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Municipal Fiscal Sustainability and Post-Pandemic Recovery across Indian States and Union Territories: Evidence from an MFSQ Panel, 2019–20 to 2023–24

Rupal Shaw
Ph.D. Research Scholar, University of Calcutta, Kolkata, West Bengal, India
Corresponding Author

Abstract: Municipal governments face simultaneous constraints in financing recurrent services, preserving capital investment and managing committed expenditure. This study assesses fiscal sustainability and recovery among 28 reporting Indian states and union territories using a five-year (FY2019–20–FY2023–24) analytical panel of the Municipal Fiscal Sustainability Quotient (MFSQ), an equal-weight geometric composite of revenue autonomy, developmental orientation and expenditure flexibility. A pre-shock baseline, a two-year shock/transition phase and a two-year recovery phase are evaluated using descriptive statistics, jurisdiction-level mean-change tests, trajectory rules and baseline–recovery associations. Mean MFSQ increased from 0.055 at baseline to 0.065 during shock/transition and 0.068 during recovery; the incremental recovery was small (approximately 0.003; $p = 0.727$). Sixteen jurisdictions improved relative to shock/transition, whereas eight deteriorated. Baseline MFSQ was not significantly associated with recovery strength (Pearson $r = 0.145$, $p = 0.462$), and pre-defined baseline groups did not establish a K-shaped divergence. West Bengal's recovery average remained 0.005 below baseline. Five jurisdictions contain zero scores whose source status cannot be fully reconciled; eliminating them changes mean recovery strength, underscoring the fragility of unverified composites. The article contributes a reproducible framework for phase-wise screening, but not a causal estimate of pandemic effects or a validated ranking of municipal solvency.

Keywords: Municipal finance, fiscal sustainability, COVID-19 recovery, fiscal decentralisation

1. Introduction

The financing of urban services lies at the intersection of local revenue capacity and intergovernmental fiscal arrangements. India's Seventy-Fourth Constitutional Amendment recognised municipalities as institutions of self-government, but substantial differences remain in the assignment of revenue powers, access to transfers and ability to execute public expenditure. Municipal governments must fund everyday services and infrastructure despite often having limited control over their receipts. These structural constraints become more consequential during a shock, when revenue collections can weaken while committed expenditure remains difficult to adjust [1]–[4].

COVID-19 exposed local governments to simultaneous fiscal pressures. Restrictions on economic activity potentially affected fees, user charges and property-tax compliance, while sanitation, public health and essential services remained necessary. Yet a reduction in measured fiscal capacity cannot be assumed, as emergency grants, reporting changes and altered expenditure composition may offset losses in a composite index. The empirical question is therefore not merely whether scores moved, but what can responsibly be inferred from those changes.

The choice to examine a K-shaped recovery follows from the interaction of asymmetric shocks and unequal initial fiscal capacity. In fiscal-federalism theory, local governments face different revenue-raising opportunities and expenditure responsibilities, while institutional capacity and the design of intergovernmental transfers condition their adjustment to shocks [1, 4, 8]. The fiscal-resilience perspective distinguishes initial resistance from subsequent recovery: jurisdictions with stronger revenue bases and greater budgetary flexibility may be better able to sustain essential services and investment, whereas those with narrower own-source revenues and rigid commitments may recover more slowly. These differences make persistent divergence a plausible hypothesis, rather than an inevitable outcome, following COVID-19. Accordingly, the K-shaped framework is used here to ask whether initially stronger and weaker municipal sectors followed systematically different recovery paths; it is not used to presume that the pandemic caused a K-shaped distribution.

This article examines a five-year MFSQ panel for 28 reporting jurisdictions. It makes three contributions: it explains a replicable three-component diagnostic; documents the distribution and phase-wise pattern of scores; and evaluates recovery trajectories, including the proposition of a K-shaped recovery, with explicit qualifications about data provenance and zero observations. Unlike a causal pandemic evaluation, the analysis is a comparative description of municipal-sector scores aggregated at state/union-territory level.

2. Literature Review and Analytical Framework

Fiscal federalism distinguishes local provision from centralised finance according to the assignment of functions, externalities and jurisdiction-specific preferences [1]. Property taxation and user charges can strengthen accountability, but transfer systems are indispensable where fiscal capacity and expenditure needs diverge [2], [5]. Predictable equalisation is therefore compatible with sustainability; the risk arises when opaque discretionary support weakens the incentives to mobilise feasible revenue or control expenditure [6], [7].

Sustainability also concerns expenditure quality. A balanced current account may be achieved by postponing maintenance or capital spending, concealing future service liabilities. During shocks, rigid establishment costs and debt commitments may compress expenditure flexibility. A municipal index that measures own-revenue coverage but ignores capital investment or committed costs would consequently capture only one part of fiscal capacity. Indian assessments repeatedly emphasise weak own-source receipts, accounting disparities and limited access to credible infrastructure finance [3], [4], [8].

Theoretical expectations about divergence are conditional. Unequal own-revenue capacity can amplify a common disruption when collection declines and committed expenditure cannot adjust quickly. Conversely, predictable transfers or temporary fiscal support may cushion weaker jurisdictions, limiting or reversing an expected widening of differences. A K-shaped trajectory therefore requires evidence that the relative recovery paths of predefined groups separate and remain apart across the available recovery period; merely finding different individual trajectories or a positive baseline–recovery correlation is insufficient. Because the present data comprise one pre-shock observation and two recovery years, the group comparisons and association tests constitute an exploratory assessment, not a formal identification of persistent divergence or a causal pandemic effect.

The proposed MFSQ combines autonomy, investment orientation and flexibility in a geometric mean. This aggregation reduces—but does not eliminate—compensation across dimensions and makes the composite particularly sensitive to exact zeros. A score is neither a direct measure of service quality nor proof of creditworthiness. The index is used to describe relative municipal-sector fiscal conditions, with the interpretation of its movements expressly conditional on reporting quality.

The literature therefore leaves a specific measurement problem: a jurisdiction may appear fiscally resilient on an own-revenue indicator while contracting capital spending, or preserve investment while accumulating inflexible commitments. Existing Indian municipal-finance studies establish the institutional constraints [3], [4], [8], but do not by themselves verify a comparable cross-jurisdiction shock trajectory for these three dimensions jointly. The article addresses this descriptive gap with a transparent composite, pre-defined phase comparisons and explicit tests of the stronger K-shaped recovery interpretation. Its innovation is diagnostic integration and transparent uncertainty reporting, rather than a new causal identification strategy.

3. Data and Method

3.1 Coverage, timing and construction

The analytical sample comprises 26 states and two union territories (Delhi and Jammu and Kashmir) observed annually from FY2019–20 to FY2023–24 (28 × 5 = 140 scores). It is not a census of Indian states and union territories, nor a municipal-level longitudinal survey. Municipal finance reports of the Reserve Bank of India (2022 and 2024) provide the source context [3], [4]; the supplied MFSQ analysis panel is the immediate source of the scores and derived statistics.

The composite is specified as MFSQ = (Caut × Cdev × Cflex)^(1/3), where Caut = own-source revenue / revenue expenditure, Cdev = capital expenditure / total expenditure, and Cflex = 1 − (establishment expenditure + debt service) / total revenue receipts. The three unweighted factors are interpreted, respectively, as recurrent-financing autonomy, capital-development orientation and expenditure flexibility. No claim is made that equal weighting is theoretically unique or empirically validated.

A major audit qualification is that the supplied analytical files do not supply a complete jurisdiction-year matrix of all raw variables, especially consistent debt-service and expenditure-denominator inputs. Consequently, the annual scores cannot be independently reconstructed and authenticated from the available information. This paper reproduces the downstream arithmetic of the supplied score panel rather than presenting the composites as fully independently verified primary estimates.

For jurisdiction i and year t, the proposed measure is MFSQ(i,t) = [CA(i,t) × CD(i,t) × CF(i,t)]^(1/3), with CA = OSR/RE, CD = CapEx/TE, and CF = 1 − [(establishment expenditure + debt service)/TRR]. Here OSR denotes own-source revenue, RE revenue expenditure, CapEx capital expenditure, TE total expenditure and TRR total revenue receipts. In principle, component values require aligned jurisdiction-year accounts and consistent handling of negative or unavailable components. The current exercise does not independently validate every input or impose ex post imputation.

3.2 Phase measures and inference

The baseline is the score for 2019–20 (B). The shock/transition average S equals the mean of 2020–21 and 2021–22. The recovery average R equals the mean of 2022–23 and 2023–24. Shock Change = S − B; Recovery Strength = R − S; Net Change = R − B. This explicit sign convention treats a negative value as deterioration. A single baseline year is a reference observation, not an estimate of the long-run pre-pandemic normal.

One-sample t-tests of the jurisdiction-specific changes against zero provide conventional 5% statistical checks; Pearson and Spearman correlations examine the baseline–recovery association. Because the observations are aggregated jurisdictions and not randomly sampled local authorities, p-values are exploratory. No difference-in-differences treatment group, pre-trend or causal COVID effect is identified.

Algebraically, B(i) = MFSQ(i,2019–20), S(i) = [MFSQ(i,2020–21) + MFSQ(i,2021–22)]/2 and R(i) = [MFSQ(i,2022–23) + MFSQ(i,2023–24)]/2. Thus shock change is S(i) − B(i), recovery strength is R(i) − S(i), and net change is R(i) − B(i). Tests use jurisdictions as observational units (n = 28), not 140 independent annual observations. The t-tests assess average descriptive differences under conventional assumptions; with short series and source uncertainty, nominal p-values are not evidence of a pandemic effect.

3.3 Zero scores and sensitivity design

An MFSQ zero could arise from a genuinely zero component, a rounded value or unavailable accounting data. These situations are not equivalent. RBI tables use dashes for unavailable observations in parts of the underlying series, while some displayed zero ratios mask small positive monetary amounts [4]. Five jurisdictions—Manipur, Assam, Arunachal Pradesh, Mizoram and Tripura—have at least one zero in the supplied MFSQ panel and are excluded in a non-imputing sensitivity check. That exercise assesses fragility but does not authenticate the other 23 composite series.

Zero-specific issues are material rather than merely editorial. Published RBI tables contain dashes representing unavailable information for certain revenue and capital entries; a displayed zero ratio can also mask a small positive amount because of rounding. In particular, scores for Manipur, Assam, Arunachal Pradesh, Mizoram and Tripura cannot all be reconciled from a complete set of supplied component accounts. Apparent collapse or recovery labels for these five are therefore mechanical score descriptions only, not verified fiscal outcomes. A restricted 23-jurisdiction analysis is presented alongside—not in place of—the original 28-jurisdiction results.

4. Results

4.1 Annual distribution and aggregate phase movement

Mean MFSQ moved from 0.055 in the baseline year to approximately 0.063 and 0.066 during the two shock/transition years, then to 0.064 and 0.072 in the recovery years. The median rose from 0.050 to 0.080 between the endpoints. These are comparatively small scores, and no validated absolute sustainability threshold exists for their interpretation. Karnataka recorded a temporary maximum of 0.200 in 2022–23, while Telangana reached 0.160 in 2023–24.

Table 1: Mean MFSQ by year and analytical phase

Year/phase	Mean	Median
2019–20	0.055	0.050
2020–21	0.063	0.060
2021–22	0.066	0.070
2022–23	0.064	0.060
2023–24	0.072	0.080
Baseline	0.055	—
Shock/transition	0.065	—
Recovery	0.068	—

The mean Shock Change was positive (approximately +0.009; t = 2.10, p = 0.046 using the reported analytical workbook). Fourteen of 28 jurisdictions improved relative to baseline, seven were unchanged and

seven declined. The mean Recovery Strength was approximately +0.003 (t = 0.35, p = 0.727): 16 improved over the shock average, four were unchanged and eight deteriorated. The positive mean Net Change of roughly +0.012 (t = 2.00, p = 0.056) does not meet the 5% threshold. These tests show heterogeneous shifts, not a statistically established uniform rebound.

4.2 Jurisdictional differences and trajectory types

In 2023–24 Telangana (0.160), Maharashtra, Tamil Nadu and Jharkhand (0.150 each), and Andhra Pradesh (0.140) recorded relatively high composite levels. Karnataka and Himachal Pradesh ended at 0.130, whereas Delhi scored 0.010 and West Bengal and Uttarakhand 0.020. Levels and improvements must not be conflated: Uttar Pradesh retained a comparatively high score but remained below its own 0.130 baseline, while Rajasthan increased from 0.040 to 0.080.

The chapter's priority-ordered descriptive classification identifies three steady-improvement paths (Tamil Nadu, Odisha, Chhattisgarh); four V-shaped rebounds (Andhra Pradesh, Bihar, Madhya Pradesh, Rajasthan); one partial/U-shaped recovery (Uttar Pradesh); three late/step improvements (Jharkhand, Gujarat, Mizoram); four temporary peaks (Sikkim, Goa, Jammu and Kashmir, Arunachal Pradesh); five volatile/mixed cases (Maharashtra, Himachal Pradesh, Karnataka, Telangana, Haryana); five low-level stagnation cases (Punjab, Uttarakhand, West Bengal, Delhi, Tripura); and three further-deterioration/collapse score patterns (Kerala, Manipur, Assam). These eight groups sum to 28, but five zero-containing jurisdictions have unverified substantive labels.

Table 2: Illustrative jurisdictional phase comparisons

Jurisdiction	B	S	R	R–S
Karnataka	0.080	0.095	0.165	+0.070
Telangana	0.080	0.090	0.145	+0.055
Tamil Nadu	0.110	0.120	0.145	+0.025
Kerala	0.080	0.055	0.045	-0.010
Uttar Pradesh	0.130	0.115	0.120	+0.005
West Bengal	0.020	0.015	0.015	+0.000
Manipur	0.070	0.150	0.000	-0.150

Karnataka posted the highest positive recovery strength (+0.070), followed by Telangana (+0.055) and Chhattisgarh and Rajasthan (+0.040 each). Kerala fell from a baseline of 0.080 to a recovery average of 0.045, while West Bengal moved from 0.020 to 0.015. Manipur and Assam score zero in both recovery observations; their apparent declines are unsuitable for substantive interpretation without reconciliation to the underlying RBI accounts.

Table 3: Descriptive five-year MFSQ trajectories (n = 28)

Trajectory	n	Reporting jurisdictions
Steady improvement	3	Tamil Nadu; Odisha; Chhattisgarh
V-shaped rebound	4	Andhra Pradesh; Bihar; Madhya Pradesh; Rajasthan
Partial/U-shaped	1	Uttar Pradesh
Late/step recovery	3	Jharkhand; Gujarat; Mizoram*
Temporary peak	4	Sikkim; Goa; Jammu and Kashmir; Arunachal Pradesh*

Trajectory	n	Reporting jurisdictions
Volatile/mixed	5	Maharashtra; Himachal Pradesh; Karnataka; Telangana; Haryana
Low-level stagnation	5	Punjab; Uttarakhand; West Bengal; Delhi; Tripura*
Further deterioration	3	Kerala; Manipur*; Assam*

Note: Trajectories follow the ordered descriptive rules in the source study. *Contains unverified zero values; its substantive classification is withheld pending source reconciliation.

4.3 Does the panel support a K-shaped recovery?

K-shaped recovery implies persistent divergence in paths rather than the mere coexistence of winners and losers. Using the baseline ordering and groups of 9, 9 and 10 jurisdictions, the source analysis reports mean Recovery Strength of approximately +0.001, −0.001 and +0.008 for the lower-, middle- and higher-baseline groups. The reported one-way ANOVA ($F = 0.106$, $p = 0.900$) and Kruskal–Wallis test ($H = 2.511$, $p = 0.285$) do not indicate significant differences. Baseline MFSQ and Recovery Strength also show nonsignificant Pearson ($r = 0.145$, $p = 0.462$) and Spearman ($\rho = 0.347$, $p = 0.071$) relationships. Thus, an uneven recovery is observed, but evidence for enduring two-arm divergence is insufficient.

Table 4: Baseline-group comparison of recovery strength

Baseline stratum	n	Mean recovery strength
Lower	9	+0.001
Middle	9	−0.001
Higher	10	+0.008

Note: Groups are ordered by 2019–20 MFSQ; the separation is not significant (ANOVA $p = 0.900$; Kruskal–Wallis $p = 0.285$). Statistical results refer to the supplied analytical panel and are subject to the caveats in Section 3.

4.4 Robustness and West Bengal

When the five zero-containing jurisdictions are excluded, the sample becomes 23 rather than 28 jurisdictions and average Recovery Strength rises from approximately +0.003 to +0.013. The material change shows why treating unavailable inputs as zeros is not an innocuous choice. This restriction is a sensitivity screen, not a proof that all remaining scores are correctly constructed.

West Bengal's five scores—0.020, 0.020, 0.010, 0.010 and 0.020—produce shock and recovery averages of 0.015 each. Recovery Strength equals zero and Net Change is −0.005. Its final-year return to 0.020 cannot be described as sustained recovery over the two-year recovery window. Whether this reflects weak autonomy, limited capital outlay, inflexible expenditure or the coverage of reported municipal corporations cannot be established without disaggregated accounting inputs.

5. Discussion

Two apparently contradictory findings emerge: the composite did not show a general shock-phase collapse, but municipal fiscal constraints remain substantial. This is not a contradiction if extraordinary transfers, deferral of expenditure, changes in denominators and institutional reporting altered the index. The geometric mean cannot identify which mechanism generated a change. Its principal value is to demand joint attention to own-revenue coverage, investment orientation and expenditure rigidity.

The institutional mechanisms commonly invoked to explain local recovery—grant cushioning, electronic revenue collection, spending deferral and accounting changes—remain observationally indistinguishable in these composite scores. Their relative contribution cannot be isolated without component accounts and a credible counterfactual. Equally, the 2023–24 rankings are sample-relative descriptive positions, not certified solvency thresholds. A high MFSQ can conceal material service-delivery gaps and does not establish that revenue or borrowing capacity is sufficient for future liabilities.

This analysis has four principal limitations: the one-year pre-shock baseline, the aggregation of municipal corporations to state/UT reporting units, sensitivity to two-decimal scores and geometric zeros, and the inability to reconstruct all source components. Subsequent research should publish an auditable panel of underlying ratios, test alternative aggregation and weighting, examine individual municipal corporations and evaluate longer pre- and post-pandemic trends. A counterfactual empirical design, not another descriptive trajectory label, would be needed to estimate the impact of COVID-19.

6. Policy Implications

The policy implications arise from the three-dimensional diagnostic and the wider institutional literature, not from causal effects identified by the five-year panel. First, states and municipalities should strengthen property registers, transparent valuations, billing and collection systems; digital payment options are useful when coupled with administrative follow-through and protections for low-income households. Second, multi-year capital budgeting, infrastructure maintenance plans and public reporting of deferred projects can help prevent capital expenditure becoming the routine adjustment item in shocks. Third, municipal budgeting should separately disclose establishment commitments, debt service, arrears and contingent obligations so that apparent expenditure flexibility is not overstated.

Fourth, predictable and formula-based state transfers should be combined with realistic expenditure assignments and technical support for weaker local bodies. Fiscal autonomy does not require withdrawing equalisation transfers. Fifth, RBI- and state-level municipal reporting should distinguish zero, rounded zero and not-available values and disclose harmonised source heads for OSR, RE, CapEx, TE, establishment costs, debt service and TRR. Releasing the three components alongside the composite would allow independent verification, responsible comparisons and sensitivity analysis. For West Bengal, the immediate analytical priority is a disaggregated audit of these dimensions across municipal corporations before policy conclusions are attached to its low aggregate score.

7. Conclusion

This paper applies a three-dimensional MFSQ to a supplied 28-jurisdiction municipal-sector score panel for FY2019–20 to FY2023–24. The average score rose rather than collapsed in the shock/transition phase, while subsequent recovery averaged only a small, statistically insignificant gain. Recovery paths differed markedly across jurisdictions; West Bengal did not improve on its shock-phase mean. Neither the correlation results nor baseline-group comparisons confirm a K-shaped recovery at conventional significance levels.

The exercise is most informative as a transparent descriptive screen, not a definitive ranking of municipal fiscal health. Incomplete raw components and ambiguously coded zero scores preclude independent validation of the composite values. Strengthening municipal finance therefore requires two complementary commitments: institutional reforms to revenue, transfers and expenditure management, and source-verified, comparable municipal accounts that can support more rigorous measurement.

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