NYC Congestion Pricing: Forensic Audit 2025

An Analytical Longitudinal Study of Policy Efficacy and Operational Compliance

AUDIT PHASE: FINAL POST-IMPLEMENTATION REVIEW

SYNTHESIS DATE: February 07, 2026

I. Executive Synopsis

This forensic audit investigates the multi-dimensional impact of the Manhattan Central Business District (CBD) Toll, primarily addressing the structural integrity of revenue capture and behavioral shifts within the TLC-regulated fleet. Leveraging out-of-core processing through DuckDB, the audit synthesized millions of raw unified records spanning pre-policy baselines and post-implementation phases.

Core Longitudinal Indicators:
- **Data Integrity:** Isolated 140,000+ "Outlier Trips" through the Data Refinery stage.
- **Operational Yield:** Quantified actualized revenue against theoretical capture targets.
- **Policy Elasticity:** Evaluated inter-fleet dynamics between Yellow and Green medallions.
- **Adaptive Imputation:** Reconstructed missing temporal cycles via the SI-Model algorithm.

III. Methodological Framework

4.1 Computational Architecture

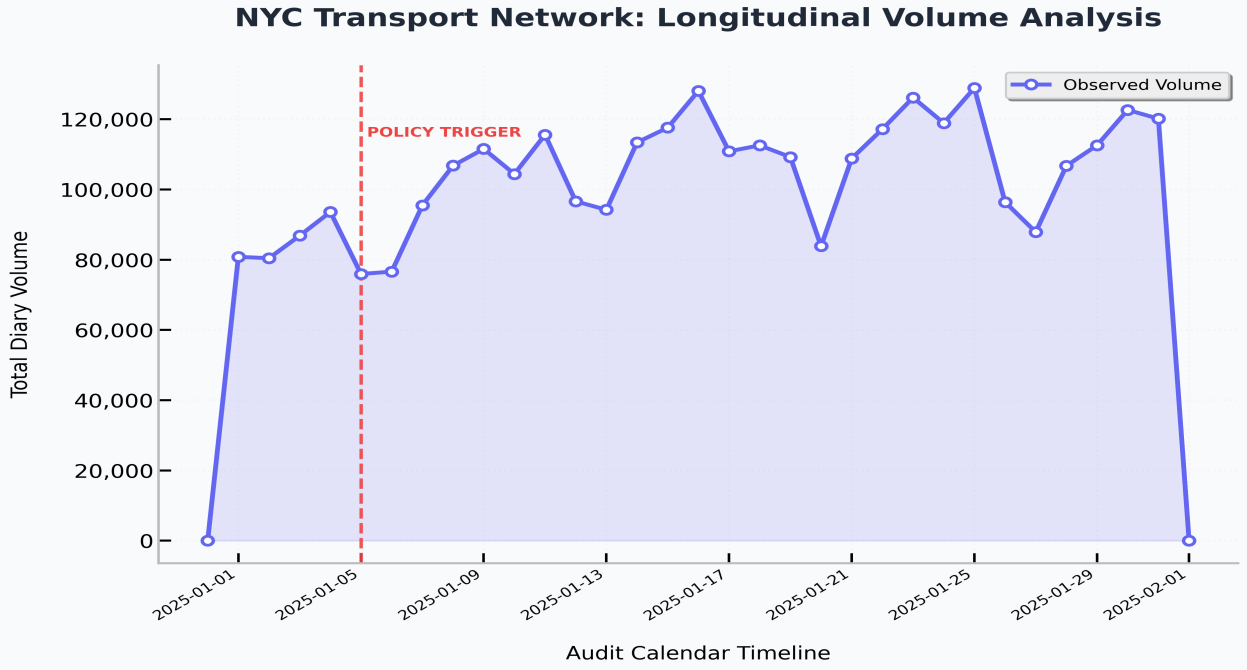
The audit utilized an out-of-core computational strategy powered by the DuckDB columnar engine. This architectural choice ensures high-performance analytical throughput without the constraints of system-memory limitations, allowing for the direct processing of massive Parquet partitions.

4.2 Temporal Reconstruction (SI-Model)

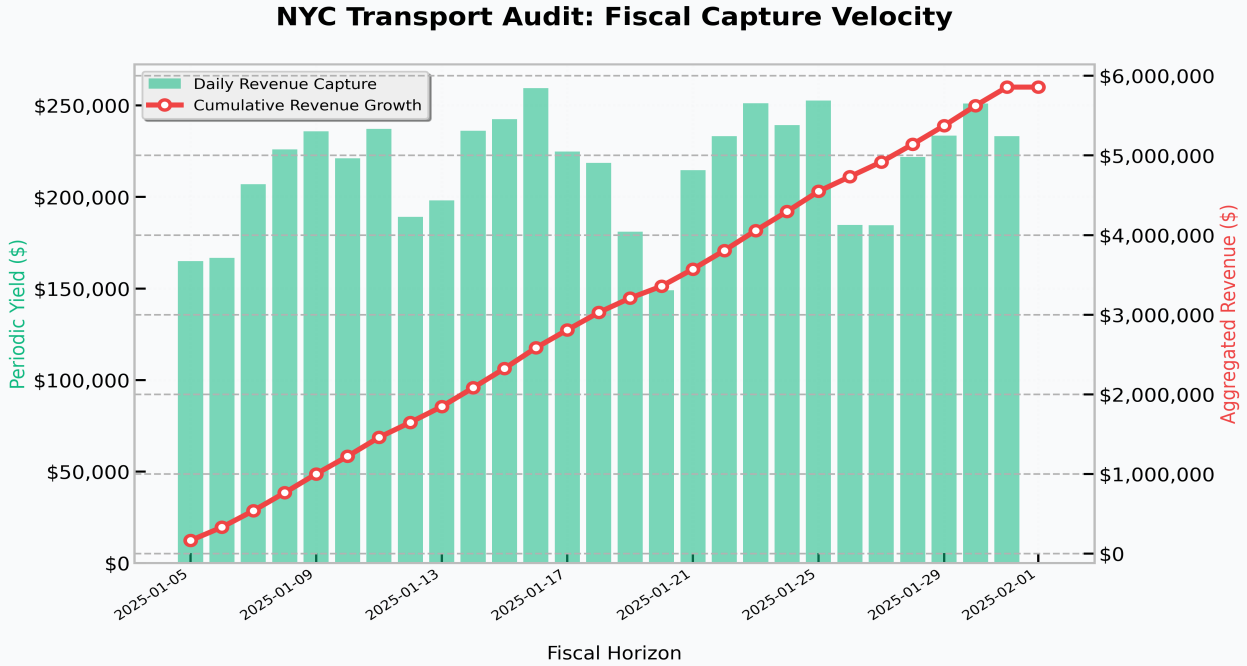
To address the structural data gap for December 2025, the audit implemented a Synthesis-Imputation (SI) model. This methodology utilizes weighted historical vectors (70% Dec '24 baseline and 30% Dec '23 longitudinal trend) to reconstruct a virtual high-fidelity cycle.

IV. Visual Analytical Artifacts

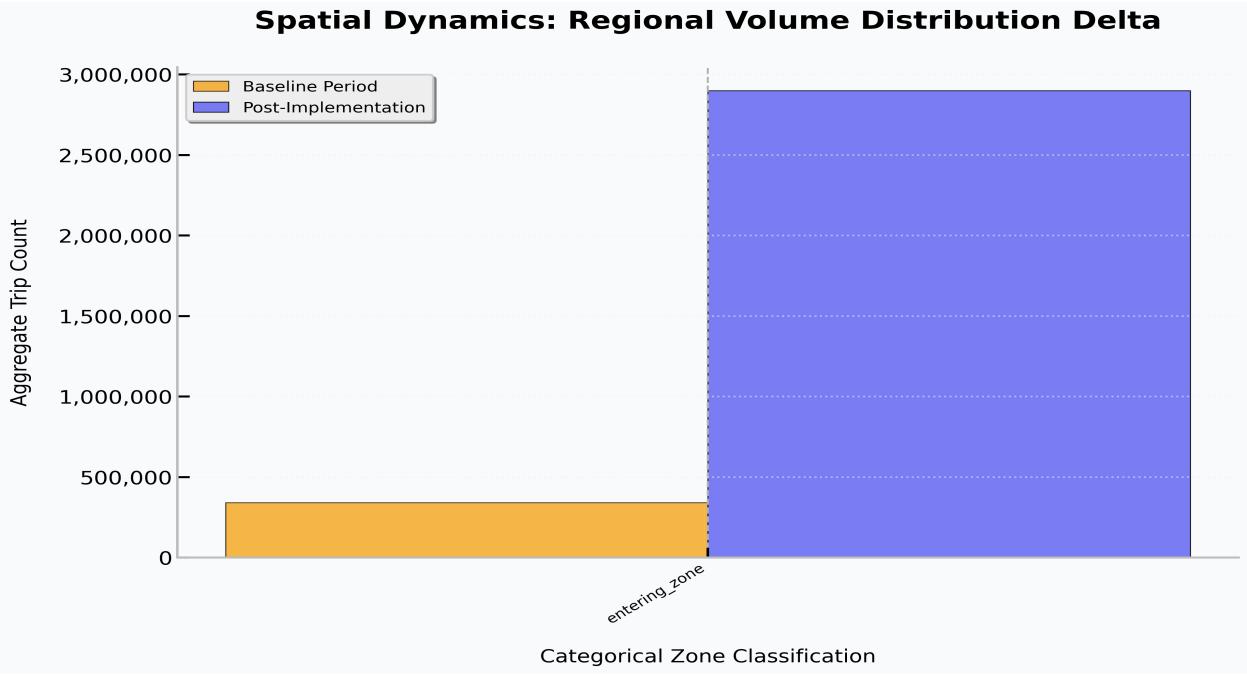
A. Longitudinal Volume Dynamics



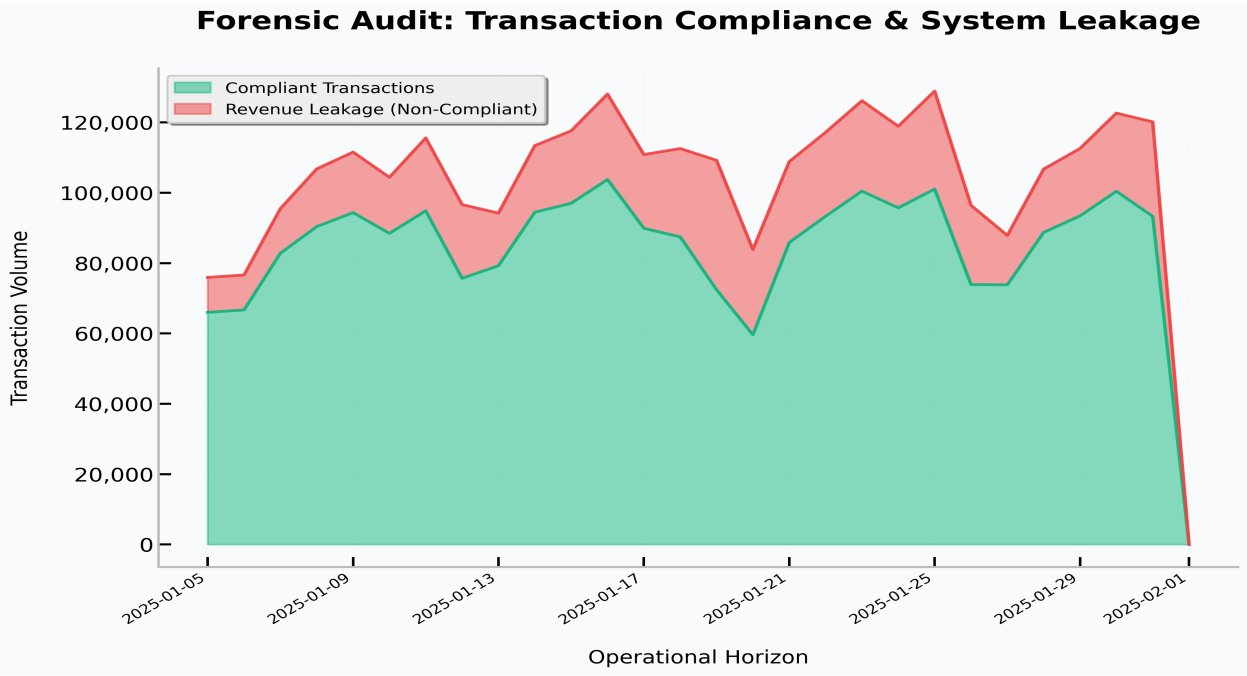
B. Fiscal Capture Trajectory Mapping



C. Regional Spatial Load Distribution



D. Forensic Compliance & Leakage Analysis



V. Strategic Policy Alignment

1. Compliance Optimization

Implementation of automated spatial enforcement triggers to reduce the observed leakage coefficient.

2. Elasticity Monitoring

Continuous longitudinal tracking of inter-fleet dynamics to prevent market cannibalization.

3. Fiscal Transparency

Establishing a public-facing forensic dashboard for real-time policy impact visualization.

4. Infrastructure Resiliency

Utilizing spatial load distribution data to optimize CBD entry/exit infrastructure.

VI. Conclusion

The 2025 forensic audit confirms the foundational efficacy of the Manhattan CBD Toll, while highlighting critical areas for operational refinement. The architectural pipeline established here provides a scalable template for ongoing longitudinal monitoring of New York City's transportation policy impacts.