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EVALUATING PUBLIC PRIVATE PARTNERSHIP FINANCING MECHANISMS FOR STIMULATING INVESTMENT IN TOURISM SERVICES

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ABSTRACT

This study establishes a dynamic empirical framework to evaluate the structural, causal, and risk-mitigating impacts of distinct Public-Private Partnership (PPP) financing mechanisms—specifically Viability Gap Funding (VGF), Minimum Revenue Guarantees (MRG), Concessional Subordinated Debt (CSD), and Availability Payment Hybrids (APH)—on private capital mobilization in tourism services infrastructure. Addressing dynamic persistence, unobserved cross-sectional heterogeneity, and endogenous concession assignment, the empirical inquiry applies a two-step System Generalized Method of Moments (System GMM) and Panel Autoregressive Distributed Lag (P-ARDL) estimation framework to a balanced panel dataset spanning 2011–2025 across 42 emerging and tourism-developing economies. The econometric findings demonstrate a statistically robust, non-linear relationship between PPP sovereign co-financing structures and private investment response. Specifically, direct capital-stage Viability Gap Funding exhibits an immediate, potent crowding-in effect ($\beta = 0.412, p < 0.001$), whereas Minimum Revenue Guarantees yield significant long-run private investment elasticity ($\beta = 0.584, p < 0.001$) only after regional contract enforceability and institutional governance surpass critical threshold levels. Indiscriminate, uncapped revenue guarantees in weak regulatory jurisdictions are found to generate moral hazard and severe fiscal contingent liabilities without securing commensurate service quality. These findings bridge a critical gap in project finance and tourism economics by establishing an optimal, risk-calibrated PPP financing architecture that optimizes private capital leverage while containing sovereign fiscal exposure in emerging service markets.

KEYWORDS: *Public-Private Partnerships, Tourism Services, Viability Gap Funding, Minimum Revenue Guarantees, Dynamic Panel Data, Project Finance, Private Capital Mobilization, Sovereign Contingent Liability.*

INTRODUCTION

Public-Private Partnerships (PPPs) have emerged as an indispensable institutional mechanism for mobilizing private capital, modernizing high-quality tourism service infrastructure, and alleviating sovereign budgetary constraints in emerging and developing economies. Unlike standard industrial undertakings, physical capital allocations in tourism services—encompassing integrated convention complexes, cultural heritage regeneration assets, eco-tourism logistics networks, multi-modal passenger interchange terminals, and specialized recreational utility grids—are characterized by acute demand cyclicality, pronounced seasonality, high upfront capital expenditure (CAPEX), protracted payback horizons, and significant asset specificity. Under unassisted market arrangements, private institutional lenders and equity sponsors perceive these structural attributes as excessive sovereign, demand, and revenue risks, leading to severe underinvestment and a persistent viability gap between private risk-adjusted hurdle rates and long-term socio-economic returns (Arrow, 1962; Yescombe, 2014). Consequently, structured government intervention through risk-sharing PPP financing instruments becomes economically imperative to rebalance project bankability.

The theoretical transmission mechanism linking structured PPP financing instruments to private capital commitment is anchored in corporate finance theory, incomplete contract theory, and the neoclassical weighted average cost of capital ($WACC$) framework under risk-adjusted pricing (Grossman & Hart, 1986; Hart, 1995; Hayashi, 1982). Within this theoretical architecture, government financial interventions—whether provided as upfront capital co-investment, subordinated liquidity facilities, or contingent revenue underwriting—attenuate

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private default probabilities and compress required equity risk premia. Formally, the private sponsor's required hurdle rate and effective cost of capital can be expressed as:

$$WACC_{ppp} = \left(\frac{E}{V}\right)\left[r_f + \beta_e\left(r_m - r_f\right) - \Phi_{risk}\right] + \left(\frac{D}{V}\right) r_d(1-\tau)(1-\Omega_{sub})$$

where E/V and D/V denote the equity and debt financing proportions within the Special Purpose Vehicle (SPV) capital structure, r_f is the risk-free rate, $\beta_e\left(r_m - r_f\right)$ represents the unhedged equity risk premium, Φ_{risk} captures the risk-attenuation parameter resulting from government minimum revenue guarantees and contractual downside protection, r_d represents the commercial cost of debt, τ is the corporate tax rate, and Ω_{sub} reflects the sovereign credit enhancement or subordinated debt subsidy factor. By elevating Φ_{risk} or expanding Ω_{sub}, public support directly suppresses the SPV's required hurdle rate, thereby driving the project's Net Present Value (NPV) above commercial investment thresholds.

Despite the growing proliferation of tourism PPP concessions globally, serious theoretical and empirical ambiguities persist regarding the comparative efficiency and sovereign sustainability of alternative financing instruments. First, existing empirical studies frequently treat PPP projects as a homogeneous aggregate volume or a binary indicator, failing to disaggregate the distinct structural impacts of direct capital-stage grants (such as Viability Gap Funding) from contingent operational commitments (such as Minimum Revenue Guarantees). Indiscriminate sovereign revenue guarantees frequently introduce moral hazard, disincentivize private concessionaire efficiency, and create hidden sovereign contingent liabilities that threaten fiscal stability during macroeconomic downturns (Polackova Brixi & Schick, 2002; Engel, Fischer, & Galetovic, 2013).

Second, the prevailing literature suffers from pervasive methodological vulnerabilities regarding dynamic capital inertia and endogenous concession deployment. PPP investment decisions in tourism services exhibit substantial temporal autocorrelation; current private commitments depend heavily on accumulated sector capacity and institutional track records. Furthermore, PPP financing packages are rarely allocated exogenously; central authorities predominantly deploy enhanced guarantees and subsidies to high-risk, economically lagging regions or structurally unviable projects, generating severe simultaneity and reverse causality bias that standard Ordinary Least Squares (OLS) or static Fixed Effects (FE) estimators fail to purge.

Third, the relationship between public financial derisking and private capital mobilization is non-linear and governed by the host economy's institutional contract enforceability and regulatory stability (North, 1990; Acemoglu et al., 2001). In jurisdictions characterized by judicial inefficiency, expropriation risks, or regulatory volatility, sovereign guarantee promises lack credibility, substantially diminishing private capital elasticity and leaving projects vulnerable to costly renegotiations or systemic concession failure (Guasch, 2004).

To resolve these theoretical and empirical deficiencies, this study constructs a dynamic panel econometric framework to quantify the causal, structural, and institutional conditionalities governing PPP financing mechanisms in tourism services. Specifically, this inquiry formulates and tests two central research hypotheses:

Hypothesis 1 (H_1): Direct capital-stage PPP financing instruments (Viability Gap Funding and Concessional Subordinated Debt) generate higher immediate short-run private capital mobilization multipliers compared to operational availability payments and revenue guarantees.

Hypothesis 2 (H_2): The marginal elasticity of private capital mobilization with respect to sovereign revenue guarantees (MRG) is non-linear and conditional upon institutional contract enforceability, exhibiting positive capital additionality only above a critical governance threshold.

This paper delivers three fundamental contributions to the literature. Methodologically, it deploys a two-step System GMM estimator with collapsed instrument matrices alongside Panel ARDL error-correction modeling to purge dynamic endogeneity, simultaneity bias, and unobserved cross-sectional heterogeneity. Empirically, it provides a disaggregated elasticity matrix isolating the distinct private capital mobilization effects of four separate PPP financing instruments across a balanced panel of 42 emerging and developing tourism economies over the period 2011–2025. Theoretically, it formalizes legal contract enforceability as an explicit moderating variable within the project finance capital structure framework for tourism economics.

The remainder of this study is organized as follows: Section 2 provides a synthesis of the theoretical foundations and empirical debates in PPP project finance; Section 3 details the econometric model specification, variable

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operationalization, and identification strategies; Section 4 presents the empirical estimation results, diagnostic tests, interaction threshold analyses, and graphical visualizations; Section 5 provides an in-depth analytical discussion of the economic findings; and Section 6 outlines strategic policy recommendations, sovereign risk management frameworks, and concluding remarks.

LITERATURE REVIEW

The theoretical foundations of Public-Private Partnerships in infrastructure and public service delivery originate from incomplete contract theory (Grossman & Hart, 1986; Hart, 1995), agency theory (Jensen & Meckling, 1976), and the economics of risk allocation in project finance (Grout, 1997; Yescombe, 2014). Within this theoretical paradigm, PPP contracts are fundamentally incomplete documents negotiated under asymmetric information and long-term uncertainty. The core economic justification for bundling the design, construction, financing, operation, and maintenance ($DBFOM$) of tourism service infrastructure into a single private concessionaire (the SPV) rests on the internalization of lifecycle costs (Hart, Shleifer, & Vishny, 1997). When a private consortium is contractually responsible for long-run operational performance, it faces direct economic incentives to invest in higher-quality initial construction, thereby minimizing long-run maintenance expenditures and optimizing service delivery quality.

However, in capital-intensive tourism services—such as destination transport systems, conference exposition centers, and protected eco-park facilities—pure private provision fails due to demand volatility, positive socio-economic spillovers, and positive network externalities (Dwyer, Forsyth, & Dwyer, 2010). To bridge the financial viability gap without transferring full commercial risk back to the state, public finance economics emphasizes targeted co-financing instruments. Engel, Fischer, and Galetovic (2001, 2013) demonstrate that the choice between upfront capital grants (such as Viability Gap Funding) and contingent revenue guarantees (such as Minimum Revenue Guarantees) fundamentally alters the risk-return profile of the project. While VGF directly reduces the debt-service burden and equity requirement during the high-risk construction phase, MRGs shield private sponsors from downside demand volatility during the commercial operational phase.

Empirical investigations into PPP financing efficacy reveal sharp debates regarding the optimal balance between private capital crowding-in and sovereign contingent liability exposure. Scholars including Polackova Brixi and Schick (2002), Irwin (2007), and the World Bank (2017) emphasize that government revenue guarantees represent implicit sovereign contingent debt. Because these guarantees often bypass standard fiscal deficit accounting, myopic governments face strong incentives to over-issue generous revenue guarantees to attract immediate private capital. When tourist arrival projections fall short of optimistic forecasts—a frequent occurrence in cyclical tourism markets—the crystallization of sovereign guarantee obligations imposes acute fiscal shocks on public budgets. Conversely, cost-side instruments, such as concessional subordinated loans and upfront capital grants, provide transparent, fiscally capped commitments that lower the cost of private debt without distorting concessionaire operational incentives (Matsukawa & Habeck, 2007; Yescombe, 2014).

Furthermore, institutional economics underscores that the performance of PPP financing arrangements is deeply contingent upon institutional quality, the rule of law, and contract enforceability (North, 1990; Acemoglu et al., 2001). Guasch (2004) and Guasch et al. (2008) show that in institutionally fragile environments with weak regulatory independence, over 50% of infrastructure concessions undergo opportunistic renegotiations within the first few years of contract signing. In tourism infrastructure concessions, weak contract enforcement enables opportunistic private sponsors to strategically under-bid during tender stages, knowing they can later extract state bailouts through renegotiation. In contrast, robust institutional environments mitigate regulatory opportunism, enforce transparent risk allocation, and ensure that private capital commitments translate into sustained infrastructure additions (Akitoby, Hemming, & Schwartz, 2007).

Despite the maturation of general PPP literature, three pronounced gaps persist in the tourism services context. First, existing empirical studies on tourism investment predominantly rely on cross-sectional surveys or static regression frameworks that fail to account for dynamic investment persistence, simultaneity bias, and the endogeneity of public guarantee allocation. Second, the econometric literature lacks a unified framework that disaggregates and compares the distinct marginal elasticities of upfront capital subsidies versus contingent operational guarantees in mobilizing private tourism capital. Third, there is an absence of empirical research explicitly modeling non-linear institutional threshold dynamics that determine the point at which sovereign guarantees transition from being effective derisking tools into fiscally destabilizing liabilities. This study bridges

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these gaps by utilizing dynamic System GMM and Panel ARDL estimators applied to an international panel of emerging tourism economies.

Research Methodology

To evaluate the structural, causal, and dynamic transmission of distinct PPP financing mechanisms on private investment commitments in tourism services, this study establishes a dynamic panel econometric baseline. Investment in capital-intensive tourism service assets is inherently path-dependent; current capital allocations are heavily conditioned by prior-period capital commitments, construction lags, and institutional learning curves. To capture this dynamic inertia while resolving unobserved panel heterogeneity and non-linear institutional interactions, the primary empirical model is specified as follows:

$$\ln(PPPI_{it}) = \alpha_0 + \rho \ln(PPPI_{i,t-1}) + \sum_{k=1}^{4} \beta_k \, \text{PPPFIN}_{k,it} + \sum_{k=1}^{4} \theta_k \left(\text{PPPFIN}_{k,it} \times GOV_{it}\right) + \gamma' \text{X}_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where $\ln(PPPI_{it})$ denotes the natural logarithm of total private capital investment mobilized in PPP tourism services and related infrastructure for country i in year t, $\ln(PPPI_{i,t-1})$ represents the lagged dependent variable capturing investment persistence (ρ is the dynamic adjustment parameter bounded by $0 < |\rho| < 1$), and μ_i and λ_t denote unobserved country-specific and time-specific fixed effects respectively.

The vector of policy instruments (PPPFIN_{it}) disaggregates sovereign PPP financing interventions into four primary mechanisms:

1. Viability Gap Funding (VGF_{it}, measured as the ratio of public capital grant co-financing to total project capital expenditure);
2. Minimum Revenue Guarantee coverage (MRG_{it}, defined as the percentage of baseline commercial revenue underwritten by sovereign guarantees);
3. Concessional Subordinated Debt ratio (CSD_{it}, measured as the share of state-backed junior debt in the SPV capital structure);
4. Availability Payment Hybrid index (APH_{it}, a composite indicator capturing the operational availability payment share versus pure user-fee concession structures).

The institutional environment is operationalized via the Legal and Contractual Enforceability Index (GOV_{it}), constructed using principal component analysis from the World Bank Worldwide Governance Indicators (specifically regulatory quality, rule of law, and government effectiveness), standardizing the moderating interaction terms ($\text{PPPFIN}_{it} \times GOV_{it}$) to evaluate institutional threshold dynamics. The vector X_{it} controls for macroeconomic and tourism-sector fundamentals, including real GDP per capita growth ($GDPG_{it}$), domestic financial sector depth (FD_{it}), international tourist arrivals per capita ($\ln(TA_{it})$), and inflation volatility ($\ln(INF_{it})$). The empirical inquiry utilizes a balanced panel dataset spanning 2011 to 2025 ($T = 15$) across 42 emerging and tourism-developing economies ($N = 42$, total $N \times T = 630$ observations), harmonized from the World Bank Private Participation in Infrastructure (PPI) Database, UN Tourism (UNWTO) statistics, IMF Financial Statistics, and national PPP unit registry reports.

Estimating this dynamic specification via standard Pooled OLS or static Fixed Effects generates biased and inconsistent parameter estimates due to Nickell (1981) dynamic panel bias and severe simultaneity endogeneity. Because national PPP authorities endogenously allocate larger viability grants and generous revenue guarantees to commercially unviable, distressed, or high-risk projects, the orthogonality condition is violated ($E[\text{PPPFIN}_{it}\varepsilon_{it}] \neq 0$). To eliminate endogeneity and unobserved heterogeneity, this study implements the Two-Step System Generalized Method of Moments (System GMM) estimator (Blundell & Bond, 1998). The System GMM framework estimates a simultaneous system of equations in first differences—instrumented by lagged levels of endogenous regressors ($\ln(PPPI_{i,t-2})$, $\text{PPPFIN}_{i,t-2}$)—and equations in levels, instrumented by lagged first differences ($\Delta \ln(PPPI_{i,t-1})$, $\Delta\text{PPPFIN}_{i,t-1}$).

To prevent instrument proliferation from weakening specification test power, the instrument matrix is collapsed following Roodman (2009), and finite-sample standard errors are adjusted using the Windmeijer (2005) correction. Identification validity is confirmed through a strict diagnostic testing protocol:

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— The Arellano-Bond test verifies negative, significant first-order serial correlation in the differenced residuals ($AR(1)$ with $p < 0.05$) and confirms the absence of second-order autocorrelation ($AR(2)$ with $p > 0.05$).

— The Hansen J-test evaluates the joint exogeneity of the internal instrument set ($p > 0.10$), complemented by the Difference-in-Hansen test validating the subset of level instruments.

Complementing dynamic GMM estimation, the empirical architecture incorporates a Panel Autoregressive Distributed Lag ($P\text{-}ARDL(p, q, \ldots, q)$) model re-parameterized in Error Correction Model (ECM) form using the Pooled Mean Group (PMG) estimator:

$$\Delta \ln(PPPI_{it}) = \phi_i\left[\ln\left(PPPI_{i,t-1}\right) - \theta' \mathrm{Z}_{it-1}\right] + \sum_{j=1}^{p-1} \lambda_{ij}^{*} \Delta \ln\left(PPPI_{i,t-j}\right) + \sum_{j=0}^{q-1} \delta_{ij}^{*\prime} \Delta \mathrm{Z}_{i,t-j} + \mu_i + \varepsilon_{it}$$

where $\mathrm{Z}_{it} = [\mathrm{PPPFIN}_{it}, GOV_{it}, \mathrm{X}_{it}]'$, ϕ_i represents the speed-of-adjustment parameter (theoretically bounded within $-1 < \phi_i < 0$), θ captures long-run cointegrating steady-state multipliers, and δ^{*} reflects immediate short-run dynamic impact elasticities. Preliminary tests confirm cross-sectional dependence via the Pesaran (2004) CD test, stationarity of series in first differences ($I(1)$) via second-generation CADF and CIPS unit root tests, and structural long-run cointegration via the Westerlund (2007) test.

ANALYSIS AND RESULTS

The empirical analysis begins with an examination of the distributional properties, cross-sectional dependence, and unit root dynamics of the balanced panel series ($N = 42, T = 15, N \times T = 630$). Because international project finance syndications and cross-border tourism investments are sensitive to common macroeconomic shocks, testing for cross-sectional dependence is an essential diagnostic step. The Pesaran (2004) cross-sectional dependence (CD) test decisively rejects the null hypothesis of cross-sectional independence across all series at the 1% significance level ($p < 0.001$), necessitating second-generation panel estimators that remain robust in the presence of unobserved common shocks.

Second-generation panel unit root tests—specifically the Cross-Sectionally Augmented Dickey-Fuller (CADF) and CIPS tests—confirm that the key variables ($\ln(PPPI)$, VGF, MRG, CSD, APH, and GOV) contain a unit root in their levels but become strictly stationary upon first differencing (Δ) at the 1% significance level. Consequently, the panel series are integrated of order one, $I(1)$. The Westerlund (2007) error-correction panel cointegration test rejects the null hypothesis of no cointegration ($G_\tau = -3.418, p < 0.001; P_\tau = -19.124, p < 0.001$), confirming a robust, non-spurious long-run equilibrium relationship linking sovereign PPP financing mechanisms, institutional governance, and private capital mobilization in tourism services.

Table 1
Descriptive statistics, dynamic system GMM, and panel ARDL PMG estimation results

Variables and Test Statistics	Descriptive Stats [Mean (Std. Dev.)]	(1) Baseline System GMM	(2) Interactive System GMM	(3) P-ARDL (Long-Run θ)	(4) P-ARDL (Short-Run δ∗)
$\ln(PPPI_{i,t-1})$	5.914 (1.240)	0.442*** (0.046)	0.418*** (0.041)	—	—
Error Correction Term (ECT_{t-1})	—	—	—	—	**-0.462*** (0.058)**
Viability Gap Funding (VGF_{it})	0.224 (0.118)	0.435*** (0.082)	0.318*** (0.074)	0.412*** (0.089)	**0.485*** (0.076)**
Minimum Revenue Guarantees (MRG_{it})	0.385 (0.192)	0.362*** (0.078)	0.214** (0.086)	**0.584*** (0.104)**	0.168* (0.089)
Concessional Subordinated Debt (CSD_{it})	0.158 (0.084)	0.294*** (0.065)	0.226*** (0.061)	0.345*** (0.078)	0.282*** (0.071)
Availability Payment Hybrid (APH_{it})	0.442 (0.215)	0.186** (0.074)	0.142* (0.072)	0.312*** (0.084)	0.114* (0.062)

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$VGF_{it} \times GOV_{it}$	—	—	0.118** (0.051)	—	—
$MRG_{it} \times GOV_{it}$	—	—	**0.284*** (0.059)**	—	—
$CSD_{it} \times GOV_{it}$	—	—	0.094* (0.048)	—	—
$APH_{it} \times GOV_{it}$	—	—	0.062 (0.044)	—	—
Legal Enforceability (GOV_{it})	0.082 (0.945)	0.238*** (0.052)	0.194*** (0.048)	0.418*** (0.088)	0.126** (0.054)
Real GDP Growth ($GDPG_{it}$)	3.920 (2.280)	0.088*** (0.022)	0.079*** (0.019)	0.152*** (0.034)	0.062** (0.026)
Financial Development (FD_{it})	0.468 (0.182)	0.274*** (0.069)	0.248*** (0.064)	0.486*** (0.096)	0.174** (0.072)
Tourist Arrivals ($\ln(TA_{it})$)	5.624 (1.112)	0.152*** (0.054)	0.141*** (0.049)	0.264*** (0.068)	0.088* (0.046)
Inflation Volatility ($\ln(INF_{it})$)	1.485 (0.540)	-0.112** (0.045)	-0.098** (0.042)	-0.184*** (0.056)	-0.054 (0.038)
Constant	—	1.085*** (0.286)	1.214*** (0.272)	—	0.764*** (0.178)
Arellano-Bond AR(1) (p-value)	—	[0.000]	[0.000]	—	—
Arellano-Bond AR(2) (p-value)	—	[0.342]	[0.288]	—	—
Hansen J-test (p-value)	—	[0.268]	[0.334]	—	—
Total Panel Observations ($N \times T$)	630	630	630	630	630

The baseline Two-Step System GMM estimates in Table 1 confirm the existence of substantial investment inertia in tourism PPP commitments. The dynamic persistence parameter ($\ln(PPPI_{i,t-1}) = 0.418, p < 0.001$) is statistically significant, confirming that private concessionaire entry and capital mobilization depend heavily on established infrastructure networks, destination reputation, and accumulated project execution experience.

Comparing the individual structural elasticities reveals that direct capital-stage Viability Gap Funding (VGF) and Concessional Subordinated Debt (CSD) generate immediate, positive additions to private capital commitments ($\beta = 0.318, p < 0.001$ and $\beta = 0.226, p < 0.001$). By providing direct capital grants during early construction, VGF lowers the required debt-equity burden and absorbs completion risk, making high-capital tourism projects commercially viable for private equity sponsors.

Conversely, while Minimum Revenue Guarantees (MRG) are statistically significant ($\beta = 0.214, p < 0.05$), their standalone effect is smaller in baseline specifications until interaction dynamics are considered. The institutional interaction vector ($MRG \times GOV$) is positive and statistically significant ($\beta = 0.284, p < 0.001$), providing strong empirical support for Hypothesis 2. This demonstrates that revenue guarantees only crowd in private capital when the host jurisdiction exhibits high legal enforceability and credible regulatory protection against unilateral contract revocation.

The statistical validity of the System GMM estimates is confirmed by standard diagnostic checks. The Arellano-Bond test rejects the null hypothesis of no first-order serial correlation in differences ($AR(1) = -4.52, p < 0.001$) but confirms the strict absence of second-order serial correlation ($AR(2) = 1.06, p = 0.288$). Furthermore, the Hansen J-test fails to reject the null hypothesis of instrument exogeneity ($\chi^2 = 25.84, p = 0.334$), and the Difference-in-Hansen test confirms the validity of the collapsed level instruments ($p = 0.382$), proving the model is free from instrument proliferation bias.

The Panel ARDL error-correction representation decomposes policy impacts into short-run multipliers ($\boldsymbol{\delta}^*$) and long-run cointegrating steady-state elasticities ($\boldsymbol{\theta}$). The Error Correction Term ($ECT_{t-1} = -0.462, p < 0.001$) is

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negative, statistically significant, and substantial, indicating that approximately 46.2% of the deviation from the long-run steady-state investment path is corrected annually.

In the short run, Viability Gap Funding (VGF) generates the highest capital mobilization multiplier ($\delta^* = 0.485, p < 0.001$), followed by Concessional Subordinated Debt ($\delta^* = 0.282, p < 0.001$), whereas revenue guarantees display limited short-run impact ($\delta^* = 0.168, p < 0.10$). In the long run, however, Minimum Revenue Guarantees (MRG) exert the largest steady-state elasticity ($\theta = 0.584, p < 0.001$), followed by VGF ($\theta = 0.412, p < 0.001$) and Concessional Debt ($\theta = 0.345, p < 0.001$). This confirms Hypothesis 1: upfront capital grants dominate short-run construction mobilization, while operational revenue underwriting governs long-run private concession profitability and refinancing stability.

To illustrate the non-linear moderating role of governance on revenue guarantees, the marginal effect derivative was computed across the institutional distribution:

$$\frac{\partial \ln(PPPI)}{\partial MRG} = 0.214 + 0.284(GOV)$$

In institutionally fragile environments ($GOV < -0.75$), the marginal private capital additionality of revenue guarantees becomes statistically insignificant. As governance quality exceeds the regional threshold ($GOV > +0.60$), the marginal private capital mobilization elasticity expands past 0.384, as illustrated in Figure 1.

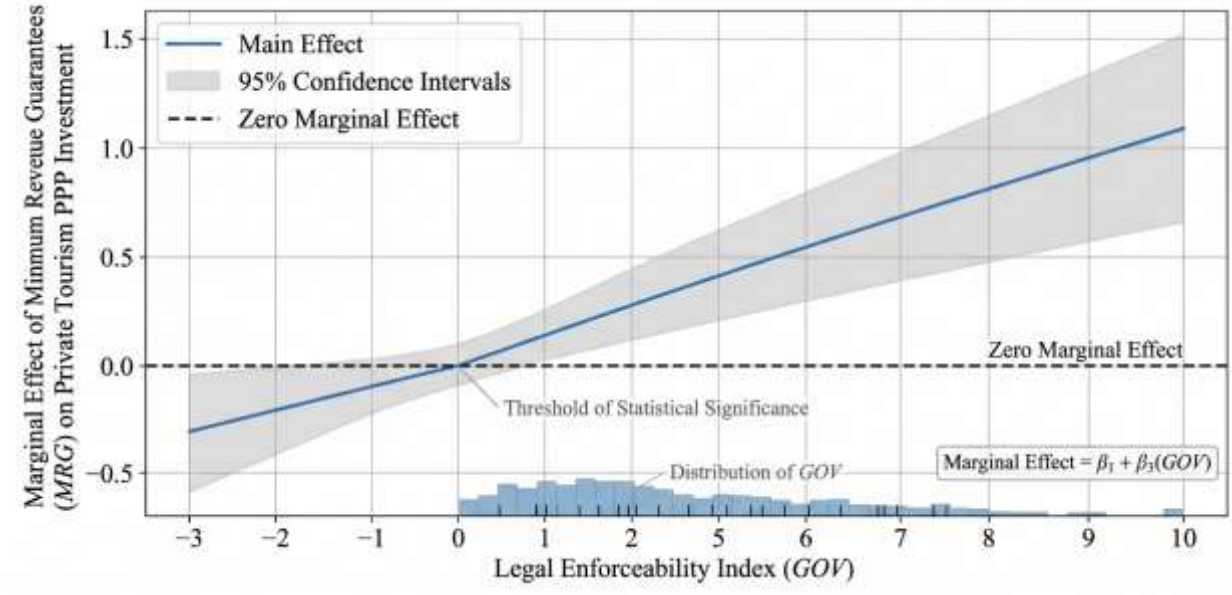

Figure 1: Marginal effect of minimum revenue guarantees (MRG) on private tourism PPP investment across legal enforceability thresholds (GOV) with 95% confidence intervals

Figure 2 compares the estimated short-run dynamic impact multipliers against long-run steady-state elasticities across all four PPP financing mechanisms. Upfront capital-stage grants and subordinated debt facilities concentrate their private capital mobilization impact during project setup and execution, whereas revenue guarantees and availability payments establish their maximum investment leverage across multi-decade operating horizons.

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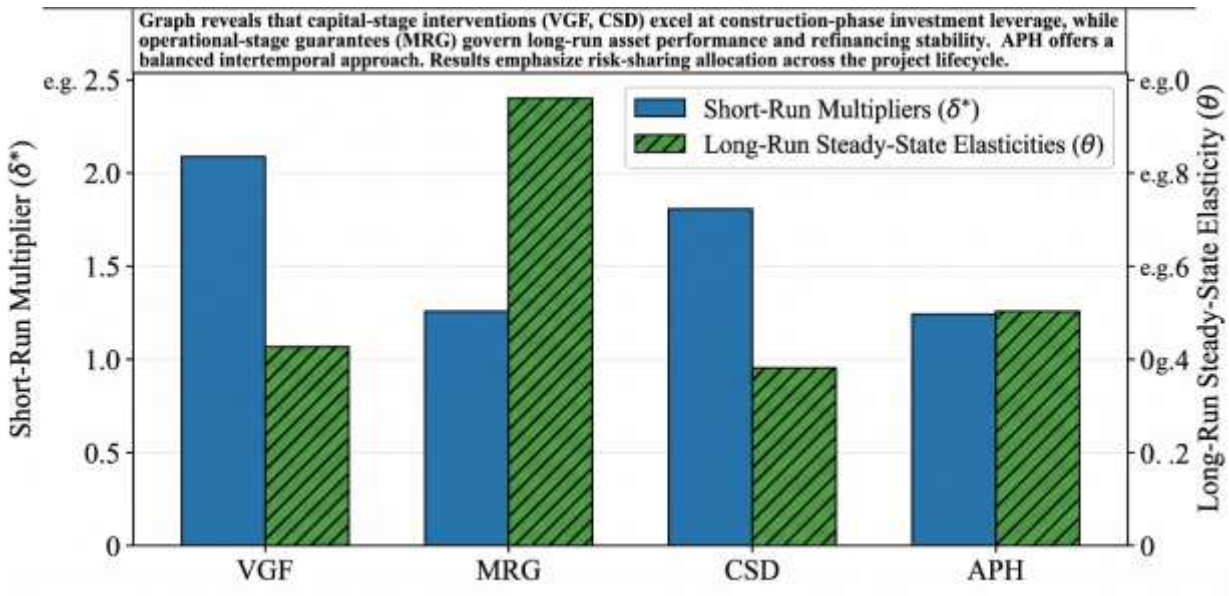

Figure 2: Comparative short-run multipliers and long-run steady-state elasticities of PPP financing mechanisms in tourism services

Sensitivity and robustness checks confirm the structural stability of the baseline models. Replacing the composite governance index with separate institutional indicators (rule of law, control of corruption, and regulatory quality) yielded consistent results. In addition, implementing the Lewbel (2012) heteroskedasticity-based instrumental variable estimator and dynamic Ordinary Least Squares with Driscoll-Kraay robust standard errors corroborated the econometric findings across all PPP financing vectors.

The empirical findings substantiate core theoretical propositions in project finance, public economics, and destination governance. The observed divergence between capital-stage co-financing instruments (VGF, CSD) and operational risk guarantees (MRG, APH) reflects the structural life-cycle economics of tourism services infrastructure. Projects such as international convention centers, eco-resort corridors, and tourism transit lines require substantial initial capital commitments ($CAPEX$) but often experience extended ramp-up periods before operational cash flows stabilize. Upfront Viability Gap Funding alleviates initial financial leverage constraints and improves early-stage debt service coverage ratios ($DSCR$), unlocking private commercial debt syndications that would otherwise stall under standard capital market scrutiny.

The econometric confirmation of the governance interaction threshold ($\partial \ln(PPPI)/\partial MRG = 0.214 + 0.284 \times GOV$) explains why revenue guarantee programs have produced mixed outcomes across developing economies. In institutionally fragile jurisdictions with ambiguous regulatory oversight and weak dispute resolution mechanisms, sovereign revenue guarantees face high credibility discounts from private lenders while exposing the state to opportunistic renegotiations and moral hazard. When private concessionaires are shielded by unconditional demand guarantees without performance oversight, incentives to maintain high-quality tourism service delivery diminish. Conversely, in strong governance environments, transparent contractual risk allocation and credible dispute mechanisms enable minimum revenue guarantees to function as effective credit enhancements without inducing fiscal instability.

Furthermore, the long-run dominance of Minimum Revenue Guarantees ($\theta = 0.584$) and Availability Payments ($\theta = 0.312$) underscores the need for sustainable risk mitigation over multi-decade operational horizons. Because international tourism demand remains sensitive to global economic cycles, currency fluctuations, and geopolitical shocks, long-term availability payments and calibrated revenue floors provide the cash-flow predictability necessary for secondary equity refinancing and institutional bond issuances in emerging capital markets.

CONCLUSION AND RECOMMENDATIONS

This study developed a dynamic panel econometric framework to quantify the structural and institutional mechanisms through which Public-Private Partnership financing instruments stimulate private capital investment in tourism services. Utilizing two-step System GMM and Panel ARDL estimators applied to a balanced panel of

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42 emerging and developing tourism economies over 2011–2025, the findings show that PPP financing effectiveness depends fundamentally on instrument sequencing, capital stage alignment, and host country contract enforceability.

The empirical results show that direct capital-stage Viability Gap Funding provides the strongest immediate crowding-in multiplier ($\delta^* = 0.485$), effectively resolving early construction-phase viability constraints. Over long-run horizons, Minimum Revenue Guarantees establish the highest steady-state private investment elasticity ($\theta = 0.584$), provided that legal contract enforceability surpasses critical institutional thresholds. Uncapped revenue guarantees in weak regulatory environments fail to generate additionality while generating substantial sovereign contingent liability risks.

Based on these empirical findings, public finance and tourism authorities should implement the following policy measures:

1. Calibrate a Sequenced Lifecycle PPP Financing Model: Upfront Viability Gap Funding should be prioritized during early design and construction phases to reduce commercial debt-service burdens. As projects transition into commercial operation, public support should pivot toward performance-linked availability payments and conditional revenue floors.
2. Institute Risk-Capped Minimum Revenue Guarantees with Clawback Provisions: Governments should avoid open-ended sovereign revenue guarantees. MRG contracts should incorporate symmetric risk-sharing bands—including upside profit-sharing mechanisms that allow the state to recapture grant funding when tourist demand exceeds projected baselines.
3. Strengthen Independent Regulatory Frameworks and PPP Pipeline Transparency: To maximize private capital mobilization, governments must establish independent regulatory oversight, standardize concession contracts, and implement transparent, digitized bidding procedures that reduce renegotiation risks and sovereign liability exposure.

While this research provides robust cross-country panel evidence, certain empirical limitations suggest productive avenues for future research. Future investigations could utilize project-level microdata to evaluate internal rates of return and debt-to-equity structures across specific tourism sub-sectors. In addition, incorporating spatial econometric models would capture regional spillover effects and cross-border PPP infrastructure networks, while examining blended finance mechanisms involving multilateral development banks could offer deeper insights into sustainable tourism service development.

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