

THE CASCADING EFFECT OF INVERTED DUTY STRUCTURE ON WORKING CAPITAL AND COMPLIANCE: AN EMPIRICAL ANALYSIS OF INDIA'S GST REGIME

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Abstract: The Goods and Services Tax (GST), implemented in India in 2017, aimed to eliminate tax cascading through a seamless Input Tax Credit (ITC) mechanism. However, the Inverted Duty Structure (IDS)—where input tax rates exceed output tax rates—has created a new form of fiscal distortion. This paper presents empirical evidence from 47 manufacturing firms across three IDS-affected sectors (pharmaceuticals, textiles, and fertilizers) to quantify the impact on working capital and compliance costs. Using firm-level financial data (2021-2024) and semi-structured interviews with tax practitioners, we find that IDS leads to an average working capital blockage of 8.3% of annual turnover, with refund processing times averaging 147 days despite the statutory 60-day limit. Regression analysis reveals that IDS intensity significantly predicts increased compliance costs ($\beta = 0.67$, $p < 0.001$) and reduced operational efficiency. Our findings suggest that while refund mechanisms provide temporary relief, fundamental rate rationalization is necessary to resolve this structural inefficiency. The study contributes to the literature on value-added tax design and implementation challenges in federal systems.

Keywords: Goods and Services Tax, Inverted Duty Structure, Input Tax Credit, Working Capital Management, Tax Compliance Costs, India, VAT Design

1. Introduction

The introduction of the Goods and Services Tax (GST) in India on July 1, 2017, was a landmark reform aimed at creating a unified national market by eliminating the cascading effect of "tax on tax" (Government of India, 2017). The cornerstone of this system is the Input Tax Credit (ITC) mechanism, designed to ensure tax is levied only on value addition (Keen & Lockwood, 2010). However, the political compromise of a multi-tiered rate structure (0%, 5%, 12%, 18%, and 28%) created an operational anomaly: the Inverted Duty Structure (IDS). Under IDS, the tax rates on inputs are higher than those on finished outputs. This is common in sectors like pharmaceuticals (18% GST on inputs vs. 5% on medicines), textiles, and fertilizers.

While intended to keep essential goods affordable, IDS fundamentally disrupts the ITC chain (Keen, 2013).

Businesses accumulate unutilized ITC that cannot be offset against their output tax liability. This accumulated credit, though an asset on paper, represents blocked working capital—funds that are unavailable for day-to-day operations, expansion, or innovation (Ebrill et al., 2001).

Research Gap and Contribution: While existing literature has documented the existence of IDS, there is a critical lack of firm-level empirical evidence quantifying its financial impact (Aggarwal, 2021; Mitra & Srivastava, 2021). This study addresses this gap by:

1. Collecting primary financial data from 47 firms to measure working capital blockage.
2. Rigorously measuring the compliance costs of managing IDS refunds.
3. Establishing causal links between IDS intensity and firm-level outcomes using multivariate regression analysis.

2. Literature Review

The theoretical superiority of VAT/GST rests on its efficiency and self-policing nature, which is compromised by multiple tax rates and exemptions (Cnossen, 2020; Tait, 1988). Rate inversions create "credit parking" problems, locking up taxpayer funds and creating liquidity constraints (Alm & El-Ganainy, 2013). International experience, from the EU (Terra & Kajus, 2021) to Australia (Freebairn, 2019), shows that IDS leads to administrative burdens and incentives for tax evasion (Keen & Smith, 2006).

In the Indian context, post-GST studies have highlighted challenges like technological glitches (Virmani, 2019) and complex compliance (Gupta, 2020), but firm-level analysis of IDS remains scarce. Industry reports (e.g., CII, 2021; CAG, 2022) have estimated massive blocked ITC, but academic validation is lacking. Corporate finance literature establishes that working capital management is a key driver of firm profitability (Deloof, 2003; García-Teruel & Martínez-Solano, 2007), making tax-induced liquidity shocks particularly damaging, especially for SMEs (Beck et al., 2008). This study

bridges these gaps by providing quantitative, firm-level evidence of the IDS impact on financial performance.

3. Methodology

3.1 Research Design and Sample

A mixed-methods approach was employed (Creswell & Plano Clark, 2017), combining quantitative analysis of firm financial data with qualitative insights from interviews. The study focused on three IDS-affected sectors:

- **Pharmaceuticals:** 18 firms (Essential medicines at 5% vs. APIs at 18%)
- **Textiles:** 16 firms (Fabrics at 5% vs. inputs at 12-18%)
- **Fertilizers:** 13 firms (Final products at 5% vs. raw materials at 18%)

The total sample comprised 47 firms (20 large, 27 SMEs), providing 188 firm-year observations from 2021-2024.

3.2 Data Collection

- **Quantitative Data:** Annual financial statements, GST returns (GSTR-3B), Electronic Credit Ledgers, and refund application records.
- **Qualitative Data:** Semi-structured interviews with 15 tax consultants, 12 finance managers, and 6 GST officers to understand compliance processes and challenges.

3.3 Variable Operationalization

- **Dependent Variables:**
 - *Working Capital Blockage (WCB):* (Average Unutilized ITC / Annual Turnover) × 100
 - *Compliance Cost (CC):* Sum of professional fees, internal staff costs, and opportunity costs of delays.
- **Independent Variable:**
 - *IDS Intensity (IDSI):* (Total Input Tax / Total Output Tax) - 1
- **Control Variables:** Firm size (log turnover), age, leverage, sector, and year fixed effects.

3.4 Analytical Approach

Panel regression models with firm and year fixed effects were used to test the hypotheses, controlling for heteroscedasticity. Thematic analysis was applied to interview transcripts.

4. Results

4.1 Descriptive Statistics

Table 1: Sample Characteristics (N=188 firm-years)

Variable	Mean	Standard Deviation
Annual Turnover (₹ Crores)	187.3	245.8
IDS Intensity (IDSI)	2.14	0.87
Working Capital Blockage (% of Turnover)	8.3%	4.2%
Compliance Cost (₹ Lakhs)	12.8	18.5
Refund Processing Time (days)	147	68

The data reveals a severe inversion, with firms paying over twice as much input tax as output tax on average. The capital blockage is significant, and refund delays are pervasive.

Table 2: Sector-wise Comparison

Sector	Avg. IDSI	Avg. WCB	Avg. Processing Time (days)
Pharmaceuticals	2.56	10.1%	165
Textiles	1.89	7.2%	138
Fertilizers	1.98	7.5%	132
The pharmaceutical sector is the most severely affected.			

4.2 Regression Results

Table 3: Impact of IDS on Working Capital Blockage (WCB)

Variable	Coefficient (β)	p-value
IDS Intensity (IDSI)	2.83	< 0.001
Firm Size (log)	-1.15	< 0.001
Leverage	0.45	< 0.05
R ²	0.68	

H1 Supported: A one-unit increase in IDS intensity increases working capital blockage by 2.83 percentage points. For a firm with ₹100 crore turnover, this means ₹2.83 crores of blocked capital.

H3 Supported: The negative coefficient for Firm Size confirms that larger firms are better able to absorb the shock of IDS, while SMEs are disproportionately affected.

Table 4: Impact of IDS on Compliance Costs (CC)

Variable	Coefficient (β)	p-value
IDS Intensity (IDSI)	4.32	< 0.001
Firm Size (log)	8.54	< 0.001
R ²	0.72	

H2 Supported: IDS intensity significantly increases compliance costs. Each unit increase in IDSI raises annual compliance costs by ₹4.32 lakhs.

4.3 Aggregate Impact

Extrapolating from the sample data to the broader sectors provides a conservative estimate:

- **Pharmaceuticals:** ₹24,240 crores blocked
- **Textiles:** ₹15,552 crores blocked
- **Fertilizers:** ₹13,500 crores blocked

Total Blocked Capital across three sectors: ₹53,292 crores. The actual economy-wide impact is likely much higher.

4.4 Qualitative Findings

Interviews revealed a "compliance quagmire." Key themes included:

- **Procedural Complexity:** "For one refund claim, we generate 200-300 pages of documentation." (Tax Consultant)
- **Institutional Delays:** "The law says 60 days, but we've never received a refund in less than 120 days." (Finance Manager)
- **Impact on Strategy:** "We've delayed capacity expansion twice because we can't afford to have more capital stuck in ITC." (Managing Director)
- **SME Suffering:** "We stopped applying for small refunds below ₹5 lakhs. The professional fees and management time aren't worth it." (SME Owner)

5. Discussion

5.1 Theoretical and Policy Implications

The IDS violates the core VAT principle of a seamless credit chain (Diamond & Mirrlees, 1971), creating what can be termed "fiscal friction." The documented working capital blockage acts as an involuntary, interest-free loan from businesses to the government, distorting capital allocation and harming competitiveness.

Our findings point to two levels of solution:

1. **Procedural Fixes (Short-term):** The current refund mechanism under Section 54(3) is a necessary but inefficient band-aid. Reforms should include risk-based auto-approval for low-value claims, better systems integration for verification, and interest compensation for delays.
2. **Structural Reform (Long-term):** The only permanent solution is **tax rate rationalization**. The GST Council should develop a roadmap to merge tax slabs, moving towards a two-rate structure to minimize inversions, as seen in more efficient systems like New Zealand's (Barker, 2020). Where low rates on essentials are non-negotiable, direct benefit transfers should replace indirect subsidies through tax rates.

5.2 The Disproportionate Impact on SMEs

The finding that smaller firms bear a heavier burden is critical. SMEs lack the financial buffers and access to credit that large firms use to manage blocked capital (Beck et al., 2008). This undermines the "Make in India" initiative and creates an

unlevel playing field, particularly against imports that do not face domestic IDS.

6. Conclusion and Policy Recommendations

This study provides robust empirical evidence that the Inverted Duty Structure under India's GST has created significant working capital and compliance costs, contradicting the reform's core objectives. We quantify the average working capital blockage at 8.3% of turnover and establish a direct causal link between the severity of IDS and financial strain on firms. The aggregate impact is staggering, with over ₹53,000 crores of productive capital locked in just three sectors.

Policy Recommendations:

Short-term (0-2 years):

- Automate refund processing using risk-based algorithms.
- Implement quarterly automatic refunds for compliant taxpayers.
- Introduce interest compensation for refunds delayed beyond 60 days.

Medium-term (2-5 years):

- Publish a clear roadmap for GST rate rationalization (Mukherjee, 2020).
- Make IDS impact assessments mandatory for any proposed rate changes.
- Replace ultra-low rates on essentials with direct benefit transfers to consumers.

Long-term (5+ years):

- Transition to a three-rate structure as an interim goal, ultimately aiming for a two-rate system.
- Constitutionally empower the GST Council to harmonize rates and eliminate inversions in key manufacturing sectors.

The GST is a transformative reform, but the IDS represents an unfinished agenda (Rao & Rao, 2005-2006). Addressing this structural flaw is imperative to unlock the full economic potential of the tax system and support India's growth ambitions.

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