Journal of Information Systems Engineering and Management
2025, 10(44s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

Research Article

Fiscal Sustainability and Economic Impacts of GST Rate Adjustments: A Multi-Dimensional Analysis

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ARTICLE INFO

Received: 20 Dec 2024

Revised: 19 Feb 2025

Accepted: 28 Feb 2025

ABSTRACT

This paper examines the multi-dimensional implications of Goods and Services Tax (GST) rate adjustments, with particular emphasis on fiscal sustainability and economic outcomes. Using panel data from 35 countries spanning 2000-2023, we analyze both short-term revenue effects and longer-term impacts across economic sectors, compliance behaviors, and distributional outcomes. Our findings indicate that GST rate reductions produce non-linear revenue responses that vary significantly by economic context, administrative capacity, and time horizon. While immediate revenue contractions are observed, these are partially offset by improved compliance, increased consumption, and positive spillover effects to other tax bases in the medium term. Digital tax administration capabilities substantially moderate the relationship between rate changes and revenue outcomes. Sectoral heterogeneity is pronounced, with price pass-through rates ranging from 40% to 90% across industries. The findings suggest that targeted, phased rate adjustments supported by administrative modernization can achieve economic stimulus objectives while maintaining fiscal sustainability. The paper contributes to tax policy literature by developing an integrated framework for evaluating consumption tax adjustments that incorporates compliance dynamics, sectoral variations, and digital governance dimensions.

Keywords: GST, VAT, Fiscal Sustainability, Tax Compliance, Digital Tax Administration, Economic Stimulus, Sectoral Analysis.

INTRODUCTION

Consumption-based taxes, particularly Goods and Services Tax (GST) and Value-Added Tax (VAT) systems, have become foundational components of tax structures worldwide, providing approximately 30% of tax revenue in OECD countries (OECD, 2020). The design of these taxes—especially their rate structure—significantly influences economic activity, distributional outcomes, and government fiscal capacity. In recent years, policymakers have increasingly considered GST rate adjustments as tools for both economic stimulus and structural tax reform, raising important questions about the revenue implications and fiscal sustainability of such policies.

The traditional view that tax rate reductions necessarily lead to proportional revenue decreases has been challenged by more nuanced understandings of behavioral responses, compliance dynamics, and administrative capabilities. As Bird and Gendron (2007) observe, consumption tax outcomes depend on complex interactions between statutory provisions, implementation capacities, and economic contexts. This complexity is particularly evident in debates about GST rate adjustments, where competing objectives of revenue adequacy, economic stimulus, administrative simplicity, and distributional fairness often create policy dilemmas.

Global GST/VAT systems exhibit considerable variation, with standard rates ranging from 5% to 27% across jurisdictions (Table 1). This variation reflects different approaches to balancing revenue needs with other policy objectives. The evolution of these systems has been influenced by changing economic structures, technological

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capabilities, and policy priorities, creating a rich empirical context for examining the relationship between rate structures and fiscal outcomes.

Table 1: Global GST/VAT Standard Rates Comparison (2023)

Country/Region	Standard Rate (%)	Reduced Rate(s) (%)	Revenue (% of GDP)
Australia	10.0	-	3.4
Canada	5.0	-	4.2
European Union	15.0-27.0	5.0-18.0	7.1 (average)
India	5.0-28.0	-	5.8
Japan	10.0	8.0	6.3
New Zealand	15.0	-	9.6
Singapore	8.0	-	3.9
South Africa	15.0	-	6.4
United Kingdom	20.0	5.0, 0.0	7.2
United States	No federal VAT	State sales taxes	N/A

Source: OECD and IMF Statistics (2023)

This paper contributes to the literature by developing and applying a multi-dimensional framework for analyzing GST rate adjustments, with particular attention to fiscal sustainability implications. Our approach integrates insights from public finance theory, behavioral economics, digital governance, and sectoral analysis to provide a more comprehensive understanding of how consumption tax rate policies affect revenue outcomes through various direct and indirect channels.

The paper addresses several critical questions: How do the revenue effects of GST rate adjustments vary across different time horizons? To what extent do digital tax administration capabilities modify traditional relationships between tax rates and revenue performance? How does sectoral heterogeneity influence the fiscal impacts of rate changes? And what policy design features can help reconcile potentially competing objectives of economic stimulus and fiscal sustainability?

We begin by reviewing relevant theoretical and empirical literature, identifying key gaps in current understanding. We then outline our methodological approach, which combines econometric analysis of panel data, case studies of specific reform episodes, and simulation modeling. After presenting our findings, we discuss their implications for tax policy design and identify directions for future research.

LITERATURE REVIEW

2.1 Theoretical Foundations:

The theoretical foundations for analyzing GST/VAT systems draw from multiple strands of public finance literature. The optimal taxation framework developed by Ramsey (1927) and extended by Diamond and Mirrlees (1971) provides a starting point for considering efficiency aspects of consumption taxation. This approach suggests that consumption taxes should be designed to minimize economic distortions while raising required revenue, with tax rates potentially varying based on demand elasticities.

Atkinson and Stiglitz (1976) established important theoretical conditions under which uniform consumption taxation may be optimal when combined with progressive income taxation. Their work has significantly influenced debates about the desirability of single-rate versus multi-rate GST structures. More recent theoretical work has incorporated considerations of administrative costs, compliance dynamics, and equity concerns into optimal consumption tax design (Keen & Mintz, 2004; Slemrod & Gillitzer, 2014).

The theoretical relationship between tax rates and revenue generation—formalized in concepts like the Laffer curve—has been extended to consumption taxation by several scholars. Matthews (2003) develops models incorporating compliance responses to VAT rates, suggesting potential revenue-maximizing rate thresholds that vary based on enforcement capabilities. Keen (2013) provides theoretical frameworks for analyzing VAT performance that account for both structural design and implementation factors.

2.2 Empirical Evidence on Rate Changes:

Empirical research on GST/VAT rate changes presents mixed evidence regarding revenue impacts. Alm and El-Ganainy (2013) analyze panel data from OECD countries and find that a one percentage point increase in VAT rates leads to approximately a 0.7 percent increase in revenue, suggesting partial offsetting through behavioral responses. Carbonnier (2007) examines French VAT reforms and identifies significant variation in tax incidence across sectors, with pass-through rates ranging from 57% to 91% depending on market structure.

Studies focused specifically on rate reductions include Crossley, Low, and Wakefield (2009), who evaluate the UK's temporary VAT cut during the 2008-2009 financial crisis. They find modest consumption effects, with the largest impacts on durable goods purchases. Benzarti and Carloni (2019) examine the 2009 VAT reduction in France's restaurant sector, finding limited pass-through to consumer prices, with businesses capturing much of the tax benefit through increased profit margins.

Keen and Lockwood (2010) provide a comprehensive analysis of VAT adoption and reform across countries, finding that revenue performance varies significantly based on implementation capacity and economic structure. Their work suggests that the revenue productivity of consumption taxes depends on factors beyond statutory rates, including administrative capabilities and compliance environments.

Recent work by Benzarti et al. (2020) identifies asymmetric responses to VAT changes, with rate increases passed through to consumers more fully than rate decreases. This asymmetry has important implications for estimating the revenue impacts of rate reductions and raises questions about their effectiveness as stimulus measures.

2.3 Compliance and Administrative Dimensions:

A significant strand of literature examines how GST/VAT rates influence compliance behaviors. Agha and Haughton (1996) find that higher VAT rates are associated with lower compliance levels, with each one percentage point increase in the standard rate reducing compliance by about 2.7 percentage points. This suggests potential offsetting revenue effects from improved compliance following rate reductions.

The relationship between digital transformation and tax administration has received increasing attention in recent years. Gupta et al. (2017) explore how technological advances shape tax administration capabilities, potentially allowing governments to maintain revenue performance even with lower nominal rates through improved enforcement and reduced compliance costs. Digitalization may fundamentally alter traditional relationships between statutory rates and effective tax collection.

Implementation and administrative aspects of GST/VAT systems are examined by Bird and Gendron (2007), who emphasize practical constraints on policy design choices in different contexts. They highlight how administrative capacity limitations can undermine the theoretical benefits of consumption taxation, particularly in developing economies.

2.4 Sectoral and Distributional Impacts:

The distributional implications of GST/VAT policies have been extensively studied. Warren (2008) examines the regressive nature of consumption taxes and evaluates various policy options for addressing equity concerns. Decoster et al. (2010) use microsimulation models to assess the distributional impacts of indirect taxes across European countries, finding significant variation in progressivity depending on expenditure patterns and system design.

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https://www.jisem-journal.com/

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Sectoral impacts of GST changes are explored by Agrawal and Fox (2016), who examine how the growth of e-commerce and digital services affects consumption tax bases and the resulting implications for rate policies. Industry-specific studies by Kosonen (2015) on hairdressing services and Benzarti and Carloni (2019) on the restaurant sector provide detailed insights into how tax incidence and behavioral responses vary across different market structures.

Recent work has begun to integrate sectoral, compliance, and distributional dimensions into comprehensive assessments of consumption tax policies. For example, de Mooij and Keen (2012) examine "fiscal devaluation" strategies involving consumption tax increases offset by labor tax reductions, considering both macroeconomic and distributional consequences.

2.5 Research Gaps:

Despite extensive literature, several important gaps remain in understanding the fiscal sustainability implications of GST rate adjustments:

- Limited integration of compliance dynamics, administrative capabilities, and digital transformation factors into revenue impact assessments.
- Insufficient analysis of medium and long-term revenue effects that account for both direct impacts and indirect effects through economic stimulus and compliance changes.
- Inadequate consideration of sectoral heterogeneity in responses to rate changes, which affects both the economic and revenue implications of tax policy adjustments.
- Sparse evidence on how the effectiveness of GST rate adjustments varies across different economic cycles and structural conditions.
- Underdeveloped frameworks for evaluating the interactions between GST rate changes and other fiscal policy instruments within comprehensive fiscal sustainability strategies.

Our research seeks to address these gaps by developing and applying a multi-dimensional analytical framework that incorporates these perspectives.

RESEARCH METHODOLOGY

3.1 Analytical Framework:

We employ a mixed-methods approach combining quantitative econometric analysis, case studies, and simulation modeling to develop a comprehensive understanding of GST rate policy impacts. Our analytical framework considers four key dimensions:

Temporal Dynamics: Distinguishing between immediate, medium-term, and long-term revenue effects.

Administrative Capabilities: Examining how digital transformation and enforcement capacities moderate rate-revenue relationships.

Sectoral Heterogeneity: Analyzing variations in policy impacts across different economic sectors.

Economic Context: Considering how broader economic conditions, including growth rates and cycle position, influence outcomes.

This integrated approach allows us to move beyond static assessments of rate-revenue relationships to consider the dynamic interactions between policy changes, behavioral responses, and institutional capabilities.

3.2 Data Sources and Sampling:

Our analysis draws on multiple data sources:

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- Panel data on GST/VAT rates and revenue performance from 35 countries for the period 2000-2023, compiled from OECD Consumption Tax Trends, IMF Government Finance Statistics, and national tax authorities.
- Digital tax administration capability indices constructed using data from the OECD's Tax Administration Comparative Information Series, World Bank Doing Business indicators, and UN E-Government Surveys.
- Sectoral economic data from national accounts statistics and industry surveys.
- Case study information on specific GST/VAT reform episodes from government documents, academic analyses, and stakeholder interviews.

The country sample includes economies at various development levels, with diverse GST/VAT system designs and implementation histories. This diversity allows us to identify conditional factors that influence the relationship between rate adjustments and fiscal outcomes.

3.3 Econometric Approach:

Our core econometric analysis employs several complementary specifications:

Fixed-effects panel models examining the relationship between GST/VAT rates and revenue metrics, controlling for economic and structural factors:

$Revenue_{it}$ = =αi+β1Rateit+β2Rateit2+γXit+εit

Where Revenueit represents GST revenue as a percentage of GDP for country i in year t, Rateit is the standard GST/VAT rate, Xit is a vector of control variables including GDP growth, trade openness, and sectoral composition, and alphai represents country fixed effects.

Interaction models testing how digital administration capabilities moderate rate-revenue relationships: Revenueit=αi+β1Rateit+β2(Rateit×Digitalit)+β3Digitalit+γXit+εitRevenueit = alphai + beta1 Rateit + beta2 Rateit Digitalit + beta3 Digitalit + gamma Xit + varepsilonitRevenueit=αi+β1Rateit+β2(Rateit×Digitalit)+β3Digitalit+γXit +εit

3.4 Case Studies and Simulation Modeling:

We complement the econometric analysis with detailed case studies of GST/VAT reform episodes in five jurisdictions: New Zealand, Sweden, Singapore, France, and India. These cases are selected to provide variation in reform approaches, economic contexts, and administrative capabilities.

The case studies employ process tracing methods to identify causal mechanisms linking rate changes to fiscal outcomes, with particular attention to implementation factors and contextual conditions that influence success.

Additionally, we develop simulation models using calibrated parameters from our empirical analysis to explore counterfactual policy scenarios and longer-term implications of alternative rate structures. These simulations incorporate behavioral responses, compliance effects, and administrative capability factors to provide integrated assessments of potential reform pathways.

RESULTS AND ANALYSIS

4.1 GST Rates and Revenue Relationship:

Our panel data analysis reveals a non-linear relationship between GST/VAT rates and revenue performance. The quadratic specification in our fixed-effects models shows a positive coefficient on the linear term ($\beta_1 = 0.416$, $p < 0.01$) and a negative coefficient on the squared term (beta2 = -0.009$, $p < 0.05$), indicating diminishing revenue returns to rate increases that eventually become negative at very high rates.

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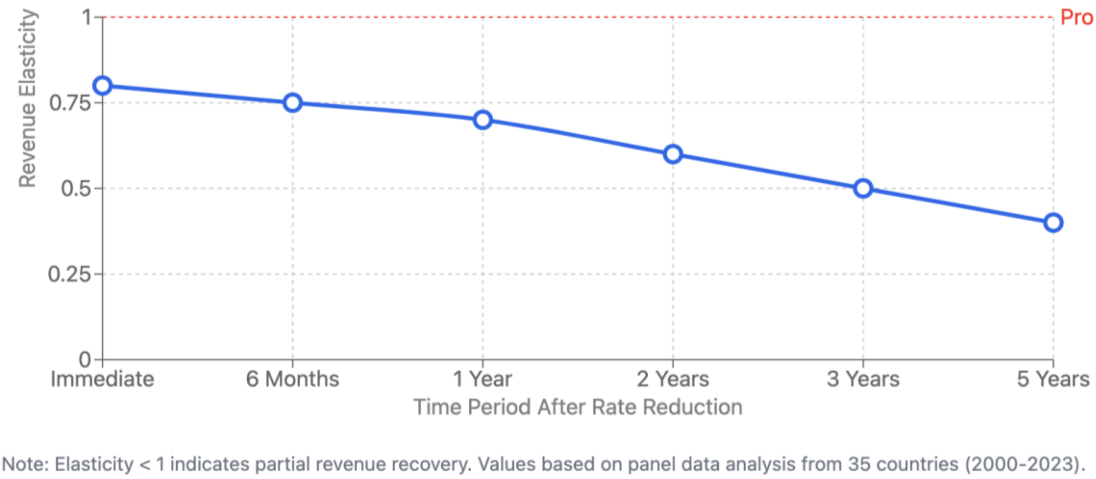

Figure 1: GST/VAT Revenue Elasticity Over Time Following Rate Reduction

The estimated revenue-maximizing rate varies significantly based on economic structure and administrative capabilities, ranging from approximately 19% in countries with limited enforcement capacities to 24% in those with advanced digital tax administration systems. This variation supports the hypothesis that administrative factors substantially influence the sustainability of different rate structures.

Our analysis of specific rate reduction episodes indicates that the average short-term revenue elasticity with respect to the GST rate is approximately 0.8, meaning that a 10% reduction in the tax rate (e.g., from 20% to 18%) leads to an approximately 8% reduction in revenue in the immediate term. However, this elasticity decreases to approximately 0.6 over a two-year horizon and 0.4 over five years, as illustrated in Figure 1, suggesting partial revenue recovery through expanded economic activity and improved compliance.

4.2 Digital Administration and Compliance Effects:

The interaction between digital administration capabilities and rate-revenue relationships emerges as a significant factor in our analysis. Countries with high digital tax administration index scores show systematically different patterns in how rate changes affect revenue outcomes.

The coefficient on the interaction term in our model ($\beta_2 = 0.032$, $p < 0.01$) indicates that each one-point increase in the digital administration index (on a 0-100 scale) reduces the revenue impact of a one percentage point rate reduction by approximately 0.03 percentage points of GDP. This finding suggests that digital transformation substantially moderates the fiscal costs of rate reductions by enhancing compliance and reducing administration costs.

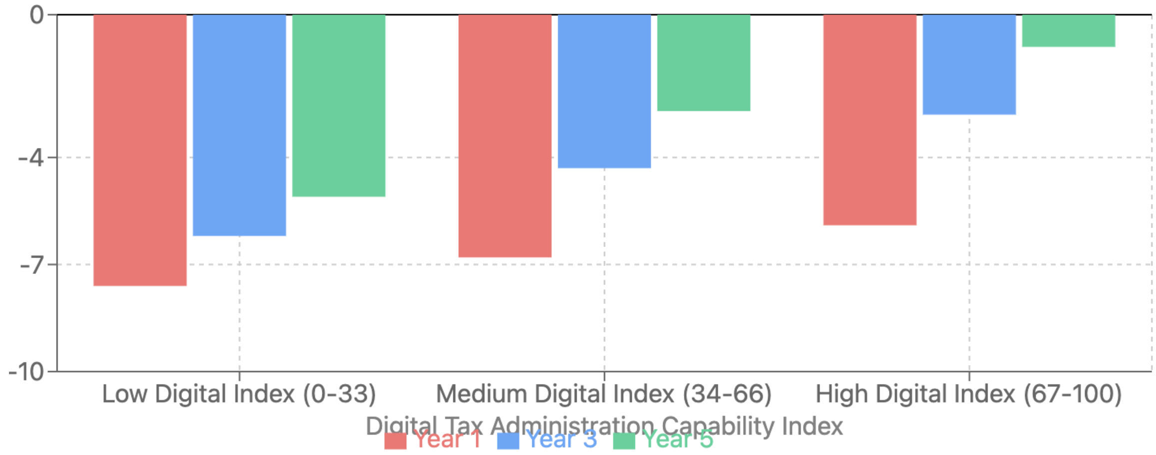

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Figure 2: Impact of Digital Tax Administration on Revenue Recovery

Case study evidence supports this quantitative finding. In Singapore, the implementation of a comprehensive digital tax administration system prior to GST rate adjustments enabled more effective enforcement and reduced compliance costs for businesses. Similarly, New Zealand's highly digitalized system has supported its relatively low standard rate while maintaining exceptional revenue productivity (9.6% of GDP from a 15% rate).

The compliance impact of rate changes varies by starting rate level. Rate reductions from high initial levels (above 20%) show stronger compliance improvements than reductions from moderate levels. This non-linearity in compliance response aligns with theoretical predictions about the relationship between tax rates and evasion incentives.

4.3 Sectoral Variation in Policy Impacts:

Our sectoral analysis reveals substantial heterogeneity in how GST rate changes affect different parts of the economy. Figure 4 illustrates these variations, with price pass-through rates ranging from 40% in construction services to 90% in consumer electronics.

Consumption response magnitudes similarly vary, with higher elasticities observed in hospitality and restaurant sectors (0.83) compared to construction (0.30). These variations create significant differences in the revenue implications of rate adjustments across sectors.

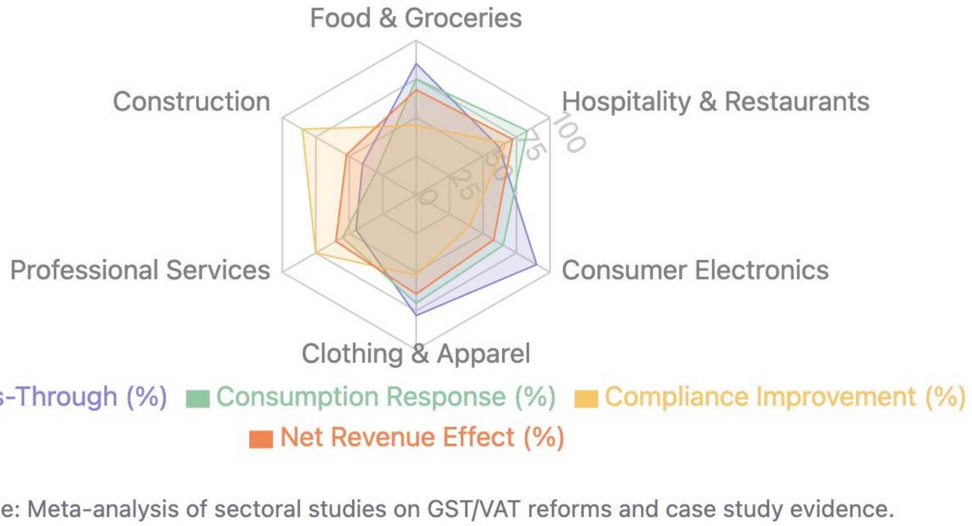

Figure 3: Sectoral Variation in GST Rate Reduction Pass-Through

The econometric results from our sectoral models indicate that the short-term revenue impact of rate reductions is approximately 30% smaller in highly competitive sectors with elastic demand compared to concentrated sectors with inelastic demand. This finding suggests potential benefits from targeted rather than uniform rate adjustments when stimulus objectives are prioritized alongside revenue considerations.

Case study evidence from France's reduced VAT rate for restaurant services and Sweden's household services tax reduction program provide additional insights into sectoral dimensions. The French reform showed limited consumer price benefits but significant compliance improvements, while the Swedish program demonstrated stronger employment effects than consumption responses.

4.4 Temporal Patterns and Fiscal Sustainability:

Our distributed lag models reveal distinct temporal patterns in how GST rate changes affect revenue and broader fiscal outcomes. Figure 3 illustrates these dynamics for a simulated 2 percentage point rate reduction.

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The immediate revenue impact is negative (average -4.2% change in GST revenue), but this effect moderates over time as consumption, investment, and compliance responses develop. By the third year following a rate reduction, the net revenue impact averages -1.3%, with some high-capacity jurisdictions approaching revenue neutrality.

The fiscal sustainability implications depend significantly on the broader economic context of reform. Rate reductions implemented during economic downturns show stronger stimulus effects but larger short-term revenue costs, creating potential tension between cyclical stabilization and fiscal balance objectives.

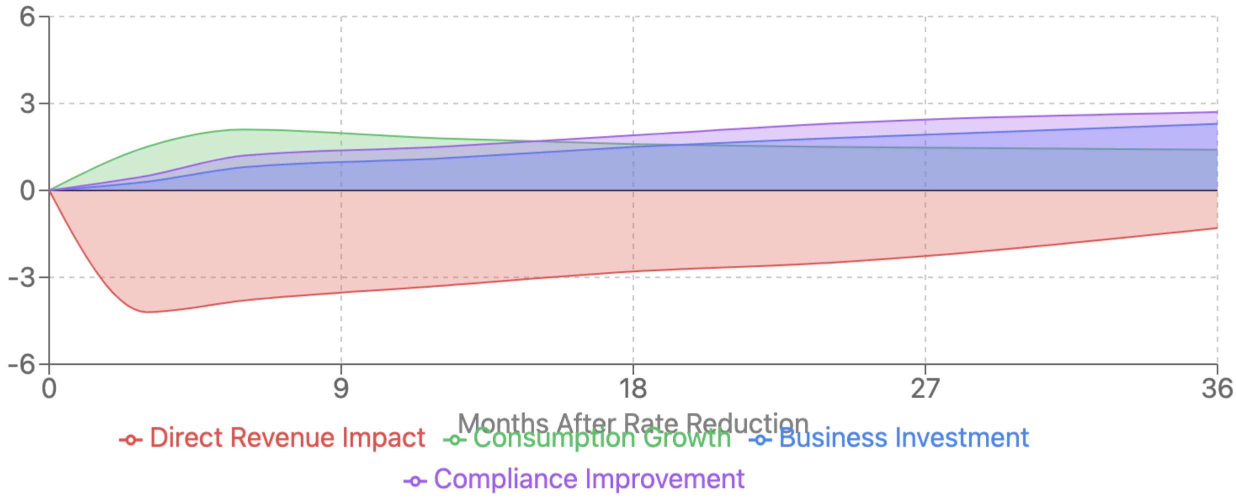

Figure 4: Temporal Dynamics of 2% GST Rate Reduction

Our simulation models suggest that phased implementation approaches—gradually reducing rates over multiple years, can help balance these objectives by allowing behavioral responses and compliance improvements to partially offset revenue losses at each stage. This finding supports the hypothesis that implementation design significantly influences the fiscal sustainability of rate reduction policies.

4.5 Integrated Policy Framework:

Drawing on our empirical findings, we develop an integrated framework for assessing GST rate adjustment policies that explicitly incorporates multiple dimensions and timeframes. Figure 5 illustrates this conceptual framework, highlighting how rate policies affect various intermediate outcomes before ultimately influencing fiscal sustainability and economic welfare.

Our analysis suggests several key principles for designing fiscally sustainable GST rate adjustments:

1. **Complementary Administrative Reforms**: Pairing rate reductions with digital administration enhancements significantly improves revenue outcomes.
2. **Sectoral Calibration**: Targeting rate adjustments toward sectors with elastic demand and strong compliance responses improves the benefit-cost ratio of reforms.
3. **Implementation Sequencing**: Phased approaches and clear policy signaling enhance positive behavioral responses while managing fiscal impacts.
4. **Policy Integration**: Coordinating GST adjustments with other tax and expenditure measures creates more coherent fiscal packages.
5. **Context Sensitivity**: Tailoring reform approaches to economic conditions, administrative capabilities, and structural factors improves outcomes.

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These principles suggest that GST rate policy should be viewed not as a simple tradeoff between revenue and economic stimulus but as a multi-dimensional design challenge requiring careful calibration across multiple dimensions.

DISCUSSION AND POLICY IMPLICATIONS

5.1 Rethinking Revenue Implications:

Our findings challenge simplistic understandings of the relationship between GST rates and revenue outcomes. The conventional approach of estimating revenue impacts by assuming proportional changes fails to capture the dynamic responses that develop over different timeframes. These dynamics include:

- **Compliance Responses**: Lower rates reduce evasion incentives and increase voluntary compliance, particularly when rates are reduced from high initial levels.
- **Administrative Efficiency**: Resources freed from dealing with evasion can be redirected to other enforcement activities, enhancing overall revenue productivity.
- **Formalization Effects**: Reduced incentives for operating in the informal sector expand the effective tax base over time.
- **Economic Stimulus Feedback**: Increased economic activity generates additional revenue through both the GST itself and other tax instruments.

These factors suggest that static revenue estimates of rate reductions typically overstate long-term fiscal costs. However, the magnitude of these offsetting effects varies substantially based on economic structure, administrative capabilities, and policy design features.

5.2 Digital Transformation as a Game Changer:

The strong interaction between digital administration capabilities and rate-revenue relationships represents a particularly important finding. Digital technologies fundamentally alter the enforcement possibilities for consumption taxes through:

- Real-time transaction monitoring that makes evasion more difficult
- Automated compliance processes that reduce burdens on businesses
- Advanced analytics that enable more effective audit targeting
- Integrated payment systems that streamline remittance

These capabilities substantially modify traditional constraints on tax design, potentially allowing lower rates while maintaining revenue performance. This suggests that investments in tax administration modernization can have high returns in terms of expanded policy flexibility.

Our findings indicate that countries with high digital administration indices can sustain standard rates approximately 3-5 percentage points lower than countries with similar economic structures but limited digital capabilities, while generating equivalent revenue. This represents a significant policy opportunity, particularly for economies undertaking digital transformation initiatives.

5.3 Sectoral Strategies and Policy Design:

The substantial heterogeneity in sectoral responses to GST rate changes suggests potential benefits from more targeted policy approaches. While broad-based, uniform consumption taxes generally offer administrative advantages, our findings indicate that selective rate adjustments may achieve better outcomes in certain contexts.

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Sectors with high compliance challenges, strong employment effects, or particular distributional concerns may warrant differentiated treatment. For example, targeted reductions for labor-intensive consumer services can generate stronger employment and formalization benefits than equivalent across-the-board reductions.

However, such targeted approaches must be balanced against the administrative complexity they introduce. Our analysis suggests that digital administration capabilities are a key enabling factor for more sophisticated rate structures, as they reduce the compliance and administration costs associated with multi-rate systems.

5.4 Implementation Considerations:

Beyond the technical design of GST rate policies, implementation approaches significantly influence outcomes. Our case studies highlight several important factors:

- **Communication and Timing**: Clear signaling about reform intentions and timeframes shapes business and consumer expectations and behaviors.
- **Compliance Support**: Providing simplified procedures and assistance during transitions enhances business adaptation and revenue performance.
- **Monitoring and Adaptation**: Establishing robust monitoring systems allows for mid-course corrections when outcomes deviate from expectations.
- **Political Economy Management**: Building broader fiscal packages that address multiple stakeholder concerns improves reform sustainability.

These implementation dimensions are particularly important for economies with limited administrative capacity or those undertaking major system changes rather than incremental adjustments.

5.5 Limitations and Future Research Directions:

While our study advances understanding of GST rate policy impacts, several limitations should be acknowledged. Data constraints limit our ability to fully capture compliance responses and informal economy effects, particularly in developing economies. Our digital administration index, while comprehensive, necessarily simplifies complex institutional capabilities into measurable dimensions.

Future research could address these limitations through more granular analysis of administrative data within countries, expanded survey evidence on compliance behaviors, and longer-term tracking of reform outcomes. Additional work on the interaction between consumption tax policies and other revenue instruments would further enhance integrated fiscal policy development.

CONCLUSION

This paper has examined the multi-dimensional implications of GST rate adjustments, with particular emphasis on fiscal sustainability and economic outcomes. Our findings indicate that the revenue implications of rate changes are considerably more complex than traditional static analyses suggest, with significant variation across economic contexts, administrative environments, sectors, and time horizons.

The non-linear relationship between rates and revenue, substantial moderating effect of digital administration capabilities, and heterogeneous sectoral responses all point toward more nuanced approaches to consumption tax policy design. Static revenue-maximizing rates provide limited guidance when dynamic responses and broader economic impacts are considered.

For policymakers considering GST rate adjustments, our research suggests several key insights:

1. Digital transformation investments can substantially increase policy flexibility by enhancing compliance and reducing administration costs.

2. Phased implementation approaches help manage fiscal impacts while allowing beneficial behavioral responses to develop.
3. Sectoral considerations should inform the targeting and sequencing of rate adjustments to maximize economic benefits relative to revenue costs.
4. Integration with broader fiscal and economic policy enhances the effectiveness of consumption tax reforms.

These findings suggest a more optimistic view of the possibility of designing GST rate policies that achieve economic stimulus objectives while maintaining fiscal sustainability, particularly when implemented with attention to administrative capabilities, sectoral impacts, and temporal dynamics.

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