167]      | 6.6827*<br>(3.6638)<br>[0.5403]      | 8.3538***<br>(2.8319)<br>[0.6859]    |
| Government Debt            | 0.0066**<br>(0.0033)<br>[0.0005]    | 0.0080<br>(0.0083)<br>[0.0006]      | 0.0129*<br>(0.0067)<br>[0.0010]      | 0.0134**<br>(0.0064)<br>[0.0011]     |
| Fiscal Interest Cost       | -0.0128<br>(0.0687)<br>[-0.0010]    | -0.0189<br>(0.1164)<br>[-0.0015]    | -0.1590<br>(0.0970)<br>[-0.0129]     | -0.1470<br>(0.0960)<br>[-0.0121]     |
| GDP Growth                 | -0.1626***<br>(0.0321)<br>[-0.0131] | -0.1871***<br>(0.0432)<br>[-0.0149] | -0.1874***<br>(0.0382)<br>[-0.0151]  | -0.1896***<br>(0.0364)<br>[-0.0156]  |
| Real GDP Per Capita        | -1.2799***<br>(0.1635)<br>[-0.1029] | -1.2290***<br>(0.2166)<br>[-0.0978] | -1.3227***<br>(0.2010)<br>[-0.1069]  | -1.4509***<br>(0.1944)<br>[-0.1191]  |
| Inflation                  | 0.0001<br>(0.0392)<br>[0.0000]      | 0.0709<br>(0.0763)<br>[0.0056]      | 0.0126<br>(0.0534)<br>[0.0010]       | 0.0191<br>(0.0518)<br>[0.0016]       |
| Current Account Balance    | -0.0449***<br>(0.0163)<br>[-0.0036] | -0.0133<br>(0.0226)<br>[-0.0011]    | -0.0258<br>(0.0176)<br>[-0.0021]     | -0.0239<br>(0.0170)<br>[-0.0020]     |
| Exchange Rate              | 3.2959<br>(4.1597)<br>[0.2651]      | -9.1201<br>(7.5979)<br>[-0.7257]    | 0.9641<br>(5.6560)<br>[0.0779]       | 1.0019<br>(5.1272)<br>[0.0823]       |
| Governance                 | -0.0186***<br>(0.0063)<br>[-0.0015] | -0.0192**<br>(0.0082)<br>[-0.0015]  | -0.0151**<br>(0.0070)<br>[-0.0012]   | -0.0137**<br>(0.0065)<br>[-0.0011]   |
| Banking Crisis             | 1.1928***<br>(0.3109)<br>[0.1429]   | 0.8660*<br>(0.5097)<br>[0.0941]     | 0.7746*<br>(0.4462)<br>[0.0825]      | 0.9441***<br>(0.3673)<br>[0.1068]    |
| Currency Crisis            | 0.1185<br>(0.5447)<br>[0.0100]      | 0.5126<br>(1.1053)<br>[0.0500]      | -0.1713<br>(0.8723)<br>[-0.0129]     | 0.0060<br>(0.7282)<br>[0.0005]       |
| Constant                   | 1.6916***<br>(0.5154)               | 1.2507*<br>(0.7259)                 | 1.5346**<br>(0.5770)                 | 1.6201***<br>(0.5587)                |
| Sample Period              | 1982-<br>2019                       | 1982-<br>2019                       | 1982-<br>2019                        | 1982-<br>2019                        |
| Wald Chi-Squared Test (11) | 110.27***                           | 55.88***                            | 78.61***                             | 98.16***                             |
| AUROC                      | 0.7987                              | 0.7729                              | 0.7859                               | 0.8050                               |
| Pseudo R-Squared           | 0.1980                              | 0.1617                              | 0.1695                               | 0.2027                               |
| Log Pseudolikelihood       | -298.6087                           | -170.2231                           | -221.9928                            | -246.8484                            |
| Number of Observations     | 916                                 | 530                                 | 691                                  | 765                                  |

Notes: Robust standard errors in parentheses. Marginal effects in brackets. AUROC stands for area under the receiver operating characteristic curve. \*Significant at 10%, \*\*significant at 5%, and \*\*\*significant at 1%.

**Table 5. Heterogeneous Effects across Country Groups**

| Data Sample                | Advanced Countries                  | Emerging Market Countries           | Low-Income Countries               |
|----------------------------|-------------------------------------|-------------------------------------|------------------------------------|
| Revenue Decentralization   | 3.3525**<br>(1.5585)<br>[0.2678]    | 0.1728<br>(0.7169)<br>[0.0364]      | 18.1961***<br>(5.8058)<br>[5.4870] |
| Government Debt            | -0.0006<br>(0.0027)<br>[-0.0000]    | 0.0322***<br>(0.0069)<br>[0.0068]   | -0.0298*<br>(0.0176)<br>[-0.0090]  |
| Fiscal Interest Cost       | 0.1665***<br>(0.0638)<br>[0.0133]   | -0.3206***<br>(0.0872)<br>[-0.0676] | 0.2046<br>(0.3334)<br>[0.0617]     |
| GDP Growth                 | -0.1116***<br>(0.0376)<br>[-0.0089] | -0.0848***<br>(0.0278)<br>[-0.0179] | -0.1524**<br>(0.0620)<br>[-0.0459] |
| Real GDP Per Capita        | -1.0768***<br>(0.3978)<br>[-0.0860] | -0.8029***<br>(0.2335)<br>[-0.1692] | -0.3364<br>(0.5629)<br>[-0.1014]   |
| Inflation                  | 0.1726**<br>(0.0793)<br>[0.0138]    | -0.0238<br>(0.0296)<br>[-0.0050]    | -0.0658<br>(0.0494)<br>[-0.0198]   |
| Current Account Balance    | -0.0633<br>(0.0398)<br>[-0.0051]    | -0.0352***<br>(0.0130)<br>[-0.0074] | 0.0256<br>(0.0199)<br>[0.0077]     |
| Exchange Rate              | -14.7047**<br>(7.1111)<br>[-1.1747] | 3.6001<br>(2.9530)<br>[0.7589]      | -0.7360<br>(4.5568)<br>[-0.2219]   |
| Governance                 | 0.0036<br>(0.0003)<br>[-0.0015]     | -0.0193***<br>(0.0057)<br>[-0.0041] | -0.0104<br>(0.0176)<br>[-0.0031]   |
| Constant                   | 1.1903<br>(1.4866)                  | 0.8115<br>(0.6011)                  | 1.3918<br>(1.0165)                 |
| Sample Period              | 1982-<br>2019                       | 1982-<br>2019                       | 1982-<br>2019                      |
| Wald Chi-Squared Test (10) | 37.20***                            | 74.28***                            | 21.53**                            |
| AUROC                      | 0.8243                              | 0.8323                              | 0.8455                             |
| Pseudo R-Squared           | 0.2583                              | 0.2766                              | 0.3217                             |
| Log Pseudolikelihood       | -77.9265                            | -146.1177                           | -221.6546                          |
| Number of Observations     | 414                                 | 422                                 | 74                                 |

Notes: Robust standard errors in parentheses. Marginal effects in brackets. AUROC stands for area under the receiver operating characteristic curve. \*Significant at 10%, \*\*significant at 5%, and \*\*\*significant at 1%.

**Figure 1. Tipping Point of Revenue Decentralization**

