CHAPTER 16

A Comparative Study of Pre-GST and Post-GST Taxation in Heavy Industries: An In-Depth Analysis of India's Tax Reform Impact on Steel, Cement, Petroleum, Power, Automotive, and Capital Goods Sectors

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ABSTRACT

The introduction of the Goods and Services Tax (GST) on July 1, 2017 marked the most significant overhaul of India's indirect tax structure since independence. This paper undertakes a comprehensive comparative analysis of pre-GST and post-GST taxation frameworks as they apply to heavy industries— specifically the steel, cement, petroleum, power, automotive, and capital goods sectors. Prior to GST implementation, these industries operated under a fragmented, multi-layered tax regime comprising Central Excise Duty, State Value Added Tax (VAT), Central Sales Tax (CST), Octroi, and various other levies, resulting in cascading tax effects, supply chain distortions, and significant compliance burdens. This study employs a doctrinal and empirical approach, drawing on data from the Ministry of Finance, GSTN filings, CMIE industry databases, and published financial statements of listed heavy industry firms from FY 2015-16 to FY 2022-23. The research evaluates changes in effective tax incidence, input tax credit (ITC) availability, logistics costs, compliance intensity, and sectoral profitability across the transition. Our findings indicate that while GST has substantially reduced the cascading effect and improved ITC flows for most heavy industries, certain sub-sectors — notably petroleum, power generation, and real estate-linked construction — remain outside GST's full ambit, creating policy asymmetries. The paper concludes with sector-specific recommendations for rationalizing the GST framework to maximize efficiency gains in heavy manufacturing.

Keywords: GST; Pre-GST taxation; Heavy industries; Cascading tax effect; Input tax credit; CENVAT; VAT; CST; Excise duty; Tax incidence; Manufacturing sector.

1.0 Introduction

India's heavy industrial sector — encompassing steel, cement, power, petroleum, automotive, and capital goods manufacturing — constitutes the backbone of the country's economic infrastructure.

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These sectors collectively contribute approximately 15-18% to India's GDP and employ over 50 million workers directly and indirectly. The tax environment governing these industries has profound implications for production costs, investment decisions, export competitiveness, and ultimately consumer prices. Before July 2017, India's indirect tax architecture was widely criticized as one of the most complex in the world. Heavy industry participants were subjected to a cascading cascade of taxes: Central Excise Duty (CED) levied by the Union Government on manufactured goods, State-level VAT on sales, Central Sales Tax on inter-state commerce, Entry Tax or Octroi at state borders, and a variety of cess and surcharges. This multiplicity created what economists termed the 'tax-on-tax' problem — where each successive levy was imposed not on the underlying value but on the cumulative price inclusive of previous taxes.

The implementation of GST, described by the Government of India as 'one nation, one tax, one market,' sought to replace this complex architecture with a unified, destination-based, multi-stage consumption tax. Under GST, heavy industries were categorized under various rate slabs (5%, 12%, 18%, and 28%), with comprehensive ITC provisions designed to eliminate the cascading effect. This research paper undertakes a rigorous comparative analysis to answer three central questions:

- How did the aggregate tax burden on heavy industries change after GST?
- What were the sectoral variations in tax treatment and ITC availability?
- What structural anomalies persist in the post-GST framework that continue to distort heavy industry economics?

2.0 The Pre-GST Taxation Framework (Pre-July 2017)

2.1 Central Excise Duty (CED)

Central Excise Duty, levied under the Central Excise Act, 1944, was the primary Union-level tax on manufactured goods. For heavy industries, the standard CED rate was 12% of the assessable value, with specific rates varying by product. Steel manufacturers faced CED at 12% on finished steel products, while the cement sector was subject to a hybrid structure combining ad valorem rates with specific duties per tonne. Capital equipment manufacturers paid CED ranging from 10% to 12% depending on the tariff classification.

A critical limitation of CED was its restricted credit mechanism under CENVAT (Central Value Added Tax Credit). While CENVAT allowed manufacturers to offset excise duty paid on inputs against the output excise liability, this credit was not transferable across different tax heads — CED credits could not offset VAT liabilities, and VAT credits could not reduce CED obligations.

2.2 State Value Added Tax (VAT)

VAT, replacing the earlier State Sales Tax in phases between 2003 and 2008, was levied by individual state governments on the sale of goods within their territories. VAT rates for heavy industrial goods varied dramatically across states. Steel products attracted VAT rates between 5% and 15% depending on the state; cement VAT ranged from 12.5% in some states to 20% in others. This inter-state variation compelled heavy industries to factor state-specific tax costs into their supply chain configurations, leading to economically irrational location decisions driven by tax arbitrage rather than genuine efficiency considerations.

2.3 Central Sales Tax (CST)

CST was levied on inter-state sales of goods at a standard rate of 2% (with Form C) or the full state VAT rate without declaration forms. For heavy industries with geographically dispersed production and consumption, inter-state movement was routine. The critical problem with CST was its non-creditable nature — CST paid on interstate purchases could not be set off against VAT payable on subsequent sales, representing an absolute cost embedded in the price of goods. For capital goods procured from different states, this resulted in permanent tax costs ranging from 2% to 14.5% depending on the applicable rates.

2.4 Additional Taxes and Levies

Beyond CED, VAT, and CST, heavy industries faced numerous additional levies:

- Entry Tax / Octroi: Levied by states and municipalities on goods entering their jurisdiction, ranging from 1% to 6% on the value of goods.
- Purchase Tax: Applicable in states like Punjab and Haryana on purchase of certain agricultural commodities used as industrial inputs.
- Luxury Tax and Entertainment Tax: Marginally relevant to certain sectors.
- Service Tax: At 12.36% (including education cess) on input services — legal, engineering, consulting — used by heavy industries. Partial CENVAT credit for service tax was available but subject to complex restrictions.
- Customs Duty: On imported raw materials and capital equipment, ranging from 5% to 25%, creating further complexity for import-dependent heavy industries.

2.5 The Cascading Tax Problem: A Quantitative Illustration

To understand the magnitude of the cascading effect, consider a simplified production chain in the steel industry: This illustration demonstrates that the effective tax rate of approximately 29.3% significantly exceeded the nominal rate of any individual tax. Industry studies estimated that cascading taxes added 25-35% to production costs in heavy manufacturing, with the steel and cement sectors being particularly affected.

Table 1: Illustration of Cascading Tax Effect in the Pre-GST Steel Supply Chain (Hypothetical Values)

Stage	Value Added (₹)	Tax Paid (₹)	Cum. Value (₹)	Tax Rate
Iron Ore Mining	10,000	1,200 (CED 12%)	11,200	12%
Steel Manufacture (on ₹11,200)	5,000	1,944 (CED 12%+VAT 5%)	18,144	17%
Inter-State Transport (CST)	2,000	363 (CST 2% on ₹18,144)	20,507	2%
Dealer / Distributor (VAT)	3,000	2,356 (VAT 12.5%)	25,863	12.5%
Total Tax Burden	—	5,863	—	~29.3% of base

3.0 The Post-GST Taxation Framework (July 2017 Onwards)

3.1 GST Architecture and Rate Structure

GST in India is structured as a Dual GST model, with the Centre levying Central GST (CGST) and states levying State GST (SGST) on intra-state transactions, while Integrated GST (IGST) applies to inter-state transactions. This structure preserves the federal character of India's Constitution while achieving tax unity.

Heavy industrial goods are spread across GST's rate slabs as detailed below:

Table 2: GST Rate Structure vs. Pre-GST Effective Tax Rates for Major Heavy Industry Products

Sector / Product	GST Rate	Prev. Eff. Rate	ITC Availability
Steel (Flat / Long Products)	18%	26-30%	Full ITC Available
Cement (OPC / PPC)	28%	28-31%	Full ITC Available
Automobiles (Passenger Cars >4m)	28% + Cess	30-55%	Full ITC Available
Capital Goods / Machinery	18%	24-28%	Full ITC Available
Coal (for power generation)	5%	11-14%	Full ITC Available
Crude Petroleum / Natural Gas	Outside GST	Variable	No ITC
Electricity (Power Generation)	Exempt / Outside	Various Levies	Restricted ITC
Aviation Turbine Fuel	Outside GST	Approx. 28%+	No ITC

3.2 Input tax credit mechanism

The cornerstone of GST's reform impact is its seamless ITC mechanism. Under GST, registered taxable persons can claim credit for GST paid on all inputs, input services, and capital

goods used in the course or furtherance of business, subject to conditions under Section 16 of the CGST Act. This eliminates the credit blockage that was endemic to the pre-GST regime.

For a steel plant, this means GST paid on iron ore, coking coal, limestone, furnace oil (where applicable), engineering services, logistics services, and even capital equipment procurement is fully creditable against the output GST liability. Industry estimates indicate that seamless ITC availability effectively reduces the net tax cost for heavy manufacturers by 8-15% compared to the pre-GST era, depending on the input intensity of the specific industry.

3.3 Unified Compliance and E-Way Bill System

GST replaced the patchwork of state-specific forms, declarations, and entry permits with a unified online compliance system administered through the GSTN (Goods and Services Tax Network). The E-Way Bill system, mandating electronic documentation for goods movement exceeding ₹50,000 in value, replaced the cumbersome state border checkpost system that had been a major bottleneck for heavy industries moving large volumes of raw materials and finished products. Empirical studies documented reductions in truck turnaround time at state borders from an average of 12-15 hours to under 2 hours following E-Way Bill implementation, translating to meaningful logistics cost savings for bulk-transport dependent heavy industries.

4.0 Sector-Wise Comparative Analysis

4.1 Steel industry

4.1.1 Pre-GST scenario

The Indian steel industry, with an installed capacity exceeding 150 million tonnes per annum (MTPA), operated under one of the most complex tax environments in the pre-GST era. Key characteristics included: CED at 12% on steel products with limited CENVAT credit for certain inputs; VAT ranging from 4% to 14.5% across states; CST at 2% on inter-state steel movements (non-creditable); separate Service Tax on transportation, logistics, and technical services (partially creditable); and Entry Tax of 1-4% in multiple states. The effective tax burden on hot rolled coil (HRC), a benchmark steel product, was estimated between 26-31% of production cost, with significant state-to-state variation creating market distortions. Steel producers strategically located warehouses in low-VAT states, maintaining artificially distributed inventory to minimize tax incidence — a commercially suboptimal but tax-rational behavior.

4.1.2 Post-GST scenario

Under GST, steel products attract an 18% GST rate. More significantly, the full credit chain for inputs — iron ore at 5% GST, coking coal at 5%, limestone at 5%, and industrial gases

at 18% — is now seamlessly available. Analysis of SAIL and JSW Steel's annual reports (FY 2018-22) indicates that net tax cost as a percentage of revenue declined by approximately 5-8 percentage points post-GST, with the bulk of savings attributable to ITC availability on inputs previously taxed under non-creditable regimes. Supply chain rationalization has been another major benefit. Steel producers have consolidated warehousing from tax-driven distributed models to economically efficient centralized hubs, reducing overall logistics and inventory carrying costs.

4.2 Cement Industry

4.2.1 Pre-GST scenario

Cement was among the most heavily taxed sectors in the pre-GST regime. The total tax incidence included CED at 12% plus specific duty (₹125 per tonne for mini cement plants, varying for large plants), VAT ranging from 12.5% to 20% across states, and CST on inter-state sales. Together with various local levies, the cumulative tax incidence was estimated at 28-32% of the ex-factory price, making Indian cement among the highest-taxed globally.

4.2.2 Post-GST scenario

Cement was placed in the 28% GST slab — the highest standard rate — which initially drew criticism from the industry as not representing meaningful tax relief. However, the critical change was the availability of comprehensive ITC. Previously blocked credits on coal, fly ash, raw materials, capital goods, and services are now fully available. The Cement Manufacturers' Association estimated that ITC benefits effectively reduce the net tax cost to approximately 20-22%, a meaningful improvement despite the nominal 28% rate. Cement companies have benefited significantly from reduced logistics costs. Being a weight-to-value heavy product, cement transportation is highly cost-sensitive; the elimination of border checkpost delays has produced logistics savings of ₹15-40 per bag depending on the route.

4.3 Petroleum and petrochemical sector

4.3.1 The GST exclusion problem

The petroleum sector represents the most significant structural anomaly in India's post-GST landscape. Crude petroleum, natural gas, aviation turbine fuel, petrol, and diesel remain outside the GST framework, continuing to be governed by Central Excise Duty and State VAT. This exclusion was initially described as temporary pending consensus in the GST Council, but as of 2024, petroleum products remain outside GST. For petrochemical manufacturers and refineries, this creates a severe ITC inversion problem. While output products like plastic

granules, polymers, and chemicals are taxable under GST (18%), the primary input — naphtha or natural gas — attracts CED and VAT for which no GST input credit can be claimed. Industry estimates place this stranded credit cost at ₹8,000-12,000 crore annually for the petrochemical sector alone.

4.3.2 Downstream impact on heavy industries

The petroleum GST exclusion creates cascading effects across other heavy industries. Diesel — the primary fuel for mining, steel plants, cement kilns, and heavy logistics — carries an effective tax rate of 45-55% (Central Excise + State VAT) with no ITC availability to industrial users. This embedded fuel tax represents a permanent production cost disadvantage estimated at 2-4% of revenue for energy-intensive heavy industries.

4.4 Power sector

Electricity is exempt from GST. While this appears beneficial for power consumers, it creates an ITC blockage problem for power generating companies. Generators procuring GST-taxable equipment (transformers, turbines, cables at 5-18% GST) and fuel (coal at 5% GST) cannot claim ITC since their output (electricity) is exempt. This blocked ITC is estimated at thousands of crores annually and is ultimately passed on to industrial electricity consumers through higher tariffs, imposing an indirect and opaque tax burden on heavy industries that are large power consumers.

The cement sector, for instance, uses 60-80 kWh per tonne of clinker production; steel manufacturing requires 400-500 kWh per tonne of crude steel. The embedded GST cost in electricity tariffs, arising from power sector ITC blockage, adds ₹20-80 per unit of production to costs that are not offset by any ITC mechanism.

4.5 Automotive and capital goods sectors

The automotive sector, particularly commercial vehicles used by heavy industries, moved to a 28% GST rate plus applicable cess. While the nominal rate appears high, comprehensive ITC availability and the integration of previously non-creditable levies has resulted in a net tax incidence broadly comparable to or lower than the pre-GST regime for most categories. Commercial vehicle manufacturers report improved working capital conditions due to reduced ITC blockage on capital goods procurement.

Capital goods — industrial machinery, plant and equipment — are taxed at 18% GST with full ITC availability. This is a significant improvement over the pre-GST era where CED on capital goods was creditable only in installments (50% in the first year, balance in subsequent years) and VAT paid on capital goods was frequently non-creditable or available with restrictions.

5.0 Quantitative Comparative Assessment

5.1 Effective tax rate comparison

Table 3: Effective Tax Rate (ETR) Comparison across Heavy Industry Segments. ETR Accounts for Nominal Tax Rates, Non-creditable Embedded Taxes, and Post-ITC Net Rax Cost

Industry Segment	Pre-GST ETR (%)	Post-GST ETR (%)	Net Change (%)	ITC Impact
Steel (Long Products)	26–31%	17–20%	-7 to -11%	High
Steel (Flat Products)	24–29%	16–19%	-6 to -10%	High
Cement (OPC 50 kg bag)	28–32%	21–24%	-6 to -9%	High
Passenger Cars (>4m)	30–55%	28–50%*	-2 to -5%	Medium
Commercial Vehicles	26–34%	28%	-2 to +2%	Medium
Industrial Machinery	22–26%	18%	-4 to -8%	High
Petrochemicals	18–24%	18% + Stranded ITC	Neutral/Negative	Low
Coal (Energy Sector)	11–15%	5%	-6 to -10%	High
Petroleum Products	45–55%	45–55% (no change)	Neutral	None

**Cess applicable on luxury/SUV segment.*

5.2 Logistics cost impact

The logistics cost reduction attributable to GST-driven supply chain rationalization has been documented across heavy industries. The National Council of Applied Economic Research (NCAER) estimated a 20-25% reduction in logistics turnaround time nationally, translating to cost savings of approximately 1-2% of revenue for logistics-intensive heavy manufacturers. Specific findings include:

- Steel industry: Logistics cost as % of revenue declined from estimated 7-9% to 5-7% post-GST (FY 2019-22 data).
- Cement industry: Transport cost per bag declined by ₹10-30 depending on haul distance due to elimination of state checkpost delays and tax-driven warehouse proliferation.
- Capital goods: OEM logistics planning improved due to unified GST documentation replacing 29 different state forms.

5.3 Compliance cost analysis

Pre-GST, a company operating in multiple states was required to register under each state's VAT legislation, file returns in different formats and frequencies, and maintain state-specific records. A steel company with plants in 5 states and customers across 20 states could

be managing 20+ VAT registrations, 15+ Service Tax registrations (for different service categories), CED registration for each manufacturing unit, and CST declarations across states.

Post-GST, the same company operates under unified GSTIN registrations (one per state of business presence), a standardized return filing framework (GSTR-1, GSTR-3B), and centralized reconciliation through the GSTN portal. While the initial transition imposed significant IT and compliance investment (estimated at ₹5-25 lakhs per company for large heavy industry players), the steady-state annual compliance cost is estimated to be 15-30% lower than the pre-GST scenario.

6.0 Structural Anomalies and Ongoing Challenges

6.1 Inverted duty structure

An inverted duty structure occurs when the GST rate on inputs is higher than the rate on finished outputs, resulting in accumulated ITC that cannot be offset and must be claimed as a refund. This problem affects several heavy industry sub-segments:

- Textile machinery manufacturers: Inputs taxed at 18%, output products at 12%, resulting in refund accumulation.
- Renewable energy equipment: Solar panels at 12% but steel and aluminium components at 18%, creating inverted credit.
- Fertilizers: Inputs at 12-18%, output at 5%, creating massive refund buildup for heavy chemical industries.

The refund process, while available under Section 54 of the CGST Act, involves procedural delays and working capital blockage that impose implicit financial costs on manufacturers.

6.2 Anti-profiteering provisions

Section 171 of the CGST Act mandates that GST-related tax reductions be passed on to consumers through price reductions. The National Anti-Profiteering Authority (NAA, now subsumed into the Competition Commission of India) conducted investigations across sectors including cement, steel, and automotive. While the provision aims to ensure GST benefits reach end consumers, heavy industry complained that the complex cost accounting involved in attributing tax savings to individual products was administratively burdensome and susceptible to interpretational disputes.

6.3 E-invoicing and technology compliance burden

The mandatory e-invoicing system, applicable to businesses with turnover above ₹5 crore, while beneficial for large heavy industry players, has created significant technology

investment requirements. Small and medium ancillary manufacturers — critical suppliers to heavy industries — faced acute difficulties in adopting e-invoicing systems, temporarily disrupting supply chains during the transition period (FY 2020-22).

6.4 GST on mining royalties and their treatment

The taxability of mining royalties under GST has been a contentious issue directly affecting the steel, cement, and mineral extraction sectors. The Supreme Court's 2024 ruling clarifying that mining royalties are not 'taxes' but contractual payments has significant implications for the taxability of royalties under GST. Uncertainty in this area has led to notices, assessments, and litigation that add compliance risk to heavy mining and minerals-based industries.

6.5 Place of supply complexity for services

Large heavy industry projects — power plants, steel greenfield expansions, cement plant constructions — involve multi-location operations with complex place of supply determinations for engineering, construction, and project management services. The cross-charging of common services between group entities and the GST treatment of 'distinct persons' (multiple registrations of the same legal entity) has generated significant litigation, particularly around construction-related input services where ITC is restricted under Section 17(5) of the CGST Act.

7.0 Macro-Economic Impact on Heavy Industry

The aggregate impact of GST on heavy industry's macro-economic indicators presents a nuanced picture. EBITDA margins for listed steel companies improved by 2-4 percentage points in FY 2018-20 (pre-COVID period), partially attributable to GST tax efficiencies alongside other market factors including capacity utilization improvements and commodity price movements.

Capital goods sector output (IIP Capital Goods Index) grew at 8.2% CAGR in the first three post-GST years (FY 2018-21), compared to 4.7% CAGR in the preceding three years, suggesting a correlation between improved tax efficiency and investment activity, though causal attribution requires caution given concurrent policy interventions.

Foreign Direct Investment (FDI) in manufacturing, which includes heavy industries, increased from USD 9.7 billion in FY 2016-17 to USD 15.3 billion in FY 2021-22. While multiple factors influenced this increase, the simplification of India's indirect tax framework under GST is consistently cited by industry surveys and investor feedback as a positive factor in investment decision-making.

Table 4: Key Macroeconomic Indicators for Indian Heavy Industry Sectors, Pre and Post-GST

Indicator	FY 2015-16	FY 2016-17	FY 2019-20	FY 2022-23
Steel Sector EBITDA Margin	8.2%	9.1%	12.4%	14.1%
Cement EBITDA Margin	17.5%	18.2%	20.1%	21.8%
Capital Goods IIP Growth	3.8%	4.7%	8.9%	9.2%
Manufacturing FDI (USD Bn)	7.1	9.7	12.3	15.3
Avg. Logistics Cost (% Rev.)	8.5%	8.2%	7.1%	6.4%

Sources: Ministry of Steel, CMA, DPIIT, RBI. Note: FY 2020-22 data excluded due to COVID-19 distortion

8.0 Policy Recommendations

Based on the comparative analysis, the following policy recommendations are proposed to maximize the efficiency and equity of GST's application to heavy industries:

8.1 Petroleum and natural gas under GST

The integration of petroleum products — at minimum natural gas and ATF, with phased inclusion of petrol and diesel — within the GST framework is the single highest-impact reform available. This would eliminate the ITC inversion affecting petrochemicals, reduce the effective fuel tax burden on heavy industry operations, and remove a major source of cascading taxation that continues to inflate production costs across energy-intensive sectors.

8.2 Rationalizing the 28% cement rate

Cement, as a critical infrastructure input with significant implications for housing and construction costs, should be reconsidered for rate reduction to 18%. The revenue impact would be partially offset by expanded base through better compliance and the multiplier effect of lower construction costs on broader economic activity. The GST Council's Technical Committee has periodically examined this proposal; implementation appears feasible within the medium term.

8.3 Streamlining refund mechanisms for inverted structures

An automated, time-bound refund system for inverted duty structure claims — with statutory interest on delays beyond 30 days — would significantly reduce working capital burden on heavy industry sub-sectors experiencing structural inversions. The current average refund processing time of 60-90 days imposes implicit financing costs that disproportionately affect capital-intensive heavy manufacturers.

8.4 Electricity sector ITC resolution

Permitting power generating companies to claim ITC on GST paid for capital equipment and fuel procurement — with appropriate ring-fencing to prevent misuse — would reduce the embedded tax cost in electricity tariffs. The GST Council could establish a formula-based pass-through mechanism that ensures ITC benefits reduce industrial tariffs on a transparent basis.

8.5 Sectoral GST stability and predictability

Heavy industry investment decisions — involving capital commitments of hundreds to thousands of crores with payback periods of 15-25 years — require tax policy stability. The GST Council should consider multi-year rate commitment frameworks for heavy industries, providing investment-grade certainty on tax treatment for approved projects, analogous to the Investment Promotion Incentive schemes that existed in the pre-GST era.

9.0 Conclusion

The introduction of GST has represented a paradigmatic shift in India's indirect tax architecture, with broadly positive implications for heavy industries. The elimination of the cascading tax effect through seamless ITC, the rationalization of supply chains enabled by E-Way Bill, and the reduction in compliance fragmentation have collectively improved the economic efficiency of heavy manufacturing operations.

Quantitative analysis confirms that most heavy industry segments have experienced a reduction in effective tax burden of 5-12 percentage points post-GST, with the steel, capital goods, and cement sectors being primary beneficiaries. These tax savings have partially translated into improved EBITDA margins, enhanced investment activity, and — in competitive markets — consumer price reductions.

However, the paper identifies three major structural deficiencies that limit the full realization of GST's potential for heavy industries: the exclusion of petroleum products creating ITC blockages across energy-intensive sectors, the electricity exemption generating opaque embedded taxes on power-dependent manufacturing, and the 28% cement rate maintaining high tax incidence on a critical construction material.

The reform journey remains incomplete. A second-generation GST rationalization — bringing petroleum under GST, streamlining refund mechanisms, and addressing power sector ITC distortions —could unlock an additional efficiency dividend estimated at 1.5-2.5% of heavy industry revenue, providing a significant boost to manufacturing competitiveness and economic growth. The imperative for continued tax reform is clear; the economic case is compelling; the political will to execute remains the critical variable.

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