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Assessing the Impact of Non-Tariff Measures on India's Export Performance in the European Union: Evidence from Sectoral Trade Data

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Abstract:

Non-tariff measures (NTMs) have become increasingly important in determining international market access as tariffs have declined and regulatory requirements have expanded. For Indian exporters, the European Union (EU) represents a significant destination market, but access depends not only on prices and tariff preferences but also on compliance with technical regulations, sanitary and phytosanitary requirements, conformity-assessment procedures, product traceability, labelling rules, and sustainability-related standards. This paper develops an empirical framework to assess the impact of NTMs on India's export performance in the EU using sectoral trade data. It proposes a sector-level panel analysis combining bilateral export values, EU import demand, applied tariffs, and NTM indicators for selected manufacturing and agricultural sectors. The empirical strategy employs a structural gravity framework with product or sector fixed effects and appropriate controls for time-varying economic conditions. It distinguishes between the trade-restricting effects of compliance costs and the potential trade-enhancing effects of standards that improve product quality, information, and consumer confidence. Particular attention is given to pharmaceuticals, textiles and apparel, chemicals, agricultural products, processed foods, and engineering goods. The paper establishes testable hypotheses and outlines robustness checks, including alternative NTM measures, sectoral heterogeneity, and treatment of zero trade flows. Its proposed contribution is to identify which types of regulatory measures are most strongly associated with Indian export performance and to derive policy implications for export readiness, regulatory cooperation, standards infrastructure, and support for small and medium-sized enterprises. Quantitative conclusions are reserved for estimation using the specified trade and regulatory datasets.

Keywords: Non-tariff measures; India–EU trade; export performance; sectoral trade; technical barriers to trade; sanitary and phytosanitary measures; structural gravity model; export competitiveness.

1. Introduction

International trade has increasingly been shaped by regulatory requirements that operate alongside conventional tariffs. While tariff reductions can lower the direct cost of entering foreign markets, exporters must also satisfy technical, sanitary, environmental, administrative, and conformity-assessment requirements imposed by importing economies. These measures may serve legitimate objectives, including consumer protection, food safety, environmental sustainability, and product quality. Nevertheless, they can increase production costs, delay shipments, require additional certification, and reduce the ability of firms to compete internationally.

The European Union is an important market for Indian exporters because of its purchasing power, diversified industrial demand, and extensive regulatory framework. India exports a broad range of products to the EU, including textiles and apparel, pharmaceuticals, chemicals, engineering goods, machinery, agricultural commodities, processed food, and other manufactured products. However, the ability of Indian firms to access this market varies across sectors because products differ in their technical characteristics, production processes, safety risks, and regulatory requirements.

Non-tariff measures are particularly relevant where exporters face mandatory testing, certification, technical documentation, product registration, traceability, labelling, or conformity-assessment procedures. Agricultural and food products may be affected by sanitary and phytosanitary (SPS) requirements and maximum residue limits. Manufactured goods may face technical barriers to trade (TBT), product-safety requirements, and testing obligations. Pharmaceutical exports may require stringent quality assurance, manufacturing compliance, and

product authorisation. Textile and apparel exporters may face chemical restrictions, product-safety requirements, and growing expectations concerning sustainability and supply-chain transparency.

The economic consequences of NTMs are not necessarily uniform. A regulation can impose fixed costs that disproportionately affect smaller exporters. Variable compliance costs may reduce the competitiveness of firms that already operate with narrow margins. Conversely, predictable standards can improve product quality, reduce information asymmetries, and increase consumer confidence. Firms capable of meeting demanding standards may consequently gain access to higher-value market segments.

Despite the importance of these issues, the relationship between NTMs and export performance requires careful empirical investigation. A simple comparison between sectors with many regulations and sectors with fewer regulations cannot establish causality. Highly regulated sectors may also be more technologically advanced, more valuable, or more dependent on quality-sensitive demand. Moreover, EU regulators may introduce additional measures precisely because imports are expanding or because a particular product presents a documented risk.

This paper therefore proposes a sectoral assessment of the relationship between NTMs and India's export performance in the EU. It examines whether regulatory exposure is associated with lower export values or weaker export growth, whether the relationship differs across sectors, and whether the effects depend on the nature of the measure and the characteristics of the exporting industry.

1.1 Research problem

The central research problem is to determine whether and how EU non-tariff measures are associated with India's sectoral export performance, after accounting for tariffs, market demand, exchange rates, production capacity, and other determinants of trade.

The study treats NTMs as heterogeneous regulatory instruments rather than as a single undifferentiated barrier. It distinguishes measures that generate direct compliance costs from measures that may facilitate trade through common standards, product assurance, and improved information.

1.2 Research objectives

The objectives of the study are:

1. To examine the pattern of India's sectoral exports to the European Union.
2. To identify the principal categories of NTMs relevant to selected Indian export sectors.
3. To estimate the relationship between NTM exposure and sectoral export values and growth.
4. To investigate whether NTM effects vary across agricultural, food-processing, pharmaceutical, textile, chemical, and engineering sectors.
5. To develop policy recommendations for strengthening Indian exporters' regulatory compliance and international competitiveness.

1.3 Research questions

The study addresses the following questions:

- What is the relationship between EU NTM exposure and India's sectoral export performance?
- Are SPS measures and TBT-related requirements associated with different export outcomes?
- Do regulatory effects differ between agricultural products and manufactured goods?
- Are smaller or compliance-intensive export sectors likely to face greater adjustment costs?
- What policy interventions could help Indian exporters meet EU requirements without unnecessarily increasing trade costs?

1.4 Research contribution

The proposed contribution lies in combining sectoral trade data with disaggregated regulatory indicators in a gravity-based empirical framework. Rather than assuming that all NTMs restrict trade, the study recognises that their effects may depend on regulatory design, implementation, sectoral characteristics, and exporters' capacity to comply.

The analysis also seeks to distinguish between the extensive margin—whether India exports a product to the EU—and the intensive margin—how much India exports when trade occurs. This distinction is important because high fixed compliance costs may prevent smaller firms or product categories from entering the market, while variable costs may reduce the value of established exports.

2. Review of Literature

2.1 Concept and classification of non-tariff measures

The United Nations Conference on Trade and Development (UNCTAD) classifies NTMs as policy measures other than ordinary customs tariffs that can potentially affect international trade in goods. NTMs include technical regulations, conformity-assessment procedures, SPS measures, quotas, licensing requirements, trade remedies, and other regulatory or administrative instruments.

The existence of an NTM does not automatically imply protectionism or an economically harmful trade restriction. Measures relating to food safety, public health, environmental protection, and product quality can correct market failures and improve social welfare. Their trade effects depend on whether the measure is proportionate to its objective, transparently administered, scientifically justified where relevant, and achievable at reasonable compliance cost.

For empirical research, NTMs must be distinguished from non-tariff barriers. An NTM is a policy measure; a non-tariff barrier generally refers to a measure or implementation practice that unnecessarily obstructs trade. Treating every regulation as a barrier would risk overstating the negative effects of legitimate public policy.

2.2 NTMs and international trade costs

The theoretical relationship between NTMs and trade is ambiguous. Regulations may increase the cost of exporting through testing, certification, documentation, adaptation of production processes, and border delays. These expenses may be especially burdensome when firms must comply with multiple overlapping requirements or repeat procedures for different destination markets.

Fixed compliance costs may reduce the number of exporting firms and product varieties. Variable compliance costs may increase marginal production costs and reduce export volumes. The effect may be stronger for smaller enterprises because fixed costs represent a larger proportion of their total operating expenses.

However, standards can also support trade by improving interoperability, product reliability, and consumer confidence. If compliance demonstrates quality or safety, exporters may benefit from greater demand or access to premium market segments. The net effect therefore depends on the balance between compliance costs and demand-enhancing benefits.

2.3 Evidence from the literature

Anderson and van Wincoop (2004) establish the importance of trade costs in explaining international trade patterns. Their analysis provides a theoretical foundation for examining regulatory measures as one component of the broader costs associated with cross-border exchange.

Disdier, Fontagné, and Mimouni (2008) examine the effects of SPS and TBT measures on agricultural and food trade. Their work demonstrates the importance of investigating regulatory effects across products and importing markets rather than assuming that standards have identical consequences in all circumstances.

Kee, Nicita, and Olarreaga (2009) develop indicators of trade restrictiveness that help quantify the effects of policy measures beyond conventional tariffs. Their approach supports the use of carefully constructed indicators rather

than unweighted counts alone.

Cadot and Gourdon (2016) investigate the prevalence and trade effects of NTMs and highlight the need to distinguish between measures, products, and policy objectives. Their work is relevant to studies seeking to identify how regulatory requirements affect trade costs and market access.

UNCTAD (2013) provides a comprehensive framework for classifying NTMs and emphasises the importance of consistent definitions and transparent measurement. This classification is particularly useful for matching regulatory measures to sector-level trade data.

WTO (2012) discusses the relationship between trade policy, regulatory objectives, and international economic integration. The analysis underscores the importance of balancing legitimate public policy goals with the avoidance of unnecessary restrictions on international trade.

2.4 Research gap

Three gaps motivate the proposed investigation.

First, aggregate trade analysis can conceal differences between agricultural products, processed foods, pharmaceuticals, textiles, chemicals, and engineering goods. Sectoral analysis is needed to identify which industries are most exposed to particular categories of regulation.

Second, simple NTM frequency measures may not capture the economic intensity of regulatory requirements. A product subject to several routine technical requirements may face a different burden from a product subject to a single costly certification or testing procedure. Frequency, coverage, and intensity indicators should therefore be interpreted separately.

Third, empirical analysis of India's exports to the EU must account for the possibility of reverse causality, omitted variables, and common economic shocks. A negative correlation between NTM exposure and exports does not, by itself, demonstrate that the measures caused exports to decline.

This paper addresses these gaps through a proposed sectoral panel framework that incorporates disaggregated NTM categories, standard trade controls, fixed effects, and robustness tests.

3. Theoretical Framework

The study combines trade-cost theory, heterogeneous-firm trade theory, and the economics of regulatory standards.

3.1 Trade-cost mechanism

In a standard trade framework, bilateral exports depend on the relative attractiveness of the destination market and the costs of supplying it. NTMs can raise those costs through certification, testing, product adaptation, documentation, and delays.

A simplified representation is:

[X_{s,t}=f(Y_{EU,t},C_{s,t},T_{s,t},N_{s,t},Z_{s,t})]

where:

- (X_{s,t}) = Indian exports in sector (s) to the EU in year (t);
- (Y_{EU,t}) = EU market demand;
- (C_{s,t}) = production and trade costs;
- (T_{s,t}) = applicable tariffs;
- (N_{s,t}) = NTM exposure;
- (Z_{s,t}) = other determinants of export performance.

The expected effect of NTMs on exports is ambiguous because higher compliance costs may reduce supply while improved quality assurance may stimulate demand.

3.2 Heterogeneous-firm mechanism

The heterogeneous-firm perspective recognises that firms differ in productivity, financial resources, technological capabilities, and access to information. When compliance requires substantial fixed expenditure, only firms with sufficient productivity or financial capacity may find EU market entry profitable.

This mechanism predicts that NTMs may have stronger effects on market entry and product variety than on the export values of established, highly productive firms. Sectoral data can help examine this possibility, although firm-level data would be needed to identify the mechanism directly.

3.3 Regulatory-quality mechanism

Regulatory requirements can improve product credibility and reduce information asymmetries. Standards that are transparent, predictable, and internationally aligned may help compliant exporters differentiate their products and gain access to higher-value markets.

Consequently, the effect of an NTM may depend on its type, implementation, and the exporting sector's existing capacity. The empirical analysis should therefore avoid imposing a uniformly negative effect on all NTM categories.

3.4 Conceptual model

The proposed relationship is represented as follows:

EU non-tariff measures → Compliance costs and regulatory adaptation → India's sectoral export performance

The relationship is conditioned by:

- Sectoral characteristics and product sensitivity.
- Exporters' technological and quality-management capabilities.
- EU market demand and consumer preferences.
- Applied tariffs and exchange-rate movements.
- Regulatory transparency and availability of testing infrastructure.

A complementary pathway is possible:

Clear and credible standards → Improved quality assurance and consumer confidence → Potential improvement in export performance

The empirical framework should accommodate both pathways.

4. Research Hypotheses

The following hypotheses are proposed for statistical testing.

H1: Greater exposure to trade-cost-increasing NTMs is associated with lower Indian export values to the EU, after controlling for relevant economic and sectoral factors.

H2: The relationship between NTM exposure and export performance differs significantly across sectors.

H3: SPS measures are associated with different export outcomes from TBT measures, particularly when comparing agricultural and food products with manufactured goods.

H4: The relationship between NTM exposure and export performance differs between the extensive margin of trade and the intensive margin of trade.

H5: The association between NTMs and export performance depends on sectoral compliance capacity and regulatory preparedness.

H5 is best tested using information on certification capacity, firm size, technology adoption, or other suitable sectoral indicators. Without such data, the analysis can investigate sectoral differences but cannot directly establish the underlying firm-level mechanism.

5. Research Methodology

5.1 Research design

The study adopts a quantitative, explanatory research design based on secondary data. It proposes a sector-year panel covering Indian exports to the EU, with disaggregation at the HS product level where feasible.

A preferred sample period is 2010–2024, subject to the availability and consistency of trade and regulatory data. The period allows examination of changes over time, although the final start and end years should be determined after assessing data completeness and classification compatibility.

The primary unit of analysis is the sector-year observation. A more detailed HS product-year dataset is preferable because NTM coverage varies across products within the same sector.

5.2 Sources of data

The proposed study uses the following sources.

Table-1

The data sources must be checked for coverage, reporting conventions, missing observations, and revisions. The final paper should state the precise extraction dates, HS classification, EU membership definition, currency, and treatment of missing values.

5.3 Dependent variables

The main dependent variable is the value of Indian exports to the EU in sector (s) and year (t), measured in current US dollars or another consistently defined currency.

Additional outcomes include:

1. Annual export growth.
2. India’s share of total EU imports in each sector.
3. The number of HS product lines exported from India to the EU.
4. The extensive margin, measured by whether positive exports occur.
5. The intensive margin, measured by export value conditional on positive trade.

Export growth should not be calculated mechanically where the previous year's export value is zero. Appropriate alternatives include a separate entry indicator or a log-difference measure defined only for positive observations.

5.4 Independent variables

The principal explanatory variables are NTM indicators.

NTM frequency index: The proportion of relevant HS product lines subject to at least one identified NTM.

NTM coverage ratio: The share of sectoral import or export value associated with products subject to one or more NTMs, depending on the precise construction and denominator.

SPS exposure: A product-level or sector-level indicator of exposure to sanitary and phytosanitary measures.

TBT exposure: A product-level or sector-level indicator of exposure to technical regulations and conformity-

assessment requirements.

Frequency and coverage ratios are descriptive measures of regulatory exposure, not direct estimates of the cost or restrictiveness of regulation. Where possible, they should be supplemented with measure-specific indicators, implementation dates, or estimates of ad valorem equivalents.

5.5 Control variables

The model should include controls for:

- Applied tariffs relevant to Indian exports.
- EU aggregate demand or sectoral import demand.
- India's production capacity or sectoral output.
- Exchange-rate movements.
- Major disruptions to trade and supply chains.
- Relevant sector-specific shocks.

Care is required when constructing these variables. For example, EU sectoral imports that include imports from India are partly determined by the dependent variable. A leave-India-out measure of EU import demand may reduce this mechanical relationship. Sectoral production and exchange-rate data should be aligned with the frequency and definitions of the trade observations.

5.6 Econometric specification

A baseline panel specification is:

[\begin{aligned}
\ln(1+X_{s,t})={}&\alpha+\beta_1 NTM_{s,t}
+\beta_2 Tariff_{s,t}\
&+\beta_3 Demand_{s,t}
+\beta_4 FX_t+\mu_s+\lambda_t+\varepsilon_{s,t}
\end{aligned}]

where:

- (X_{s,t}) represents India's exports to the EU in sector (s) and year (t);
- (NTM_{s,t}) denotes the selected NTM indicator;
- (Tariff_{s,t}) is the applied tariff measure;
- (Demand_{s,t}) captures EU import demand;
- (FX_t) represents the relevant exchange-rate measure;
- (\mu_s) denotes sector fixed effects;
- (\lambda_t) denotes year fixed effects;
- (\varepsilon_{s,t}) is the error term.

The transformation (\ln(1+X)) accommodates zero observations but can complicate interpretation and may behave poorly across sectors with very different export scales. A Poisson pseudo-maximum-likelihood (PPML) model is therefore recommended as the principal estimator when the dataset is constructed from trade values and includes zero flows.

A practical sectoral PPML specification is:

[E[X_{s,t}\midZ_{s,t}]

=\exp\left(
\beta_1NTM_{s,t}
+\beta_2Tariff_{s,t}
+\beta_3Demand_{s,t}
+\mu_s+\lambda_t
\right)]

The coefficient on a continuous NTM indicator represents a conditional semi-elasticity in the specified log-link model. If the explanatory variable is binary, the percentage association can be calculated as (100[\exp(\beta_1)-1]), subject to the model specification and interpretation of the conditional mean.

Year fixed effects absorb shocks common to all sectors in a year. They also absorb any national-level variable that varies only over time, such as a single annual exchange rate. Therefore, the exchange-rate coefficient cannot be estimated separately alongside a full set of year fixed effects unless exchange-rate exposure varies across sectors or you use an alternative specification.

5.7 Structural gravity extension

A more comprehensive analysis can use product-level bilateral trade data across India's EU destinations and comparator exporters. This enables the inclusion of exporter-year, importer-year, and product fixed effects, as appropriate to the data structure, and better controls for multilateral resistance and common demand shocks.

The structural gravity extension is preferable for causal interpretation because it can compare changes in India–EU trade with changes in other bilateral trade relationships. However, the specification must be tailored to the available variation: highly saturated fixed effects can absorb the NTM indicator if it does not vary within the relevant comparison groups.

5.8 Sectoral classification

Table-2

Sector	**Potentially Relevant Regulatory Exposure**	**Proposed Outcome Measures**
Agriculture and food products	SPS measures, residue limits, inspection, traceability, labelling	Export value, growth, product entry
Pharmaceuticals	Quality standards, manufacturing compliance, product authorisation	Export value, market share, product coverage
Textiles and apparel	Chemical restrictions, product safety, labelling, sustainability-related requirements	Export growth, market share, product variety
Chemicals	Technical specifications, hazard communication, registration and conformity requirements	Export value, growth
Engineering goods and machinery	Technical standards, product safety, testing and conformity assessment	Export value, product entry
Processed foods	Food safety, ingredient and labelling requirements, traceability	Export value, growth, market share

The study should classify products using a documented HS-to-sector concordance. The study presents a feasible sectoral framework below.

Sector	Potentially relevant regulatory exposure	Proposed outcome measures

These categories are a research design, not evidence that each listed measure applies to every product in the sector. The relevant legal instruments and product coverage must be verified for the period studied.

5.9 Robustness checks

The analysis should include the following checks:

1. Replace the NTM frequency index with the coverage ratio and separate SPS and TBT indicators.
2. Estimate alternative models for export values and export growth.
3. Use PPML for trade values, including zero observations, and compare results with appropriate log-linear specifications.
4. Test whether findings depend on the selected period, including sensitivity to exceptional trade disruptions.
5. Examine sector-specific effects and, where possible, HS product-level estimates.
6. Cluster standard errors at a level consistent with the treatment variation and panel structure. With few sectors, conventional cluster-robust inference may be unreliable; suitable small-sample corrections or alternative aggregation may be required.
7. Investigate endogeneity through policy timing, lagged indicators, comparator countries, or credible quasi-experimental designs where the data support them.

A lagged NTM indicator can help examine timing but does not by itself resolve endogeneity. Similarly, a causal claim based on a difference-in-differences design requires a defensible comparison group, a clearly defined treatment, and evidence supporting the parallel-trends assumption.

6. Sectoral Analysis and Expected Relationships

This section identifies sectoral mechanisms and testable expectations. It does not present these expectations as estimated findings.

6.1 Agriculture and food products

Agricultural and food exports can be sensitive to SPS requirements, residue limits, inspections, traceability, and certification. These requirements may impose additional costs where exporters need specialised testing facilities, rapid documentation, or changes in production and handling.

The effect may be particularly important for perishable goods, for which delays can reduce product quality and increase losses. At the same time, compliance can improve product safety and credibility, potentially strengthening access to premium markets.

The empirical analysis should therefore investigate whether higher SPS exposure is associated with lower export values or reduced product entry, while distinguishing regulatory exposure from the underlying quality and risk characteristics that may have prompted the measures.

6.2 Pharmaceuticals

Pharmaceutical exports may be influenced by stringent requirements relating to manufacturing quality, product authorisation, inspection, and documentation. Compliance can require substantial investment in quality systems, technical expertise, and regulatory management.

However, such requirements may also support product reliability and international acceptance. The net effect may therefore depend on exporters' existing capabilities, the specific regulatory procedure, and whether requirements are predictable and transparent.

For this sector, a simple count of regulations may be insufficient. The study should distinguish product-specific authorisation requirements from broader manufacturing and quality obligations wherever the data permit.

6.3 Textiles and apparel

Textile and apparel exporters may encounter product-safety rules, chemical restrictions, labelling requirements, and sustainability-related expectations. Meeting these requirements may involve testing, traceability, supplier monitoring, and production-process adjustments.

Larger firms with established compliance systems may be better placed to absorb such costs than smaller manufacturers. Nevertheless, the relationship must be examined empirically because improvements in product quality and sustainability performance may also enhance competitiveness.

The analysis should avoid treating voluntary sustainability schemes and mandatory EU legal requirements as equivalent. Each should be identified separately.

6.4 Chemicals

Chemical exports can be affected by product-specific safety, hazard communication, registration, and conformity requirements. Compliance costs may include documentation, testing, data management, and changes in product formulation or handling.

The strength of the effect is likely to vary by chemical category and the precise legal obligations applicable during the observation period. Sector-wide NTM indicators may consequently conceal substantial differences among products.

6.5 Engineering goods and machinery

Engineering goods may be subject to technical standards, product-safety obligations, testing, and conformity-assessment requirements. These measures can increase entry costs, especially for manufacturers unfamiliar with EU requirements.

On the other hand, compliance with recognised standards can demonstrate reliability and facilitate access to industrial supply chains. The study should investigate whether the relationship between regulatory exposure and exports varies with the technological and quality-management characteristics of the sector.

6.6 Cross-sector comparison

A comparative analysis should establish whether the association between NTMs and exports is concentrated in particular regulatory categories or appears more broadly across sectors. It should also test whether differences remain after controlling for tariffs, demand, and common shocks.

The analysis should report sector-specific estimates with confidence intervals rather than relying exclusively on statistical significance. Economic magnitude, robustness, and consistency across alternative measures are equally important.

7. Results and Discussion: Empirical Reporting Framework

This section must be completed after the sectoral trade dataset has been assembled and the models have been estimated. No numerical results are asserted in this draft.

7.1 Descriptive statistics

The first stage should report annual export values, export growth, product counts, NTM frequency, NTM coverage, and applied tariffs for each selected sector.

The descriptive analysis should identify whether sectoral export patterns move alongside changes in regulatory exposure. Such patterns are useful for developing hypotheses but cannot establish causal effects.

7.2 Baseline regression results

The baseline regression table should report the coefficient on the principal NTM indicator, its standard error, confidence interval, sample size, fixed effects, and model fit or relevant specification diagnostics.

The coefficient should be interpreted in relation to the measurement scale. For example, a coefficient estimated

using a 0–1 NTM coverage ratio is not directly comparable with one estimated using a 0–100 percentage scale unless the scaling difference is accounted for.

7.3 Sectoral heterogeneity

Sectoral estimates should be used to assess whether the relationship differs between agricultural products and manufactured goods. Interaction terms between NTM indicators and sector categories can test whether associations vary systematically across industries.

A statistically significant negative coefficient in one sector and an insignificant coefficient in another does not, on its own, establish that the coefficients differ significantly. A formal test of coefficient equality is required.

7.4 Robustness and interpretation

Results should be compared across alternative NTM measures, model specifications, and sample periods. If the direction and approximate magnitude remain stable, the findings can be described as robust associations within the tested specifications.

Causal language should be used only if the empirical design supports causal identification. Otherwise, the conclusions should refer to conditional associations between NTM exposure and export performance.

7.5 Suggested regression-results table

Table-3

Variable	Model 1: Baseline	Model 2: SPS	Model 3: TBT
NTM indicator	To estimate	—	—
SPS indicator	—	To estimate	—
TBT indicator	—	—	To estimate
Applied tariff	To estimate	To estimate	To estimate
EU import demand	To estimate	To estimate	To estimate
Sector fixed effects	Yes/No	Yes/No	Yes/No
Year fixed effects	Yes/No	Yes/No	Yes/No
Observations	To calculate	To calculate	To calculate
Standard errors	To report	To report	To report

The final table should replace every placeholder with actual estimates or an explicit explanation of why a variable or specification could not be estimated.

8. Policy Implications

8.1 Strengthening regulatory intelligence

Indian exporters require timely, product-specific information about EU regulations, certification requirements, labelling obligations, and changes in applicable standards. Export-promotion institutions and industry associations could develop accessible regulatory information services that link HS codes with relevant EU requirements.

Such services should distinguish mandatory legal obligations from voluntary certification schemes and private buyer requirements.

8.2 Improving testing and certification infrastructure

Investment in internationally recognised laboratories, testing facilities, calibration services, and conformity-assessment capacity could help reduce delays and duplicated compliance expenditure. Better coordination between testing institutions and export-oriented industries may be particularly useful for products requiring

specialised testing.

8.3 Supporting small and medium-sized enterprises

Smaller exporters may face proportionately higher fixed compliance costs. Targeted support could include technical assistance, shared testing facilities, regulatory training, digital documentation tools, and financial support for qualifying compliance investments.

The effectiveness of these interventions should be assessed through measurable outcomes, including reduced certification delays, increased product entry, and improved export continuity.

8.4 Promoting regulatory cooperation

India and the EU could pursue technical dialogue on transparency, notification practices, standards cooperation, conformity assessment, and the avoidance of unnecessary duplication. Mutual recognition or equivalence arrangements should be pursued only where technically justified and consistent with applicable legal obligations.

8.5 Integrating compliance into export strategy

Export competitiveness depends increasingly on the capacity to demonstrate product quality, traceability, safety, and environmental performance. Indian firms may benefit from integrating regulatory monitoring and compliance planning into product development, supplier management, and export-market selection.

Public support should focus on reducing unnecessary procedural costs and improving exporters' capabilities, rather than weakening legitimate consumer-protection or environmental standards.

8.6 Sector-specific policy support

Agricultural exporters may benefit from stronger residue-testing and traceability systems. Pharmaceutical firms may require specialised regulatory expertise and quality-management support. Textile exporters may benefit from chemical-management and supply-chain documentation capabilities. Engineering and chemical exporters may require accessible technical guidance and efficient conformity-assessment services.

These are policy priorities to evaluate, not interventions whose effects have already been demonstrated by the proposed model.

9. Limitations of the Study

The proposed analysis has several limitations.

First, NTM databases may record the existence or coverage of a measure without quantifying its actual compliance cost. Frequency and coverage indices should therefore not be interpreted as direct measures of restrictiveness.

Second, sectoral aggregation can conceal differences among products and firms. HS product-level analysis is preferable, but even product-level trade data cannot reveal firm productivity, financial constraints, or the precise costs incurred by individual exporters.

Third, regulatory measures may be endogenous to trade patterns. Authorities may introduce or intensify controls in response to safety concerns, import growth, or changes in product composition. Fixed effects and conventional controls cannot automatically eliminate this problem.

Fourth, trade values may change because of prices, quantities, product quality, or exchange-rate movements. Where possible, the analysis should examine quantities and unit values alongside nominal export values.

Fifth, the EU's regulatory environment evolves over time. The empirical dataset must match measures to their applicable dates and distinguish mandatory requirements from voluntary schemes and private standards.

Finally, conclusions from the selected sectors and period may not generalise to all Indian exports or to other destination markets.

10. Conclusion

Non-tariff measures are an important component of the market-access conditions facing Indian exporters in the

European Union. Their implications extend beyond the formal existence of regulations to the costs of testing, certification, documentation, product adaptation, traceability, and conformity assessment. At the same time, appropriate and transparent standards may improve product quality, consumer confidence, and access to higher-value markets.

This paper develops a sectoral empirical framework to assess the relationship between NTM exposure and India's export performance. It proposes combining disaggregated trade data with NTM indicators, tariff measures, market-demand controls, and sectoral and year fixed effects. PPML estimation, sectoral interactions, alternative NTM measures, and appropriate robustness checks are recommended to improve the reliability of the analysis.

The principal empirical question is not whether all NTMs are harmful, but which measures are associated with higher trade costs, which sectors are most exposed, and under what conditions compliance can be converted into a competitive advantage. Answering that question requires careful measurement and transparent statistical estimation.

For Indian trade policy, the analysis highlights the importance of regulatory intelligence, testing infrastructure, export-oriented technical assistance, and constructive regulatory cooperation with the EU. For firms, it underscores the strategic value of integrating compliance capabilities into production and export planning.

The final empirical conclusions must be based on estimated sectoral trade models. Once these estimates are available, the study can identify the regulatory categories and sectors most strongly associated with export outcomes and provide a more precise evidence base for improving India's competitiveness in the EU market.

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