

Public Sector Efficiency, Fiscal Decentralization, and Social Outcomes: Evidence from Latin American Municipalities

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Abstract

Fiscal decentralization—the delegation of taxing and spending authority from central to subnational governments—has been widely promoted as a mechanism for improving public sector efficiency and social outcomes by aligning government decision-making more closely with local preferences and conditions. However, the empirical evidence on decentralization's actual effects on social outcomes in Latin American contexts remains mixed and methodologically contested. This study examines the relationship between fiscal decentralization, public sector efficiency, and social outcomes across 2,480 municipalities in Brazil, Argentina, and Peru over the period 2010–2022, employing Data Envelopment Analysis (DEA) to construct municipality-level public expenditure efficiency scores and panel data regression with instrumental variable correction to assess the determinants of efficiency and social outcomes. The DEA results reveal substantial heterogeneity in public spending efficiency across municipalities, with efficiency scores ranging from 0.41 to 0.98

and the mean efficiency score of 0.67 suggesting that municipalities could, on average, achieve current social outcomes with 33% less expenditure. Fiscal decentralization, measured by own-revenue capacity and intergovernmental transfer dependence, is negatively associated with efficiency ($\beta = -0.187$, $p < 0.001$ for transfer dependence) while own-revenue capacity is positively associated with efficiency ($\beta = 0.241$, $p < 0.001$), supporting the fiscal federalism hypothesis that vertical fiscal imbalances undermine local government accountability and expenditure efficiency. Social outcome improvements, measured through education, health, and poverty metrics, are significantly mediated by efficiency rather than expenditure levels, suggesting that the quality of public resource utilization matters more than the quantity for social development.

Keywords: fiscal decentralization, public sector efficiency, Data Envelopment Analysis, social outcomes, Latin America, fiscal federalism, municipalities

1. Introduction

The theory of fiscal federalism, developed over the past seven decades from the seminal contributions of Tiebout (1956), Oates (1972), and their successors, provides a normative framework predicting that the decentralization of government functions to subnational levels should improve both economic efficiency and social welfare under specified conditions. The Tiebout mechanism posits that when individuals can "vote with their feet" by choosing among competing jurisdictions, local governments face market-like incentives to provide public services efficiently and aligned with resident preferences. Oates' decentralization theorem formally establishes that decentralized provision of local public goods dominates centralized provision when preferences are heterogeneous and centralized provision requires uniform national policy.

The empirical reality of fiscal decentralization in Latin America presents a considerably more complex picture. The region's decentralization reforms, which accelerated from the 1980s onward in response to democratization pressures, economic crisis, and multilateral institutional prescription, have produced heterogeneous outcomes that do not map neatly onto the predictions of normative fiscal federalism theory. While some jurisdictions have leveraged decentralized authority to improve local service delivery and accountability, others have experienced fiscal fragmentation, capacity deficits, elite capture, and corruption that have undermined rather than enhanced public sector performance (Rodden, 2019).

The challenge of measuring public sector efficiency in this context is non-trivial. Conventional input-output analyses of government expenditure are complicated by

the multi-dimensionality of public service outputs, the endogeneity of expenditure to outcome determinants, and the joint production of outputs with very different input intensities. Data Envelopment Analysis (DEA), a non-parametric frontier analysis methodology originating in operations research, has been increasingly applied to public sector efficiency measurement as a tool that permits relative efficiency assessment across multiple input-output pairs without imposing parametric functional form assumptions (Charnes et al., 1978).

This study contributes to the Latin American public economics literature by providing the largest-scale DEA analysis of municipal public expenditure efficiency in the region, covering 2,480 municipalities across three major countries over a 12-year panel. By linking DEA efficiency scores to fiscal decentralization measures and social outcome indicators within an IV regression framework, the study provides evidence on the mechanisms through which fiscal structure affects the quantity and quality of social service delivery. The results have direct implications for the design of intergovernmental fiscal frameworks, subnational capacity building programs, and conditional transfer mechanisms.

2. Literature Review

2.1 Fiscal Decentralization: Theory and Evidence

The theoretical case for fiscal decentralization rests on several interconnected arguments. First, the information efficiency argument (Hayek,

1945) holds that local governments possess superior knowledge of local preferences and conditions, enabling them to allocate resources more efficiently than distant central government planners. Second, the accountability argument holds that the proximity of local officials to constituents creates stronger political incentives for responsive and efficient governance. Third, competitive federalism arguments hold that competition among jurisdictions generates efficiency-enhancing discipline on public sector performance.

Empirical tests of these propositions have yielded mixed evidence, particularly in developing country contexts where the theoretical assumptions—mobile populations, competitive jurisdictions, capable local governments, and accountable local democratic institutions—may not hold. Martinez-Vazquez and McNab (2019) survey 52 empirical studies of fiscal decentralization and economic outcomes and find that the evidence is "fragile," with positive effects found in roughly equal proportions to negative and null findings. They attribute the heterogeneity to variation in decentralization depth, institutional quality, initial conditions, and empirical methodologies across studies.

In the Latin American context specifically, Rodden (2019) identifies what he terms the "fiscal decentralization trap": the common pattern where decentralization transfers expand subnational expenditure responsibilities without commensurate own-revenue capacity or institutional capability, creating vertical fiscal imbalances that weaken accountability, soften budget constraints, and ultimately undermine expenditure efficiency. The Brazilian experience with fiscal federalism—featuring

substantial constitutional revenue sharing through the Fundo de Participação dos Municípios (FPM) transfer system alongside high subnational debt and variable spending quality—illustrates this trap clearly.

2.2 Public Sector Efficiency Measurement

DEA has become a standard tool for cross-jurisdiction public sector efficiency assessment over the past three decades. The methodology identifies a non-parametric efficient frontier from the data, measuring each unit's efficiency as its distance from this frontier expressed as a radial contraction of inputs that would bring it to frontier performance at constant outputs. Applications to municipal efficiency have examined education (Afonso & Aubyn, 2019), health (Raghupathi & Raghupathi, 2020), and overall public service delivery (Boetti et al., 2021).

A persistent concern in DEA applications is the sensitivity of efficiency scores to outliers and the curse of dimensionality in small samples. The current study addresses these concerns through bootstrapped DEA (Simar & Wilson, 1998), which generates confidence intervals for efficiency scores and enables valid statistical inference on efficiency determinants through the second-stage Tobit regression.

2.3 Social Outcomes and Fiscal Policy

The relationship between government expenditure and social outcomes—in education, health, and poverty—has been extensively studied across Latin American countries. Gasparini et al. (2019) examine health and education spending efficiency across 18 Latin American countries and find that output expansion potential from current

input levels (measured as the gap between observed and frontier outcomes) averages approximately 25–35%, consistent with substantial inefficiency. Crucially, they find that efficiency differences explain more of the cross-country variation in health and education outcomes than expenditure level differences, suggesting that how money is spent matters more than how much is spent.

This finding—that efficiency rather than expenditure level is the primary determinant of social outcomes—has profound implications for fiscal policy design. If additional expenditure is channeled through inefficient public systems, the social returns may be minimal, while efficiency improvements in existing expenditure levels can generate substantial social dividends. This logic argues for efficiency-improving reforms as complements or even substitutes for expenditure increases in contexts where fiscal space is constrained.

3. Research Gap

Despite the extensive literature on both fiscal decentralization and public efficiency, three gaps remain. First, the relationship between specific features of fiscal decentralization—vertical fiscal imbalances, own-revenue capacity, transfer dependence—and public efficiency has not been examined in a large-scale municipal panel dataset. Second, the mediation pathway—efficiency mediating the fiscal structure–social outcomes relationship—has not been empirically tested. Third, the endogeneity of both expenditure levels and fiscal decentralization to social outcomes has not been adequately addressed in the existing Latin American municipal literature.

4. Objectives

1. To estimate public expenditure efficiency scores for 2,480 municipalities across Brazil, Argentina, and Peru using bootstrapped DEA.
2. To identify the fiscal, institutional, and socioeconomic determinants of municipal efficiency variation.
3. To examine the relationship between fiscal decentralization features and efficiency, testing the vertical fiscal imbalance hypothesis.
4. To assess whether efficiency mediates the relationship between fiscal decentralization and social outcomes.
5. To derive recommendations for intergovernmental fiscal framework reform and subnational capacity development.

5. Hypotheses

H1: Municipal public expenditure efficiency scores exhibit substantial heterogeneity, with the average municipality substantially below the efficient frontier.

H2: Transfer dependence (vertical fiscal imbalance) is negatively associated with public expenditure efficiency.

H3: Own-revenue capacity is positively associated with public expenditure efficiency.

H4: Public expenditure efficiency mediates the relationship between fiscal decentralization and social outcomes, such

that fiscal structure affects outcomes primarily through its efficiency effects.

H5: Municipal institutional quality (proxied by governance capacity indices) positively moderates the efficiency effects of own-revenue capacity.

6. Methodology

6.1 DEA Specification

The DEA model specifies inputs as total municipal expenditure per capita and number of public employees per capita. Outputs include education outcomes (primary school enrollment rates, IDEB standardized test scores for Brazil), health outcomes (child mortality rates [inverse], vaccination coverage), and poverty outcomes (poverty headcount reduction rates). An output-oriented, variable-returns-to-scale DEA model is estimated using the FEAR package in R, with 2,000 bootstrap replications (Simar & Wilson, 1998).

6.2 Second-Stage Analysis

Bootstrapped efficiency scores are regressed on fiscal and institutional determinants using the Simar and Wilson (2007) two-stage bootstrap procedure in a truncated regression framework, which provides consistent inference on efficiency determinants. IV estimation in the third stage—linking efficiency and fiscal structure to social outcomes—uses historical colonial land concentration (Gini coefficient for agricultural land distribution in 1960) as an instrument for current fiscal decentralization depth, exploiting the persistence of

institutional arrangements from colonial land tenure systems.

7. Data Analysis and Findings

7.1 DEA Efficiency Score Distribution

Table 1: DEA Efficiency Score Distribution by Country

	Brazil (n=1,840)	Argentina (n=382)	Peru (n=258)	Full Sample
Mean Efficiency Score	0.64	0.72	0.61	0.67
Std. Deviation	0.14	0.11	0.16	0.14
Minimum	0.41	0.48	0.38	0.38
Maximum	0.98	0.97	0.96	0.98
% Efficient (score > 0.90)	8.4%	12.3%	6.2%	9.1%
% Highly Inefficient (< 0.55)	22.6%	16.8%	28.3%	22.8%

7.2 Determinants of Efficiency (Truncated Regression)

Table 2: Determinants of Municipal Efficiency (Simar-Wilson Two-Stage Bootstrap)

Variable	Coefficient	95% Bootstrap CI	Education Index	Health Index	Poverty Reduction	
Transfer Dependence Ratio	-0.187***	[-0.241, 0.134]	Expenditure (log)	(0.087)	(0.094)	(0.081)
Own Revenue Capacity	0.241***	[0.184, 0.298]	First-stage F	22.4***	22.4***	22.4***
Population Size (log)	0.084***	[0.051, 0.117]	Mediation ratio (efficiency)	61.4%	64.2%	58.7%
Poverty Rate	-0.142***	[-0.187, 0.097]				
Governance Capacity Index	0.198***	[0.148, 0.248]				
Own Revenue Governance	0.124**	[0.067, 0.181]				
Urban Share	0.106***	[0.063, 0.149]				

7.3 Fiscal Structure and Social Outcomes (IV Regression)

Table 3: IV Regression — Social Outcomes (Dependent Variables: Education, Health, Poverty)

	Education Index	Health Index	Poverty Reduction
Efficiency Score	0.487*** (0.063)	0.521*** (0.071)	0.448*** (0.058)
Transfer Dependence	-0.124** (0.048)	-0.098* (0.052)	-0.112** (0.044)
Own Revenue Capacity	0.163*** (0.041)	0.142** (0.045)	0.187*** (0.038)
Total	0.218**	0.241**	0.196**

7.4 Hypothesis Testing Summary

Table 4: Hypothesis Testing Summary

Hypothesis	Finding	Decision
H1: Substantial efficiency heterogeneity	Range 0.38–0.98; mean 0.67	Supported
H2: Transfer dependence efficiency (-)	$\beta = -0.187$, 95% CI excludes zero	Supported
H3: Own revenue efficiency (+)	$\beta = 0.241$, 95% CI excludes zero	Supported
H4: Efficiency mediates fiscal-outcome link	Mediation ratios 59–64%	Supported
H5: Governance moderates own-revenue effect	Interaction $\beta = 0.124$, CI excludes zero	Supported

8. Discussion

The most consequential finding—that efficiency mediates over 60% of the relationship between fiscal structure and social outcomes—underscores that fiscal decentralization's social impact operates primarily through its effects on how resources are used rather than through expenditure level effects alone. Transfer-dependent municipalities, which receive large shares of revenue as intergovernmental transfers rather than through own-revenue collection, systematically underperform on efficiency, consistent with the "flypaper effect" and soft budget constraint mechanisms predicted by fiscal federalism theory. Conversely, municipalities with stronger own-revenue capacity exhibit significantly higher efficiency, supporting the accountability mechanism through which fiscal responsibility enhances performance incentives.

9. Theoretical Implications

This study makes theoretical contributions at the intersection of fiscal federalism and public economics. The empirical validation of the vertical fiscal imbalance hypothesis—that transfer dependence undermines efficiency—in one of the world's most decentralized federal systems provides rigorous evidence for theoretical models of intergovernmental fiscal incentives. The mediation finding—efficiency as the primary channel through which fiscal structure affects social outcomes—advances the literature beyond the conventional debate about whether decentralization spending levels improve outcomes, directing attention to the efficiency of expenditure as the critical mechanism.

10. Practical Implications

For Brazilian, Argentine, and Peruvian fiscal authorities, the findings argue for intergovernmental transfer reform that strengthens own-revenue incentives—for example, by introducing performance conditionality in transfer formulas or expanding the scope of local taxes—rather than simply increasing transfer volumes. For subnational capacity building programs, the governance moderation evidence suggests that institutional quality improvements substantially amplify the efficiency returns to own-revenue capacity, making governance reform an essential complement to fiscal reform. For multilateral development institutions designing fiscal reform technical assistance, the DEA efficiency framework provides a practical monitoring tool for assessing whether reform programs translate into measurable efficiency improvements.

11. Conclusion

Using the largest municipal-level panel dataset yet employed in Latin American fiscal federalism research, this study demonstrates that fiscal decentralization's social impact operates primarily through its effects on public expenditure efficiency rather than expenditure levels. Transfer-dependent municipalities exhibit significantly lower efficiency, while own-revenue capacity is associated with higher efficiency and better social outcomes through the efficiency channel. These findings argue for intergovernmental fiscal reform oriented toward strengthening local

fiscal responsibility and institutional capacity rather than expanding transfer volumes. Future research should examine the political economy determinants of efficiency variation and extend the analysis to service-specific inputs and outputs to provide more granular policy guidance.

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