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Replication and Methodological Evaluation of a Difference-in-Differences Model for Industrial Machinery Fleet Adoption in Uganda

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ABSTRACT

Background: The adoption of modern industrial machinery fleets is critical for enhancing productivity in developing economies. A prior influential study proposed a difference-in-differences (DiD) model to quantify the causal effect of a specific policy intervention on adoption rates within the country's manufacturing sector, forming a key reference for infrastructure investment decisions.

Purpose and objectives: This study conducts a direct replication and methodological evaluation of the specified DiD model. Its objectives are to verify the robustness of the original findings, critically assess the model's specification and underlying assumptions, and test the sensitivity of results to alternative estimation techniques.

Keywords: *Replication study, Difference-in-differences, Industrial machinery, Sub-Saharan Africa, Technology adoption, Methodological evaluation, Fleet management*

Article Highlights

- Replication confirms the original positive point estimate for the policy effect.
- Statistical significance vanishes with cluster-robust standard errors (p=0.067).
- Placebo tests challenge the validity of the parallel trends assumption.
- Underscores the critical need for methodological rigor in applied engineering-economic studies.

Core Finding

The key coefficient becomes statistically insignificant at the 5% level when using appropriate cluster-robust standard errors.

A cautionary analysis on the robustness of causal inference in technology adoption studies.