



Fiscal Sustainability of Malaysian State Governments under a Centralized Fiscal Federalism System: Evidence from Second-Generation Panel Data Analysis

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Abstract: This study examines the fiscal sustainability of Malaysian state governments within a highly centralized system. Using annual data from 13 states between 2004 and 2023, we analyze whether state expenditures are structurally supported by their own revenues and federal transfers. Methodologically, we apply second-generation panel econometric tests to handle cross-sectional dependency. The diagnostics show that all fiscal variables are stationary at levels, meaning standard panel cointegration tests are not appropriate for this empirical setting. The empirical results show that own-source revenues do not provide sufficient support for long-run fiscal sustainability at the state level. However, when federal transfers are included, the long-run fiscal synchronization parameters improve significantly. This partial adjustment indicates weak fiscal sustainability, suggesting that federal transfers play a critical stabilizing role in supporting state fiscal adjustment. State-level analysis also reveals high heterogeneity: developed states with stronger economic and revenue bases demonstrate greater fiscal resilience, while fiscally weaker states remain more dependent on federal transfers. From a policy perspective, these findings highlight the need for a more transparent and rules-based fiscal transfer framework.

Keywords: Fiscal federalism, Fiscal sustainability, Intergovernmental transfers, Fiscal equalization, Malaysia.

INTRODUCTION

Evaluating whether public finances satisfy the intertemporal budget constraint (IBC) remains a foundational cornerstone of fiscal policy analysis. When a government persistently spends beyond its capacity to generate revenue, it faces a cascade of macroeconomic vulnerabilities, including ballooning debt burdens, fiscal stress, and severely restricted policy flexibility (Bohn, 1998; Mendoza & Ostry, 2008). While the public finance literature heavily features empirical assessments of national-level fiscal health, subnational fiscal solvency is just as critical. Structural imbalances at the subnational level do not sit in a vacuum; they can trigger systemic failures across the wider federation, forcing central governments to issue ad hoc bails or leading to chronic underinvestment in vital public infrastructure.

Early empirical work by Hakkio and Rush (1991), Trehan and Walsh (1991), and Quintos (1995) established that fiscal sustainability can be validated by looking at the long-run co-movement between government revenues and expenditures. Over time, this analytical framework has expanded through panel data methodologies to investigate state, regional, and municipal finances cross-sectionally (Westerlund & Prohl, 2010; Mahdavi & Westerlund, 2011; Dang et al., 2020). Pooling cross-sectional units gives researchers a

distinct econometric edge by enhancing statistical power and making it possible to account for unobserved region-specific heterogeneity across time.

Yet, empirical evidence on fiscal sustainability among Malaysian state governments remains limited. This lack of empirical attention is a glaring gap, given that Malaysia operates under one of the most fiscally centralized federal systems in the Asia-Pacific region (Ambrosanio & Bordignon, 2006; World Bank, 2014). Under the Federal Constitution, the federal government retains exclusive jurisdiction over all major lucrative revenue instruments, such as corporate and personal income taxes, customs and excise duties, petroleum income tax, and sales and service taxes (SST). State authorities are left with limited, inelastic revenue options, relying mostly on land administration charges, forestry royalties, and central fiscal injections (Abd Ghani et al., 2017; Jalil, 2008; Bakar, 2004).

This structural asymmetry creates a profound vertical fiscal imbalance (VFI). While states bear the heavy burden of managing local development and public service delivery, their legal power to mobilize independent revenues remains severely restricted by constitutional arrangements. Calculations from our comprehensive dataset show that the transfer dependency ratio averaged 43.9% across all 13 states between 2004 and 2023. In extreme cases like Perlis, dependency levels regularly shot past the 100% mark, meaning federal transfers alone exceeded total own-source revenue collections. Consequently, local fiscal sustainability in Malaysia is not merely an issue of internal fiscal management; it is fundamentally tied to the architecture of the intergovernmental transfer system (Bird & Vaillancourt, 1998).

Addressing this problem is becoming more urgent as regional economic disparities widen alongside expanding spending commitments. Measured in real terms, aggregate expenditure across the 13 Malaysian states increased from RM11,866.9 million in 2004 to RM30,294.6 million in 2023. However, growth in own-source revenues has lagged behind rising expenditure commitments, intensifying fiscal pressures at the state level. While industrial and urban hubs like Selangor, Johor, and Pulau Pinang can leverage deep local economic bases to capture revenue, less-developed states are structurally more dependent on intergovernmental transfers.

To address this gap, this paper models the long-run fiscal adjustment relationships between subnational revenues and expenditures across all 13 Malaysian states. Adopting the IBC framework and a second-generation heterogeneous panel approach following Dang et al. (2020), we contrast two distinct scenarios: Model A captures baseline solvency using only own-source revenues, while Model B includes federal transfers to test how the current fiscal setup supports subnational solvency.

Our study makes three key contributions. First, it offers a rigorous empirical mapping of fiscal sustainability across all 13 states using a single, unified panel framework. Second, it treats centralized fiscal federalism not just as a background setting, but as an important institutional factor shaping subnational fiscal sustainability. Third, by utilizing second-generation panel econometric techniques that handle cross-sectional dependence, we provide a more appropriate empirical framework for analyzing fiscal sustainability when cross-sectional dependence and slope heterogeneity are present.

LITERATURE REVIEW

Theoretical Foundations of Fiscal Sustainability

Testing for fiscal sustainability means evaluating whether a government satisfies its intertemporal budget constraint (IBC). Formally, the IBC requires that the present value of all expected future public expenditures, including servicing outstanding debt liabilities, must not exceed the present value of all anticipated future revenues combined with initial asset holdings (Hamilton & Flavin, 1986; Trehan & Walsh, 1991). Operationally, this constraint prevents a state from permanently running a primary deficit by rolling over debt indefinitely; the government must eventually run primary surpluses to keep its long-term debt-to-GDP ratio from expanding without bound (Bohn, 1998).

In the early empirical literature, Hamilton and Flavin (1986) tested this condition by verifying the stationarity of the public debt series, as stationary debt satisfies the transversality condition of the IBC. Hakkio and Rush (1991) shifted the empirical focus by looking for a long-run cointegrating vector between government revenue and expenditure series. If a cointegrating relationship exists with a vector of $(1 - \beta)$, the value of the β parameter tells us the strength of the system's sustainability: β approaching one indicates strong sustainability, where revenues and expenditures adjust one-for-one over time; $0 < \beta < 1$ signals weak sustainability, where debt is technically bounded but grows faster than revenues; and $\beta \leq 0$ indicates a structurally unsustainable path. Quintos (1995) showed that these trajectories are frequently altered by policy shifts and structural breaks. Shifting away from strict cointegration, Bohn (1998, 2007) introduced the fiscal reaction function, demonstrating that a fiscal path is sustainable if the primary balance adjusts positively to changes in past debt accumulations.

Fiscal Sustainability in Federal and Decentralized Systems

As public finance decentralized globally, researchers began adapting these models to subnational settings. For instance, Mahdavi and Westerlund (2011) examined US state finances and found that while most individual states satisfied their long-run constraints, their fiscal behaviors varied significantly. Potrafke and Reischmann (2015) analyzed German states (*Länder*) and concluded they were broadly sustainable, pointing to institutional backstops like the national fiscal program and constitutional debt breaks.

In Spain, Bajo-Rubio et al. (2014) found that autonomous communities were sustainable when transfers were included but not on own-source revenues alone, a pattern closely parallel to the Malaysian findings reported in this study. Dang et al. (2020) found the same pattern for Chinese provinces, where CCEMG coefficients confirmed sustainability only with central government transfers. Studies on Indian states have highlighted the challenges of vertical fiscal imbalances and soft budget constraints (Chakraborty, 2006; Rao & Singh, 2007).

These studies collectively suggest that subnational fiscal sustainability cannot always be assessed independently from the institutional arrangement of intergovernmental finance. In decentralized or fiscally asymmetric systems, transfer mechanisms may influence the capacity of subnational governments to maintain expenditure commitments over time.

Fiscal Sustainability under Centralized Fiscal Federalism

A distinctive gap in the literature concerns fiscal sustainability under highly centralized fiscal federalism, where the central government controls the vast majority of revenue instruments while subnational governments retain significant expenditure responsibilities (Boadway & Shah, 2009). This arrangement creates structural vertical fiscal imbalances, where subnational governments cannot finance expenditures from own-source revenues and must rely on intergovernmental transfers (Bird & Vaillancourt, 1998). Key concepts include vertical fiscal imbalance (Eyraud & Lusinyan, 2013), revenue centralization (Musgrave, 1959; Oates, 1999), transfer dependency and soft budget constraints (Kornai et al., 2003; Rodden, 2002), and fiscal equalization (Shah, 1994).

Malaysia represents a particularly instructive case because its fiscal federalism is among the most centralized in the Asia-Pacific region. Unlike federations such as the United States, Canada, or Germany-where subnational governments possess significant tax autonomy-Malaysian states have minimal independent revenue-raising capacity and no formal revenue-sharing formula directing a portion of major federal taxes to states. This institutional design makes Malaysia an important context for examining how centralized federalism shapes subnational fiscal sustainability.

However, existing Malaysian evidence remains limited, particularly regarding whether state expenditure adjustments are supported by own-source revenue alone or are strengthened when federal transfers are incorporated into the fiscal relationship.

To provide a comprehensive structural overview of the empirical landscape, Table 1 synthesizes the landmark studies on fiscal sustainability, contrasting their regional contexts, methodological applications, and core findings against the present study.

Table 1: Summary of Major Studies on Fiscal Sustainability.

Author(s)	Country/Region	Methodology	Key Findings
Hamilton & Flavin (1986)	United States	Unit root tests on debt	Stationary debt supports IBC
Hakkio & Rush (1991)	United States	Cointegration (Engle-Granger)	Weak sustainability; $\beta < 1$
Trehan & Walsh (1991)	United States	Unit root and cointegration	Sustainable when inclusive deficit is stationary
Quintos (1995)	United States	Cointegration with structural breaks	Strong pre-1980s; weak post-1980s
Bohn (1998)	United States	Fiscal reaction function	Primary surplus responds positively to debt
Afonso (2005)	EU-15 countries	Panel cointegration	Mixed evidence; weak sustainability
Westerlund & Prohl (2010)	OECD countries	Second-generation panel cointegration	Strong sustainability in most OECD countries
Mahdavi & Westerlund (2011)	US state governments	Panel cointegration	US states largely sustainable; heterogeneity
Cassette et al. (2012)	French local govts	Panel unit root and cointegration	Local governments fiscally sustainable
Paleologou (2013)	Greece	Cointegration, regime-switching	Sustainability weakened after EU accession
Bajo-Rubio et al. (2014)	Spain (regional)	Panel cointegration	Regions sustainable with transfers; not without

Camarero et al. (2015)	OECD countries	Panel stationarity tests	Most OECD countries satisfy IBC
Potrafke & Reischmann (2015)	German states	Panel cointegration	German Länder exhibit fiscal sustainability
Dang, Chan & So (2020)	Chinese provinces	CCEMG, AMG	Sustainable with transfers; not without
Ahmad & Ariff (2023)	Malaysian federal	ARDL bounds test	Federal government weakly sustainable
Present study	13 Malaysian states	CIPS, CCEMG, AMG	Own source revenue; alone provides insufficient fiscal adjustment; fiscal sustainability improves when federal transfers are included

INSTITUTIONAL BACKGROUND: MALAYSIA'S CENTRALIZED FISCAL FEDERALISM

Constitutional Assignment of Revenue Powers

The distribution of fiscal powers in Malaysia is dictated by the Federal Constitution, which organizes legislative and revenue-raising authority into three lists under the Ninth Schedule (Noh 1991; Bakar 2004). The Federal List places all highly lucrative, broad-based tax instruments under exclusive central control. This central monopoly covers personal income tax, corporate income tax, petroleum income tax, customs duties, excise taxes, export duties, and consumption-based taxes like the Sales and Service Tax (SST).

In contrast, the State List assigns states a narrow, inelastic set of revenue options. States are restricted to land-related fees (such as land rents and premiums), forestry and timber royalties, mining revenues (excluding petroleum), entertainment duties, water service charges, and Islamic institutional revenues. The Concurrent List outlines shared responsibilities, but federal legislation takes precedence in the event of a conflict. This structure dates back to colonial administrative choices and the federation agreements of 1948 and 1963 (Ghani, 2014). Economically, this centralized design was intended to safeguard national macroeconomic stabilization, eliminate tax competition across states, and maintain nationwide redistribution capacity (World Bank, 2014). However, it has left the federation with a steep vertical distribution gap between central and state capacities.

Sources of State Government Revenue

Because their constitutional tax powers are limited, Malaysian state governments rely on a narrow set of revenue sources. Land-related revenue consisting of annual quit rents and upfront premiums for land alienation or conversion, serves as the primary source of independent income for most Peninsular states. However, this stream is highly volatile and deeply exposed to property market cycles. Natural resource revenues, such as timber and mineral royalties, are also problematic due to highly unequal geographic distribution across the federation. For example, Sarawak's natural resource-backed revenues averaged roughly RM6,700 million annually over the 2004-2023 period, while the resource-scarce state of Perlis generated a modest RM79 million. This stark 85:1 capacity gap illustrates the horizontal fiscal imbalances within the country. For petroleum-producing states, direct oil revenue is legally constrained, as the Petroleum Development Act 1974 caps state-level petroleum cash payments at 5% of wellhead value (Bakar, 2004). To bridge these structural revenue gaps, states rely heavily on a combination of constitutional and ad hoc federal

transfers, such as the Capitation Grant, State Road Grant, and Special Grants. This legal and structural dichotomy underscores the structural rigidity of subnational revenue mobilization in Malaysia. To provide a structured and comprehensive mapping of these constitutional arrangements, Table 2 summarizes the federal-state revenue assignment matrix, highlighting the respective constitutional bases and specific yield characteristics of major revenue instruments.

Table 2: Federal-State Revenue Assignment in Malaysia.

Revenue Source	Assigned Level	Constitutional Basis	Remarks / Yield Characteristics
Personal income tax	Federal	Federal List	Elastic; major federal revenue generator
Corporate income tax	Federal	Federal List	Highly elastic; cyclically sensitive
Petroleum income tax	Federal	Federal List	Collected centrally; states receive only royalty
Sales & Service tax (SST)	Federal	Federal List	-
Customs & Excise duties	Federal	Federal List	Collected at ports; trade and consumer-based
Stamp & Gaming taxes	Federal	Federal List	Capital transactions and regulated betting
Land premium & rent	State	State List	Main own-source item; real estate cyclicity
Forest & Mining revenue	State	State List	Highly significant for resource-rich states
Petroleum royalty	State	Petroleum Dev Act 1974	Capped at 5% of wellhead value

As demonstrated in Table 2, the empirical reality of Malaysia's fiscal federalism is defined by a central monopoly over elastic, broad-based tax instruments, leaving subnational jurisdictions dependent on inelastic and highly volatile revenue streams. This institutional design suggests that expansion in state-level development responsibilities may be difficult to sustain through own-source revenues alone, reinforcing the importance of intergovernmental transfers within Malaysia's fiscal framework. Consequently, evaluating subnational fiscal sustainability necessitates an empirical framework that models these structural imbalances, which is detailed in the subsequent methodology section.

THEORETICAL FRAMEWORK AND METHODOLOGY

Data Sources and Variable Construction

This study employs an annual balanced panel dataset covering the 13 Malaysian states from 2004 to 2023. The Federal Territories are excluded because their fiscal administration is directly managed by the federal government and therefore differs from the institutional setting faced by state governments. The data were compiled from official publications issued by state governments, the Ministry of Finance Malaysia, and the Department of Statistics Malaysia (DOSM). Specifically, primary fiscal data were extracted from the State Financial Statements certified by the National Audit Department. To ensure consistency across time, all monetary variables were converted into constant prices using the Consumer Price Index (CPI).

Three key fiscal variables are examined: state expenditure (EXPEND), own-source revenue (OWNREV), and federal transfers (TRANSF). State expenditure is measured as the sum of operating and development expenditure, reflecting the overall spending responsibilities of state governments. Own-source revenue captures revenues generated directly by the states through taxes and non-taxes including, fees, licences, land-related revenues, investment income, and other internally generated sources. Federal transfers represent intergovernmental fiscal support received from the federal government through constitutional and administrative arrangements. Following standard practice in the fiscal sustainability literature, all variables are transformed into natural logarithms before estimation. This transformation helps reduce heteroscedasticity, improves comparability across states, and allows estimated coefficients to be interpreted as elasticities.

The Intertemporal Budget Constraint

We ground our analysis of subnational fiscal sustainability in the classic intertemporal budget constraint model (Hamilton & Flavin, 1986). Within any single period, a government's accounting budget identity is expressed as:

$$G_t + (1 + r_t)B_{t-1} = R_t + B_t \quad (1)$$

where G_t is government primary expenditure excluding interest payments, r_t is the real interest rate on government debt, B_{t-1} is the real stock of debt outstanding at the end of period $t-1$, R_t is real government revenue, and B_t is the debt outstanding at the end of period t . Rearranging equation (1) allows us to express current debt as a function of the primary balance ($R_t - G_t$) and next period's debt:

$$B_{t-1} = \frac{1}{1+r_t}(R_t - G_t) + \frac{1}{1+r_t}B_t \quad (2)$$

Iterating equation (2) forward over an infinite horizon yields the comprehensive intertemporal budget constraint relation:

$$B_t = \sum_{j=1}^{\infty} \left(\prod_{i=1}^j \frac{1}{1+r_{t+i}} \right) (R_{t+j} - G_{t+j}) + \lim_{n \rightarrow \infty} \left(\prod_{i=1}^n \frac{1}{1+r_{t+i}} \right) B_{t+n} \quad (3)$$

To satisfy the solvency condition and rule out Ponzi financing schemes, the transversality condition requires that the limit term approaches zero:

$$\lim_{n \rightarrow \infty} \left(\prod_{i=1}^n \frac{1}{1+r_{t+i}} \right) B_{t+n} = 0 \quad (4)$$

This condition ensures that public debt does not grow faster than the prevailing interest rate in perpetuity. At the subnational level, Malaysian state governments do not issue conventional bonds; borrowing is strictly restricted to concessional loans from the federal government (Article 111(2) of the Federal Constitution of Malaysia). Thus, the subnational solvency condition dictates that the present value of future state primary surpluses must match outstanding federal loan obligations.

Empirical Framework for Testing Fiscal Sustainability

Following Hakkio and Rush (1991), if revenues (R_t) and expenditures (G_t) are both integrated of order one, $I(1)$, the presence of a long-run cointegrating relationship can be evaluated using a linear specification:

$$R_t = \alpha + \beta G_t + \varepsilon_t \quad (5)$$

where $\varepsilon_t \sim I(0)$. The parameter β is crucial for sustainability assessment: $\beta = 1$ indicates strong sustainability, where revenues and expenditures move one-for-one, rendering any deficit short-term and mean-reverting; $0 < \beta < 1$ signifies weak sustainability, where revenues react to expenditure shifts but insufficiently, causing debt to grow while remaining bounded; and $\beta \leq 0$ or the lack of cointegration indicates fiscal unsustainability.

To capture the specific institutional realities of Malaysia's fiscal system, we formulate two separate panel models:

Model A (Own-Source Sustainability):

$$\ln(OWNREV_{it}) = \alpha_i + \beta_i \cdot \ln(EXPEND_{it}) + \varepsilon_{it} \quad (6)$$

Model B (Transfer-Adjusted Sustainability):

$$\ln(REVENUE_{it}) = \alpha_i + \gamma_i \cdot \ln(EXPEND_{it}) + u_{it} \quad (7)$$

where $OWNREV_{it}$ is the real own-source revenue of state i in year t , $REVENUE_{it}$ is the real total revenue including federal transfers ($REVENUE_{it} = OWNREV_{it} + TRANSF_{it}$), and $EXPEND_{it}$ is real total expenditure. All variables are deflated to real terms using the national Consumer Price Index ($CPI_{2010} = 100$) and expressed in natural logarithms.

As detailed in our empirical results, the panel unit root diagnostics reveal that all fiscal series are stationary in their levels, $I(0)$. Consequently, conventional panel cointegration analysis (such as Westerlund, 2007), which strictly requires variables to be non-stationary $I(1)$, is not applicable to this dataset. Instead of modeling non-stationary cointegration vectors, the parameters β and γ are interpreted as measures of long-run fiscal adjustment and revenue-expenditure synchronization. Under an $I(0)$ stationary panel framework, these elasticities capture the long-run dynamic tracking between revenues and expenditures. A coefficient closer to unity indicates stronger fiscal adjustment, where revenue changes more closely match expenditure movements over time.

Before examining the long-run fiscal adjustment parameters, it is important to establish the institutional context underlying differences in state revenue capacity. Figure 1 illustrates the variation in transfer dependency across Malaysian states, highlighting the extent to which intergovernmental transfers complement limited own-source revenue capacity within a centralized fiscal framework. The vertical fiscal imbalance inherent in the Federal Constitution manifests as a highly unequal distribution of financial autonomy across the federation. To illustrate the scale of this structural asymmetry before conducting the formal long-run estimation, Figure 1 outlines the baseline transfer dependency profiles across all 13 states throughout the 2004-2023 period.

Figure 1 reports the average transfer dependency ratio (TRANSDEPEND) across Malaysian states for the period 2004-2023. The results reveal substantial variation in the degree of reliance on federal transfers. Perlis recorded the highest average dependency ratio (117.4%), followed by Kedah (102.4%) and Kelantan (86.1%). The ratios exceeding 100% for Perlis and Kedah indicate that federal transfers alone exceeded the states' own-source revenue collections, indicating a high degree of reliance on intergovernmental fiscal support due to limited own-source revenue capacity.

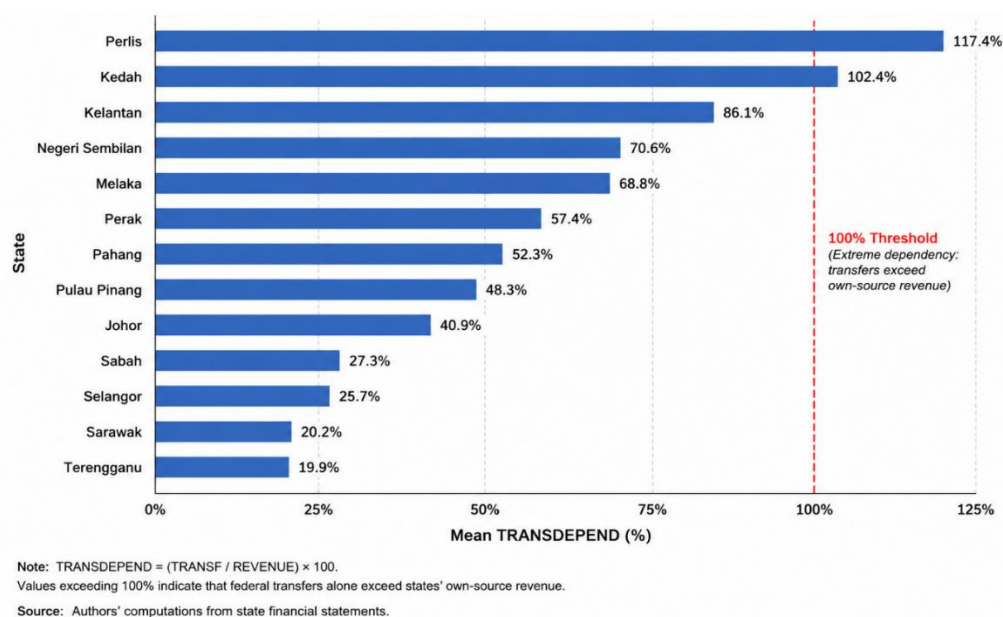


Figure 1: Average Transfer Dependency Ratio by State (TRANSDEPEND), 2004-2023

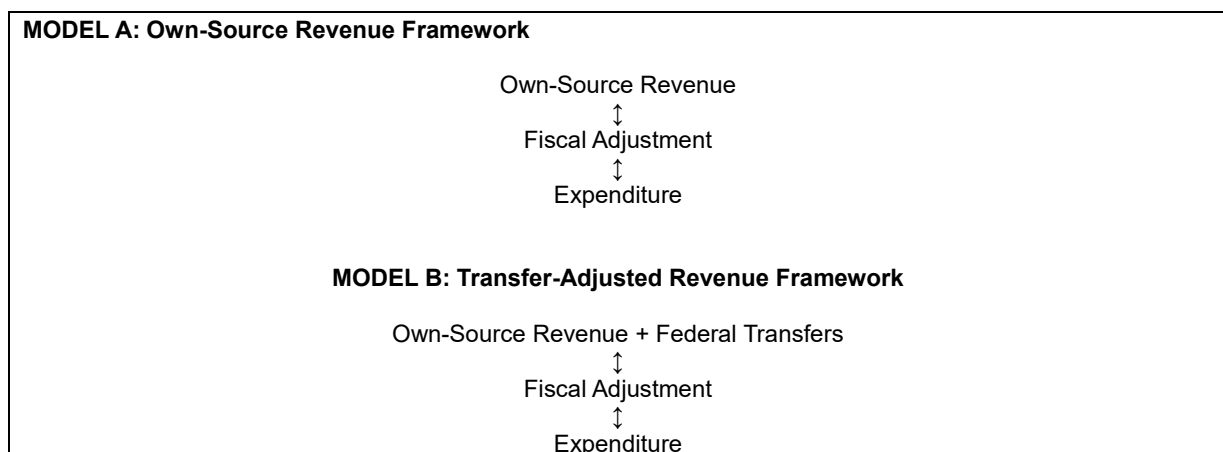


Figure 2: Analytical Model Specification

Source: Developed by the authors based on the empirical framework

At the intermediate level, Negeri Sembilan (70.6%), Melaka (68.8%), Perak (57.4%), and Pahang (52.3%) exhibited moderate dependence on federal transfers. While these states maintained some revenue-generating capacity, federal transfers remained an important component of their fiscal resources. In contrast, Sarawak (20.2%), Terengganu (19.9%), Selangor (25.7%), and Sabah (27.3%) displayed relatively low transfer dependency. These states were able to finance a larger share of their expenditure through internally generated revenue or resource-based income. Selangor, in particular, recorded one of the lowest dependency ratios, reflecting its strong economic base and diversified revenue sources.

Overall, Figure 1 highlights substantial horizontal differences in fiscal capacity among Malaysian states. The wide variation in transfer dependency indicates that states operate under different revenue constraints, reflecting the uneven distribution of own-source revenue capacity across the federation. In this context, intergovernmental transfers

represent an important equalization mechanism that helps complement limited state revenue capacity and supports the provision of public services across states.

Second-Generation Econometric Strategy

Given the deep economic interconnectedness of Malaysian states, arising from common federal policies and synchronized business cycles, cross-sectional dependence (CSD) is highly prevalent. The presence of CSD invalidates first-generation panel unit root and cointegration tests (such as IPS or Pedroni), which may reduce the reliability of inference in the presence of common shocks. We therefore apply second-generation econometric procedures robust to cross-sectional dependence.

First, the Pesaran (2004) CD test is executed using pairwise correlation coefficients of residuals:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \quad (8)$$

Second, the Cross-sectionally Augmented IPS (CIPS) test (Pesaran, 2007) is implemented, which augments standard Dickey-Fuller equations with cross-sectional averages to account for common factors:

$$\Delta y_{it} = \alpha_i + \beta_i y_{i,t-1} + \delta_i \bar{y}_{t-1} + \sum_{j=0}^p \phi_{ij} \Delta \bar{y}_{t-j} + \sum_{j=1}^p \lambda_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \quad (9)$$

Third, Westerlund's (2007) error-correction-based cointegration test is applied. It evaluates whether error correction occurs at the individual or panel level using bootstrap critical values to handle cross-sectional dependence:

$$\Delta y_{it} = \delta_i' d_t + \alpha_i (y_{i,t-1} - \beta_i' x_{i,t-1}) + \sum_{j=1}^{p_i} \alpha_{ij} \Delta y_{i,t-j} + \sum_{j=-q_i}^{p_i} \gamma_{ij} \Delta x_{i,t-j} + e_{it} \quad (10)$$

Finally, long-run parameters are generated via the Common Correlated Effects Mean Group (CCEMG) estimator (Pesaran, 2006), which filters out unobserved common factors by adding cross-sectional averages of the dependent and independent variables directly to the model. This is complemented by the Augmented Mean Group (AMG) estimator (Eberhardt & Bond, 2009) as a robustness verification.

EMPIRICAL RESULTS AND DATA ANALYSIS

Data Screening and Diagnostics

The balanced panel framework constructed for this empirical analysis encompasses 13 Malaysian states over a 20-year period (2004-2023), yielding a total pool of 260 observations. Prior to executing the long-run structural synchronization estimations, a series of rigorous diagnostic screening tests are implemented to explicitly ascertain the presence of cross-sectional dependence and evaluate the exact order of integration characterising the fiscal variables. Table 3 presents the summary descriptive statistics for the core deflated fiscal metrics across the sampled jurisdictions.

Given the deep regional interconnectedness, institutional budget channels, and shared macroeconomic cycles linking the Malaysian states, investigating cross-sectional dependence (CSD) is an essential diagnostic prerequisite. The Pesaran (2004) CD test strongly rejects the null hypothesis of cross-sectional independence across all evaluated

series: $\ln EXPEND = 11.52$, $\ln OWNREV = 21.51$, $\ln TRANSF = 39.50$, and $\ln REVENUE = 16.40$, with all test statistics achieving high statistical significance at the $p = 0.000$ level. This diagnostic outcome confirms pervasive cross-sectional dependence across the subnational units, thereby making first-generation panel techniques inappropriate and validating the adoption of robust second-generation econometric approaches.

Table 3: Descriptive Statistics of Key Fiscal Variables (CPI 2010 = 100).

Variable	Obs	Mean	Std. dev.	Min	Max
EXPEND (Real RM Million)	260.00	1810.63	3289.79	129.10	44598.33
OWNREV (Real RM Million)	260.00	1349.25	2077.58	44.36	13132.54
TRANSF (Real RM Million)	260.00	499.62	385.02	93.47	2097.64
REVENUE (Real RM Million)	260.00	1598.13	2115.95	82.10	13311.36
TRANSDPEND (%)	260.00	58.70	47.66	11.57	474.98

Source: Authors' computations from state financial statements.

To formally evaluate the stationarity and integration properties of the panel series under CSD conditions, the second-generation Cross-sectionally Augmented IPS (CIPS) unit root test by Pesaran (2007) is applied. The empirical outputs reveal that the level statistics for all core variables, specifically $\ln EXPEND$ at -3.022 , $\ln OWNREV$ at -3.025 , $\ln TRANSF$ at -6.190 , and $\ln REVENUE$ at -3.081 , are markedly smaller than the strict 1% critical threshold value of -2.47 . This supplies empirical evidence to reject the unit root null hypothesis at the 1% significance level.

Consequently, all relevant fiscal series are stationary in their levels, integrating at order zero, or $I(0)$. Because conventional panel cointegration frameworks (e.g., Westerlund, 2007) strictly necessitate non-stationary, $I(1)$ series to model long-run relationships, they are fundamentally inapplicable to this stationary dataset. To resolve this methodological constraint, the empirical analysis directly bypasses conventional cointegration modeling and utilizes the Common Correlated Effects Mean Group (CCEMG) estimator by Pesaran (2006), complemented by the Augmented Mean Group (AMG) framework by Eberhardt and Teal (2010).

Both second-generation estimators are robust to cross-sectional dependence and unobserved slope heterogeneity, while their consistent theoretical properties under stationary panels provide an appropriate framework for estimating of long-run fiscal synchronization parameters.

CCEMG and AMG Estimation Results

The panel unit root diagnostics detailed in Section 5.1 reveal that all relevant subnational fiscal series are stationary in their levels, integrating at order zero, or $I(0)$. Consequently, conventional panel cointegration frameworks, such as the error-correction-based Westerlund (2007) test, which strictly require variables to be non-stationary $I(1)$, are methodologically inapplicable to this dataset. To address this empirical characteristic and robustly capture the co-movements within the data, long-run structural parameters are

generated via the Common Correlated Effects Mean Group (CCEMG) and Augmented Mean Group (AMG) estimators.

Under an $I(0)$ stationary panel framework, these elasticities do not model non-stationary cointegration vectors; instead, they serve as they serve as indicators of long-run fiscal adjustment and revenue-expenditure synchronization. These estimators are highly appropriate for this framework as they filter out unobserved common factors by incorporating cross-sectional averages, making them robust to cross-sectional dependence and slope heterogeneity without requiring non-stationary variables. The empirical outputs for both Model A (Own-Source Sustainability) and Model B (Transfer-Adjusted Sustainability) are presented in Table 4.

Table 4: CCEMG and AMG Long-Run Parameter Estimates.

Estimator / Metric	Model A: Own-Source Sustainability	Model B: Transfer-Adjusted Sustainability
CCEMG Coefficient	0.318	0.517
CCEMG t-statistic	-2.89	-3.22
AMG Coefficient	0.303	0.591
AMG t-statistic	-2.54	-5.64

Notes: CCEMG refers to the Common Correlated Effects Mean Group estimator, while AMG denotes the Augmented Mean Group estimator. Both estimators are employed to account for cross-sectional dependence and slope heterogeneity in the panel data t-statistics are reported in parentheses. All coefficient estimates are based on real (CPI-deflated) fiscal variables.

The empirical estimations presented in Table 4 reveal a stark structural divergence between the two models. In Model A, which captures baseline solvency using only independent own-source revenues, the estimated coefficients are not relatively weak as indicators of long-run revenue-expenditure adjustment. Because own-source revenues fail to exhibit a stable baseline relationship with expenditure commitments, these restricted elasticities suggest that own-source revenues alone provide insufficient support for long-run fiscal sustainability when state governments operate in isolation from the federal government. Consequently, these baseline estimates should not be interpreted as evidence of independent long-run fiscal sustainability.

In contrast, Model B establishes a much stronger long-run tracking mechanism once intergovernmental transfers are integrated into the total subnational revenue stream. The CCEMG estimator reports a long-run coefficient of 0.517, while the AMG estimator produces a comparable estimate of 0.591. Both estimates are positive and statistically significant, confirming that increases in transfer-adjusted revenues are associated with higher state expenditures over the long run. However, the estimated elasticities remain substantially below unity, implying that expenditure adjustments are proportionately smaller than changes in total available revenues. Overall, the comparison between the two models demonstrates that federal transfers play important role in strengthening long-run fiscal synchronization across Malaysian states. Nevertheless, the estimated long-run response remains incomplete. Although intergovernmental transfers substantially improve subnational fiscal resilience by reinforcing the relationship between revenues and expenditures, they do not satisfy the criterion for strong fiscal sustainability, which strictly

requires a long-run coefficient approaching unity. Instead, the empirical evidence is more consistent with weak fiscal sustainability, whereby state expenditures respond positively but less than proportionately to changes in available revenues. These findings are consistent with Malaysia's centralized fiscal federalism framework, in which federal transfers function as an important institutional mechanism supporting subnational fiscal sustainability despite the restricted own-source revenue capacity of state governments.

CROSS-STATE HETEROGENEITY IN FISCAL SUSTAINABILITY

While the panel estimates reported in Section 5 indicate that Malaysian state governments are fiscally sustainable on average, Table 5 reveals substantial differences in fiscal performance across individual states.

Table 5: State-Level Fiscal Indicators and Long-Run Fiscal Elasticities (Average Real Values, 2004-2023).

State	Average Own-Source Revenue (RM mil)	Average Expenditure (RM mil)	Average Federal Transfers (RM mil)	Transfer Dependency (%)	β (Own-Source Elasticity)	γ (Transfer-Adjusted Elasticity)
Johor	1123.05	1448.20	543.31	40.96	0.55	0.76
Kedah	339.72	583.38	438.27	107.70	Omitted	Omitted
Kelantan	379.32	698.41	394.38	91.54	0.13	0.24
Melaka	283.89	434.68	219.13	62.05	0.63	0.94
Negeri Sembilan	322.65	404.02	263.01	68.22	0.84	0.77
Pahang	609.47	786.84	359.28	51.36	1.04	0.98
Pulau Pinang	487.16	728.21	271.80	46.44	0.52	0.77
Perak	714.12	1029.28	490.93	75.47	0.06	Omitted
Perlis	72.88	192.44	148.92	126.24	0.37	0.71
Sabah	3865.22	6277.32	1130.78	27.42	0.11	0.22
Sarawak	7103.56	5636.78	1341.43	18.92	Omitted	Omitted
Selangor	1797.56	2268.40	525.75	25.31	0.24	0.42
Terengganu	441.60	3050.28	368.06	21.41	0.10	0.77

Notes: β denotes the own-source fiscal elasticity estimated from Model A, while γ denotes the transfer-adjusted fiscal elasticity estimated from Model B. Omitted coefficients indicate economically implausible estimates arising from small-sample estimation instability ($T = 20$) and are excluded from substantive interpretation. All monetary variables are expressed in real terms (CPI-deflated; base year = 2010) to ensure cross-state and intertemporal comparability.

These differences reflect variations in economic structure, revenue-generating capacity and dependence on federal transfers despite operating under a common constitutional and fiscal framework. The estimated own-source fiscal elasticities (β) and transfer-adjusted elasticities (γ) provide additional evidence that long-run fiscal adjustment differs considerably across states.

High Fiscal Capacity States

Johor, Selangor and Pulau Pinang represent the strongest fiscal performers among the Malaysian states. These states consistently generated relatively high own-source revenue while recording comparatively low transfer dependency ratios. Although their own-source fiscal responses remain below unity ($\beta < 1$), all three states exhibit higher transfer-adjusted elasticities ($\gamma > \beta$), indicating that federal transfers strengthen long-run fiscal adjustment rather than substitute for local revenue mobilization. This pattern reflects the diversified economic bases of these states, where manufacturing and services provide relatively stable revenue sources while federal transfers continue to support fiscal stability (Hutchinson, 2014; World Bank, 2021).

Resource-Based States

The resource-rich states display more heterogeneous fiscal outcomes. Sarawak recorded the highest average own-source revenue and among the lowest transfer dependency ratios, indicating relatively strong fiscal capacity. However, the estimated β and γ coefficients were omitted because of estimation instability arising from the limited time dimension of the panel. Sabah and Terengganu present contrasting evidence. Both states possess substantial natural resources, yet their own-source fiscal responses remain relatively weak ($\beta = 0.11$ and $\beta = 0.10$, respectively). In particular, Terengganu's fiscal elasticity increases markedly after transfers are incorporated ($\gamma = 0.77$), highlighting the continued importance of federal fiscal support despite its resource endowment (Abdul Jalil, 2008).

Transfer-Dependent and Intermediate States

Kelantan, Perlis and Kedah remain structurally dependent on federal transfers because of relatively limited own-source revenue capacity. Their low β values, together with high transfer dependency ratios, suggest persistent constraints in financing expenditure independently.

By contrast, Melaka, Negeri Sembilan and Pahang demonstrate comparatively stronger fiscal adjustment despite more moderate revenue bases. Pahang is the only state with an own-source elasticity exceeding unity ($\beta = 1.04$), indicating the strongest fiscal response before transfers are considered, while Melaka and Negeri Sembilan also record relatively high β and γ values. Overall, the state-level evidence indicates that broader economic activity generally supports greater fiscal autonomy, whereas fiscally weaker states continue to depend on intergovernmental transfers to sustain expenditure commitments (Noh, 1991; Ministry of Finance Malaysia, various years).

Overall, the state-level findings complement the aggregate results presented in Section 5. Across most states, transfer-adjusted elasticities (γ) exceed own-source elasticities (β), demonstrating that federal transfers consistently strengthen long-run fiscal adjustment. This evidence supports the view that intergovernmental transfers are an institutional component of Malaysia's fiscal federalism, serving an equalization function by reducing vertical fiscal imbalances while enabling states with different fiscal capacities to maintain relatively stable expenditure levels (Oates, 1999; Shah, 2007)

DISCUSSION AND POLICY IMPLICATIONS

Fiscal Sustainability within Malaysia's Fiscal Federalism

The empirical findings indicate that fiscal sustainability at the Malaysian state level cannot be explained solely by own-source revenue performance. Instead, long-run fiscal adjustment reflects the institutional characteristics of Malaysia's highly centralized fiscal federalism, where major taxation powers are concentrated at the federal level while state governments continue to undertake substantial expenditure responsibilities. This constitutional arrangement creates persistent vertical fiscal imbalances, making intergovernmental transfers an essential component of state finance rather than a temporary source of fiscal support (Federal Constitution of Malaysia, Article 111(2); Hutchinson, 2014; Abdul Jalil, 2008).

The improvement in fiscal adjustment after incorporating federal transfers demonstrates that fiscal sustainability is jointly determined by state fiscal effort and the federal transfer system. Rather than signalling weak fiscal management, the results suggest that Malaysian states operate within an institutional framework in which transfers are designed to complement limited own-source revenue capacity. This interpretation is consistent with fiscal federalism theory, which argues that transfers are necessary to correct vertical fiscal imbalances and support efficient public service delivery across different levels of government (Oates, 1999; Shah, 2007).

Fiscal Equalization and Horizontal Fiscal Imbalances

Beyond correcting vertical fiscal imbalances, the findings highlight the importance of Malaysia's fiscal equalization system in addressing horizontal fiscal disparities across states. Table 5 demonstrates considerable variation in fiscal capacity, with economically stronger states generating substantially higher own-source revenue than less-developed states. These differences imply that states do not possess the same ability to finance comparable levels of public expenditure from their own revenue sources.

Federal transfers therefore perform an important equalization function by reducing disparities in fiscal capacity and enabling states with weaker revenue bases to continue providing essential public services. The consistently higher transfer-adjusted fiscal elasticities (γ) relative to own-source elasticities (β) indicate that the contribution of federal transfers extends beyond increasing available financial resources. Instead, they operate as an institutional mechanism that narrows horizontal fiscal imbalances and strengthens long-run fiscal sustainability across the federation (Shah, 2007; Boadway & Shah, 2009).

This interpretation is particularly relevant for Malaysia because substantial differences in economic development, industrial structure, natural resource endowments and demographic characteristics continue to shape state revenue capacity. Consequently, fiscal sustainability should be interpreted not simply as the ability of individual states to finance expenditure independently, but also as the effectiveness of the fiscal equalization system in supporting balanced regional development within a highly centralized federation (Hutchinson, 2014; Ministry of Finance Malaysia, various years).

Policy Implications

The findings support strengthening the effectiveness of Malaysia's fiscal equalization framework rather than reducing federal transfers. As fiscal capacity differs considerably across states, equalization remains necessary to ensure reasonably comparable standards of public service delivery while preserving macroeconomic stability.

While federal transfers perform an important equalization function, prolonged reliance on transfers may create challenges in sustaining incentives for states to strengthen their own-source revenue capacity. This concern is consistent with the soft budget constraint hypothesis, which suggests that expectations of continued financial assistance may weaken incentives for fiscal discipline and revenue mobilisation at the subnational level (Kornai et al., 2003; Wibbels, 2005).

An important policy consideration is that prolonged reliance on federal transfers may weaken incentives for states to strengthen their own-source revenue capacity. This concern is consistent with the soft budget constraint hypothesis, which suggests that expectations of continued financial assistance may reduce incentives for fiscal discipline and revenue mobilization at the subnational level (Kornai et al., 2003; Wibbels, 2005). However, the Malaysian evidence should be interpreted with caution. Since states possess relatively limited taxation powers under the existing constitutional framework, transfer dependency is largely institutional rather than behavioural. Therefore, while concerns regarding potential moral hazard should not be overlooked, federal transfers in Malaysia should also be understood as an essential component of the fiscal equalization system that supports balanced regional development and comparable public service provision across states.

Future reforms should therefore focus on improving the transparency and predictability of transfer allocation. A more rules-based system that incorporates objective indicators such as fiscal capacity, expenditure needs, population characteristics and regional development gaps would enhance accountability while maintaining the equalization objectives of the existing fiscal framework (Shah, 2007; Boadway & Shah, 2009). At the same time, states should continue strengthening their own-source revenue through better revenue administration, improved management of state assets and broader non-tax revenue initiatives. Such measures would reinforce fiscal resilience without undermining the equalization role of federal transfers.

Contribution to the Literature

This study contributes to the literature in three respects. First, it provides updated empirical evidence on fiscal sustainability among Malaysian state governments using a balanced panel dataset covering the period 2004-2023. Second, it extends previous Malaysian studies by explicitly considering the role of fiscal equalization through intergovernmental transfers in assessing subnational fiscal sustainability. The findings demonstrate that federal transfers function as an institutional mechanism supporting long-run fiscal adjustment rather than merely supplementary revenue. Finally, by applying second-generation heterogeneous panel estimators to stationary fiscal variables, the study provides an alternative empirical framework for evaluating fiscal sustainability in fiscally centralized federations where conventional panel cointegration approaches may not be suitable.

Although concerns regarding soft budget constraints remain relevant, the findings suggest that Malaysia's policy focus should be directed towards improving the design of the fiscal equalization framework while encouraging states to strengthen their own-source revenue capacity.

CONCLUSION

This study examined fiscal sustainability within Malaysia's highly centralized fiscal federalism system using annual data for 13 states over the period 2004-2023. The findings indicate that own-source revenue alone provides limited support for long-run fiscal adjustment, whereas the inclusion of federal transfers substantially improves the revenue-expenditure adjustment relationship across states. These results demonstrate that fiscal sustainability in Malaysia is jointly shaped by state fiscal effort and the institutional role of intergovernmental transfers.

The state-level analysis further reveals pronounced differences in fiscal capacity across Malaysian states. While economically stronger states exhibit greater fiscal autonomy, states with weaker revenue bases remain more dependent on federal transfers to finance public expenditure. These disparities reflect both persistent vertical fiscal imbalances arising from the constitutional allocation of taxing powers and horizontal fiscal imbalances associated with differences in economic development and revenue capacity. Consequently, fiscal sustainability should be understood within the broader context of Malaysia's fiscal equalization system, where federal transfers function as an important equalization mechanism that supports balanced regional development and comparable public service provision across states (Oates, 1999; Shah, 2007; Hutchinson, 2014).

From a policy perspective, the findings support further strengthening the transparency and effectiveness of Malaysia's fiscal equalization framework through a more rules-based allocation mechanism that considers fiscal capacity, expenditure needs and regional disparities. Such reforms would improve fiscal accountability while maintaining the equalization objectives of the federal system and encouraging greater own-source revenue mobilisation by state governments.

Overall, this study contributes to the growing literature on subnational fiscal sustainability by demonstrating that fiscal sustainability in a highly centralized federation requires consideration of the equalization role of intergovernmental transfers. Future research may extend this analysis by incorporating institutional quality, governance and political economy factors to provide a more comprehensive understanding of fiscal sustainability across Malaysian states and other fiscally centralized federations.

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