The RoDTEP Effect: Institutional Transitions in Export Tax Rebate and Exports from India

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December 2025

Please cite this article as:

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December 23, 2025

Abstract

In the context of global supply chain realignment and the resurgence of protectionist trade policies, many countries are pursuing institutional transitions aimed at strengthening the competitiveness of domestic firms. Our study examines such a transition in India, focusing on the implementation of the Remission of Duties and Taxes on Exported Products (RoDTEP) scheme in 2021. We conceptualise RoDTEP as a significant institutional transition in the export incentive framework, shaped by a continuous sequence of amendments since its initial rollout, with each amendment redefining the range of products covered under the scheme and adjusting the applicable export tax rebate rates. Using firm level data on 2796 unique firms from the Annual Survey of Industries database from periods 2021–2022 and 2022–2023, we investigate whether export tax rebates influence firm-level export performance during a period of institutional transition. We find that intermediate export subsidy rates are strongly associated with higher firm export shares, while lower and higher subsidy rates have weaker effects. We further show that subsidy effectiveness varies sharply across states and declines with export infrastructure quality, indicating that subsidies act as substitutes for, rather than complements to, local export infrastructure.

1   Introduction

With seismic shifts in the global supply chains and protectionist policies gaining traction, nations are strategically reforming their institutions to both enhance the competitiveness of their domestic firms and adapt to the changing global trade order. This study investigates the impact of export tax rebate on firm export performance during a period of institutional transition using the context of introduction and subsequent changes in export tax rebate rates under the Remission of Duties and Taxes on Exported Products (RoDTEP) policy.

Export tax rebates in the study involve refunding the taxes and duties at the cen-

policy amendments that have systematically altered the scope and rates of export tax rebate rates since the policy's initial rollout.

We posit that the institutional transition in the export tax rebate rates presents a paradox for firms. On the one hand, the expanded scope and potentially higher rebate rates should incentivise firms to increase their export intensity. This aligns with a rational-choice perspective where managers adapt to and capitalise on more favourable policy conditions. On the other hand, the continuous policy changes could generate significant strategic uncertainty and impose substantial transition costs on firms. In this context, managers may adopt a wait-and-see approach, delaying or even forgoing internationalisation initiatives to mitigate perceived downside risk. Our study, therefore, aims to test which of these two competing responses, leveraging the institutional transition or reacting to the transition costs, is dominant. The central research question of the study is to determine how the export tax rebate influences firm-level export performance during the institutional transition marked by the introduction and amendments of India's RoDTEP scheme. We investigate which of two competing effects dominates in an emerging market context: whether firms leverage the expanded scope and higher rebate rates to increase their export intensity, or whether the strategic uncertainty and transition costs from continuous policy changes lead them to delay internationalization or decrease exports.

This paper studies the relationship between export subsidy policies and firm-level export intensity in India, with a particular focus on how local conditions shape policy effectiveness. Using repeated cross-sectional data on single-product manufacturing firms, we examine whether exposure to different subsidy rate categories is associated with higher export shares and whether these relationships vary across states. The analysis has three main objectives. First, we document the average association between subsidy intensity and export performance using pooled regressions. Second, we assess the extent of state-level heterogeneity in subsidy effects to determine whether national averages mask meaningful local variation. Third, we investigate whether dif-

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ferences in export infrastructure help explain this heterogeneity by interacting subsidy rates with a state-level export infrastructure index. Together, these objectives aim to shed light on when and where export subsidies are most effective and to inform the design of place-sensitive trade and industrial policies.

The remainder of the paper is organised as follows: Section Section 2 provides a review of existing literature; Section 3 provides the theoretical perspective and develops the hypothesis; Section 4 describes our data; Section 5 discusses the empirical specifications; Section 6 presents our results; Section 7 concludes.

2   Literature Review

Institutional theory has long served as a foundational framework for understanding firm behavior. According to Scott (2013), institutions comprise "regulative, normative, and cognitive structures and activities that provide stability and meaning to social behavior," encompassing elements such as laws, regulations, and cultural norms. Meyer and Peng (2016) further emphasize that institutional frameworks shape the incentives faced by economic actors through their influence on uncertainty, agency relationships, business transactions, and market structures. At its core, institutional theory suggests that firms' strategic actions are driven not solely by efficiency or goal attainment, but also by broader institutional pressures and social expectations (Nayyar and Prashantham, 2020; Peng et al., 2017). In this context, firm-level export intensity can be understood as a strategic outcome shaped by such institutional incentives and constraints. Policies like export tax rebates represent regulative institutions designed to influence firm behavior—encouraging greater participation in international markets and enhancing firms' export performance. Thus, institutional theory provides a framework to examine how export-oriented government policies translate into firm-level outcomes such as export intensity.

A stream of IB research focused on how host country institutions matter in inward

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internationalisation of foreign entrants (Chacar et al., 2010; HolmesJr. et al., 2013; Luo and Peng, 1999; Meyer et al., 2009). These studies suggest that institutional factors, such as the quality of regulatory institutions, political stability, and the rule of law, determine how MNEs select host markets, structure entry modes, and manage operations abroad. A well-functioning host institutional environment reduces transaction costs and increases efficiencies in supply chains for foreign firms. However, this traditional host-centric view largely relates to internationalisation of firms from developed markets and does not fully account for the role of firms from emerging markets, whose internationalisation patterns may be shaped more by their home institutional contexts than by the characteristics of their host countries.

As emerging market firms have increasingly engaged in outward internationalisation in recent times, a strand of literature has emerged on understanding how the home country institutional environment is a critical determinant of such internationalisation (Barnard and Luiz, 2018; Fathallah et al., 2018; Gaur et al., 2018; Luo and Tung, 2007; Witt and Lewin, 2007). Such an evaluation is necessary, as emerging markets exhibit varying degrees of institutional maturity; while some have undergone significant institutional reforms, others continue to experience underdeveloped governance systems (Cuervo-Cazurra et al., 2018).

Two competing theoretical frameworks; institutional leverage and institutional escapism are used to explain how home-country institutions affect internationalization decisions of firms from emerging markets.

The institutional leverage perspective posits that firms can strategically capitalize on institutional support and advantages available in their home environment to facilitate their international expansion (Cuervo-Cazurra and Genc, 2008; Landau et al., 2016; Yan et al., 2018). This view suggests that proximity to political actors, preferential access to resources, and favorable government policies provide firms with unique competitive advantages abroad. For example, state-backed firms may benefit from access to low-cost financing, raw materials and export incentives such as tax rebates,

that enhance their international competitiveness (Buckley et al., 2007; Cui and Jiang, 2010; Rui and Yip, 2008). From this perspective, government intervention can act as a positive "push factor" encouraging firms to globalise. Our study corresponds to the institutional leverage perspective by examining how government export rebate schemes, specifically RoDTEP serve as institutional instruments that incentivize firms to increase their export intensity.

Government policies constitute a significant channel through which the state can shape firm behaviour, serving as institutional mechanisms that help mitigate the competitive disadvantages faced by emerging market enterprises (Luo et al., 2010; ?). Export tax rebate programs, as a form of policy-driven institutional support, exemplify this mechanism by lowering firms' financial burdens, improving liquidity, and enhancing their capacity to compete internationally. In our study, RoDTEP comprises a case study of government policy that conforms to the institutional leverage perspective.

Additionally, most internationalisation research assumes institutional homogeneity within nations. However, recent studies challenge this assumption, emphasising significant within-country institutional variations (Gao et al., 2010; Ma et al., 2013; Meyer and Nguyen, 2005). In emerging economies, subnational regions vary significantly in terms of institutional quality, regulatory enforcement, and access to resources. These differences shape firms' internationalisation capacity by influencing their ability to obtain information, financing, and government support.

Consequently, firms' internationalisation decisions are not determined solely by national institutions but by multi-level institutional dynamics spanning firm, industry, and regional levels. Recognising such heterogeneity enriches the understanding of how institutions shape firm strategies, moving the discussion beyond the question of whether "the state matters" to how specific institutional configurations differentially affect firms' global expansion. Our study contributes to this stream of literature by examining the moderating role of sub-national institutions on the effect of export tax

rebates on export intensity of firms from emerging markets.

3 Theory and Hypothesis

3.1 Subsidies and Exports

A growing body of evidence suggests that internationalization benefits firms, particularly in emerging markets. Among the different modes of internationalization, exporting has been the most popular (Aulakh et al., 2000; Leonidou and Katsikeas, 2010; Gao et al., 2010). This is reflected by firms with more export share associated with more organizational learning (Bratti and Felice, 2012; Lileeva and Trefler, 2010; Salomon and Jin, 2010), higher product quality (Verhoogen, 2008; Atkin et al., 2017; Bastos et al., 2018; Hansen et al., 2022), enhanced productivity (De Loecker, 2007; Atkin et al., 2017; Garcia-Marin and Voigtländer, 2019) , encouraging technology adoption (Lileeva and Trefler, 2010; Bustos, 2011), increased wages (Verhoogen, 2008; Brambilla et al., 2012; Frías et al., 2024) and better working conditions (Tanaka, 2020).

There is a competing line of argument that, relative to domestic business activities, firms associate exporting with heightened levels of risk. The reliance on foreign distribution networks in international markets subjects exporters to a range of uncertainties, including protracted transaction durations (Nguyen and Almodóvar, 2018), fluctuations in exchange rates (Dennis and Shepherd, 2011; Martínez-Zarzoso and Johannsen, 2017), and exposure to exogenous shocks such as the COVID-19 pandemic. Moreover, divergences in language, institutional frameworks, and cultural norms between home and host countries generate additional transaction costs, particularly in relation to documentation requirements, customs duties, and cross-border communication (Agnihotri and Bhattacharya, 2015; Nguyen and Almodóvar, 2018).

To encourage firms to pursue internationalisation through exporting, home-country governments often provide export tax subsidies, or tax rebates to access export markets at tax-free prices to avoid double taxation, thereby promoting foreign trade, en-

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hancing their competitiveness in global markets, and increasing their share of exports (Juhász and Steinwender, 2024; Juhász et al., 2024). Standard trade theory, particularly the Heckscher-Ohlin model, highlights that such subsidies can lead to distortions in trade patterns, resulting in inefficient resource allocations. When subsidies alter the relative price of exports compared to domestic products, they may encourage over-production in subsidised sectors at the expense of others, leading to suboptimal outcomes for the economy as a whole (Bhagwati and Ramaswami, 1963). In contrast, Melitz (2003) presents a different perspective by emphasising the role of fixed costs associated with entering export markets. The Melitz (2003) model suggests that many firms, particularly those with lower productivity, face substantial barriers to entering international trade due to fixed costs. Thus, subsidies can be beneficial by assisting these firms to overcome initial challenges related to export entry. By reducing the cost burden, export subsidies can enable less productive firms to engage in exporting, which might not have occurred in their absence. (Ali et al., 2025).

The relevance of export subsidies to promote exporting performance is perhaps more important in emerging markets, which are likely to have less developed financial markets. As capital markets in emerging countries are less mature, firms' engagement in exporting activities is likely to be more severely affected by financial constraints relative to the exporting activity of firms in developed economies (Mateut, 2018). Therefore, assessing whether export subsidies effectively stimulate export activity becomes crucial in the context of firms in emerging markets.

3.2 Institutional transitions

In the international business field, the institution-based view (IBV) provides a framework to explain the role of subsidies in the exporting decision of a firm. IBV stresses that firm behaviours and strategies are subject to not only industrial and firm-level factors but also to the institutional framework surrounded by formal and informal rules (Peng et al., 2009), impacting export strategies. Studies find the role of home institu-

tions in explaining the export intensity to be larger in emerging markets (Peng et al., 2008). Export subsidies can be understood through the IBV as they reflect the interactions between firms and their regulatory institutions, where supportive government policies enhance firm competitiveness and facilitate internationalisation of firms from emerging markets (Mac and Evangelista, 2016).

Coordination failures are a type of institutional void that occurs in emerging markets when the necessary complementary assets for economic development, particularly export-led growth, cannot be effectively organised by either market or state institutions (Hoff and Stiglitz, 2000; Shapiro et al., 2024). This institutional gap often necessitates a more pronounced role for the state through industrial policy (Wade, 2018). Such an argument can be applied to the recent era of protectionism, where the existing institutional structures are insufficient to act as complementary assets to aid firms in exporting. In response, institutional environments are rapidly changing with a new wave of industrial policy, with home country governments in emerging markets changing the export subsidy policy to ensure international competitiveness (Signoret, 2024; Evenett et al., 2024). The recent introduction of India's RoDTEP scheme in 2021 constitutes a good example of institutional transition, as it fundamentally and comprehensively revised the formal rules governing export subsidies that affect firms' decisions concerning exports (Peng, 2003). RoDTEP rollout was not a one-off policy shift. Instead, it serves as a compelling case study of institutional transition, characterised by a scheduled series of amendments. These revisions systematically altered export subsidy rates, expanded the product coverage eligible for export subsidy, and, in specific cases, led to the removal of certain products from its purview. For this reason, the institutional transition perspective adopted in this study to evaluate the role of export subsidy in improving export share amid RoDTEP rollout in India becomes important. With the institutional transition of RoDTEP, with its expanded coverage of eligible products and increase in export tax rebate rates, one would expect a positive effect of RoDTEP rates on firm export intensity.

However, from an organisational and managerial perspective, this relationship may be more complex. Adjustment to a new institutional environment is not an instantaneous process; rather, it can introduce significant hurdles related to organisational learning and the management of strategic uncertainty (Newman, 2000). With institutional transition, firms may choose to withdraw or persist with existing practices instead of adapting (Aldous and Conroy, 2021; Kostova et al., 2008). Firms require not only historical data to estimate the potential returns of exporting more but also a high degree of confidence in the future validity of these estimates, which is contingent upon expectations regarding the stability of the institutional environment (Leymann and Lundan, 2023). More recent studies use the behavioural risk perspective to show that the managers' risk preferences affect the internationalisation decision of emerging economy firms (Panicker et al., 2019). In the context of the RoDTEP transition, frequent amendments to the formal rules and rebate rate structure may elevate perceived uncertainty. Firms may respond to this heightened downside risk by postponing significant internationalisation initiatives. This phenomenon aligns with the concept of transition cost that reflects the difficulties organisations face when adapting to comprehensive institutional shifts (Newman, 2000).

This study examines how firms respond to institutional transitions within India's RoDTEP export tax rebate framework. We investigate which of two competing hypotheses prevails: whether firms adapt to and leverage these transitions to increase their export intensity, or whether the higher transition costs associated with frequent policy amendments cause firms to decrease their export intensity or withdraw from exporting. The research aims to determine which of these behavioural responses dominates following changes in the institutional environment of export promotion.

Hypothesis 1: *The greater the export tax rebate under institutional transition, the higher a firm's export intensity*

3.3 Background to the Institutions governing Export Incentive Schemes in India

The landscape of export incentive schemes in India is ever-evolving. An institutional transition is underway, with export-focused policies becoming more consolidated yet broad-based. In 2015, multiple incentive schemes with varying conditionalities—such as the Focus Market Scheme (FMS), Focus Product Scheme (FPS), Vishesh Krishi Gramin Udyog Yojana (VKGUY), Market-Linked Focus Product Scheme (MLFPS), and the Agri Infrastructure Incentive Scheme—were replaced with a singular policy, the Merchandise Export Incentive Scheme (MEIS), which provided no-conditions rewards. MEIS functioned as an export subsidy scheme under which exporters, particularly in labour-intensive industries, were reimbursed 2, 3, or 5 percent of the FOB value of their exports in the form of credit scrips (DGFT, 2015). These could be used to pay customs duties, import goods, or be transferred.

In 2020, the United States initiated a dispute at the World Trade Organization (WTO) concerning the validity of MEIS. While the specifics of the WTO proceedings are not the focus here, the ruling compelled India to re-examine its promotion incentives, leading to the introduction of the Remission of Duties and Taxes on Exported Products (RoDTEP) scheme. RoDTEP marked a clear departure from MEIS. First, it was explicitly designed to comply with WTO regulations, premised on the principle that taxes and duties should not be exported. Whereas MEIS sought to offset costs of exporting goods manufactured in India, RoDTEP aimed to create a level playing field for Indian exporters in global markets by neutralising embedded domestic taxes (Press Information Bureau, 2020). Second, MEIS had a narrower scope in terms of sectors and eligible exporters, while RoDTEP encompassed a wider range. The transition from MEIS to RoDTEP also introduced digitalisation and automation, replacing physical scrips to reduce implementation hurdles and enhance ease of use.

Given its nature as a tool to improve cost competitiveness, support low-volume

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exports, and contribute to the broader economy, RoDTEP's coverage has been continuously modified since its launch. The initial schedule of 2021 covered around 8,500 unique products. This list was amended three times in 2022 alone. By the third amendment, total coverage expanded to 10,436 products. Amendments continue; for example, in 2023, 149 products were added and 52 deleted, with sectoral expansion in handlooms (Government of India, 2023). At the same time, exporters previously excluded due to participation in other schemes such as Advanced Authorisation and Special Economic Zones were subsequently allowed to benefit under this all-encompassing scheme (Government of India, 2024). For this study, the evolving scope of the RoDTEP scheme constitutes the institutional transition of interest.

3.4   Sub-national institutions

The Remission of Duties and Taxes on Exported Products (RoDTEP) scheme represents a significant institutional transition at the national level. However, the configuration of the rebate–export intensity nexus under such a transition is unlikely to be uniform across regions, as it may be conditioned by sub-national differences in institutional development. Some regions possess stronger market-supporting institutions than others, despite operating under the same national laws and regulations, largely because local authorities vary in how rigorously they enforce these rules. (Chen et al., 2015; Meyer and Nguyen, 2005; Shi et al., 2012). Such institutional differences between sub-national regions are particularly stronger in large emerging economies (Chan et al., 2010). This heterogeneity is particularly relevant in the Indian context, where a federal governance structure gives rise to substantial variation in the quality of state-level institutions (Shirodkar et al., 2024). We argue that the impact of the export tax rebate under the RoDTEP framework on export intensity is larger for firms situated in sub-national regions characterised by stronger institutional quality as compared to their counterparts with weaker institutions.

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Hypothesis 2: *The positive effect of export tax rebate on export intensity under institutional transition will vary across sub-national regions owing to differences in institutional quality.*

4 Data

Export tax rebate rates The Government of India announced the Remission of Duties and Taxes on Exported Products (RoDTEP) scheme through a press release on 13 March 2020. Product-level rebate rates were subsequently notified in August 2021, with applicability to exports made from 1 January 2021 [1]. The initial schedule of rates was later revised through three amendments. Amendment 1, notified on 11 May 2022, applied retrospectively from 1 January 2022 [2]. Amendment 2, notified on 1 June 2022, took effect from 1 May 2022 [3]. Amendment 3, notified on 7 December 2022, applied from 15 December 2022 [4]. These amendments entailed changes in rates, the inclusion of additional products, and, in limited instances, the removal of products from coverage. The first step involved constructing a consolidated dataset of rates; this required assembling and harmonizing the four notifications into a single schedule.

The RoDTEP scheme's first notification in 2021, notified product-level rates at the 8-digit ITC-HS 2017 level. In this classification, the first six digits correspond to HS 2017 codes, while the last two digits represent India-specific extensions. Subsequent amendments to the scheme were issued using the ITC-HS 2022 version, where the first six digits are aligned with HS 2022 codes.

As is standard in HS revisions, the transition from HS 2017 to HS 2022 increases product granularity (UNSD, nd). Consequently, a single HS 2017 code maps to one or multiple HS 2022 codes. To ensure comparability across rounds, each 2021 RoDTEP rate in HS 2017 was assigned to the corresponding HS 2022 codes. This harmonization allowed both the initial schedule and all subsequent amendments to be expressed

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[1]Government of India (2021)
[2]Government of India (2022a)
[3]Government of India (2022b)
[4]Government of India (2022c)

uniformly in HS 2022. Moreover, the removal of the India-specific extension to product codes—whereby the classification shifted from the 8-digit ITC-HS codes (with the last two digits reflecting national subclassifications) to the 6-digit HS codes—led to instances where the same product code had multiple entries. To ensure comparability, we computed the simple average of rates within each year–amendment–HS 6-digit combination, thereby generating a single rate at the HS 6-digit level.

Figure 1 presents a histogram of the distribution of the offered export tax rebate rates. The rates ranged from 0 to 4.3, with most of them being less than 1%. The average rate was 0.595% with a standard deviation of 0.771.

Figure 1: Distribution of rates
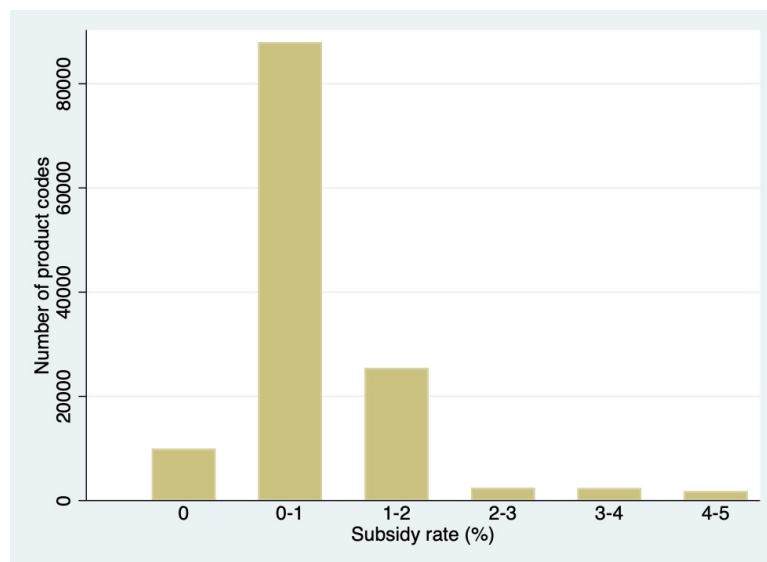
Manufacturing plant-level data To quantify our analysis, we utilise plant-level microdata obtained from the Annual Survey of Industries (ASI). ASI, launched in 1959, is the most comprehensive source of industrial statistics in India, released annually by the Ministry of Statistics and Programme Implementation (MoSPI). Firstly, its breadth of coverage is extensive. The nationwide survey follows an establishment-based approach, in contrast to an enterprise-based approach, using the factory as the primary unit of observation for the manufacturing sector (MoSPI, nd). The scope covers all factories registered under the Factories Act, 1948, defined as any premises employing 10

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or more workers using power, or 20 or more workers without power. The list of units is divided into two parts: Census and Sample. Census covers all units meeting fixed criteria, such as all units from less industrialised states and those above state-specific employment thresholds (50–100 employees). The Sample is drawn from the remaining units selected through Circular Systematic Sampling, wherein each stratum is defined by State × District × Sector × 3-digit Industry Code, and the sample weights ensure reliable national representativeness of the industrial sector.

Secondly, ASI provides significant depth of information for empirical research on Indian manufacturing. Variables on output, input, value added, wages, and fixed capital have been widely used to study productivity and misallocation (Hsieh and Klenow, 2009, 2014). Rich data on employment, such as the number of direct and contractual workers, mandays worked, and worker compensation, is extensively used, such as for labour regulations and reforms analysis (e.g., Besley and Burgess (2004)). Most importantly, ASI's repeated cross-sectional structure allows for a difference-in-differences empirical strategy, especially since the Census sector is surveyed annually, which makes for a balanced panel (e.g., Goswami and Paul (2020)). Further, ASI's detailed industry and product codes permit sector-specific studies of trade, industrial policy, and structural change (Topalova and Khandelwal, 2011), though careful concordance across Indian and international classification systems will be required.

Our study uses the share of products or by-products directly exported as the main dependent variable, which is defined as the ratio of the gross sale value of such exports to the total gross sale value. The gross sale value, in ASI, is reported as charged to customers and includes excise duty or GST paid by the factory, as well as all distributive expenses incurred. The other variables used as controls include net sales, capital stock, mandays worked, age of firm, ownership, intermediate goods imports, profit, value-added, wages, and expenses on R&D.

One of the greatest challenges in studying export-promotion policies in India is that product-level data across policies and datasets are reported using different clas-

sification systems. Several complications arise in making these systems comparable: (1) local classification systems often build upon international ones by adding country-specific extensions; (2) even when the same classification is in use, different iterations may appear across datasets and over time; (3) when different classification systems are in use, concordances are required; (4) depending on the iterations involved, direct concordances may not exist and must be imputed; and (5) multiple mappings, such as many-to-many correspondences, further complicate the exercise. As a result, harmonization across datasets is cumbersome and often not undertaken. A key contribution of this paper is the construction of a consistent mapping of RoDTEP product-level rates to ASI factory-level output data, enabling plant-level analysis of the policy.

ASI classifies output using the National Product Classification for the Manufacturing Sector (NPCMS), where the first five digits follow the CPC Version 2 international classification and the last two digits are India-specific extensions. To link RoDTEP rates with ASI data, we mapped HS product codes to CPC product codes using concordances from the UN Statistics Division (UNSD). Since UNSD provides both an HS 2022–HS 2007 concordance and an HS 2007–CPC V2 concordance, HS 2007 was used as the bridge. The HS 2022 to HS 2007 mapping is straightforward: one or more HS 2022 codes map to a single HS 2007 code, so rates were averaged to obtain one per HS 2007 code. The HS 2007 to CPC V2 mapping involves many-to-many correspondences; in these cases, all HS codes linked to a CPC code were averaged to generate a single RoDTEP rate per CPC code for every year-amendment level.

The reference period for each round of ASI is the financial year from April to March of the following year. There is a time lag between the reference period, the collection period, and the year of release. For example, in the latest round of ASI 2022-2023, data pertains to the financial year 1st April 2022 to 31st March 2023; it was collected between November 2023 and June 2024 and released in October 2024. In this study, we use two periods - ASI 2021-2022 and ASI 2022-23. We restrict our analysis to these two periods because RoDTEP's predecessor policy MEIS, an export-subsidy scheme, was

in effect till 2020, which would confound any pre-period assessment. Since the 2022 scheme amendments were notified at different points during the year, average rates are applied for 2022–23.

Table 1 presents the summary statistics of the firm level data from ASI. The average export share of firms in our sample was 55.76% with a standard deviation of 38.53. 38% of the firms were located in a rural location with an average 1.3 number of units. The average fixed assets turnover ration was 11.15, average capital intensity ratio was 0.003. The average number of mandays worked at the firms in our sample was about 77, and firms were on average 22 years old. 5.6% of the firms had some foreign ownership. Total imports were 138 million, labour productivity was 0.15 and 8.8% of firms had an R&D unit in the factory.

Table 1: Summary statistics

Variable	Mean	Std. Dev.
RoDTEP rate	.855	.583
Share(%) of products/by-products	55.756	38.534
Rural location	.38	.485
Number of units	1.299	.759
Fixed assets turnover ratio	11.147	39.113
Capital intensity ratio	.003	.048
Mandays worked	77.406	93.947
Age of firm	21.848	13.749
Any foreign ownership	.056	.23
Total imports	138.047	730.288
Labour productivity	.015	.018
Any R&D	.088	.283
N	2796	

NITI Aayog Export Preparedness Index   NITI Aayog[5], the successor to the Planning Commission of India, in collaboration with the Institute for Competitiveness[6],

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[5]NITI Aayog, translated as Policy Commission, stands for the National Institution for Transforming India, the foremost think tank of the Government of India tasked with policymaking in a bottom-up manner through cooperation with State Governments to catalyse economic development (NITI Aayog, nd).

[6]The Institute for Competitiveness is the Indian affiliate of Harvard Business School's Institute for Strategy and Competitiveness, which studies competition in relation to firm strategy, national and re-

launched an evaluation exercise of India's export landscape with a special focus on assessing the institutional readiness of sub-national economies to address the opportunities and obstacles of their export competitiveness. The index framework consists of four main dimensions: Policy (20%), Business Ecosystem (40%), Export Ecosystem (20%) and Export Performance (20%), with their respective weightages in brackets (Kapoor and Singh, 2023). Each of these four dimensions can be broken down into sub-pillars, each of which contains multiple indicators. The Policy pillar addresses the presence and implementation of state-specific export promotion policies. The second pillar, Business Ecosystem, assesses infrastructure quality, market access, capital availability, and regulatory simplicity of doing business. The Export Ecosystem pillar includes indicators related to export-oriented industrial clusters, trade facilitation and promotion services, regulatory and quality assurance agencies, and other factors crucial for promoting the competitiveness and productivity of export enterprises. Lastly, Export Performance is the only output-based pillar, measuring the growth and diversification of exports. For our purpose, we will focus on export ecosystem pillar and use that in understanding the importance of the state's export ecosystem in explaining state level differences in the effectiveness of the subsidy policy in Section 6.

5 Empirical Methodology

5.1 Identification Strategy

Our empirical specification exploits variation in subsidy rate categories across products, states, and survey years using repeated cross-sectional firm-level data. We estimate the following equation:

$$\text{ExportShare}_{ipst} = \sum_k \beta_k 1\{\text{RateCat}_{pt} = k\} + \alpha_s + \lambda_t + X_{ipst} + \varepsilon_{ipst}, \quad (1)$$

gional competitiveness, and society at large (Institute for Competitiveness, nd).

where i indexes firms, p products, s states, and t survey years. The outcome variable ExportShare$_{ipst}$ denotes the firm's overall export share. The main independent variables are categorical indicators for subsidy rate categories, which vary at the product–year level.

The analysis is restricted to single-product firms, which ensures a one-to-one mapping between a firm's export share and the subsidy rate applicable to its product. This restriction eliminates ambiguity in subsidy exposure that would otherwise arise in multi-product firms and substantially reduces measurement error in the treatment variable.

Identification relies on within-state, within-year variation in subsidy exposure across firms producing different products. State fixed effects α_s absorb time-invariant differences across states, including export infrastructure, institutions, geography, and persistent policy environments, while year fixed effects λ_t control for aggregate shocks and nationwide policy changes. As a result, the coefficients β_k are identified by comparing firms located in the same state and observed in the same survey year but exposed to different subsidy rate categories due to differences in their product classification.

Firm-level controls X_{ipst} include rural location, number of units, capital intensity ratio, man days employed, age of firm, whether the firm has any foreign ownership, firm's total imports, whether the firm has a research and development unit and finally, labour productivity as they are typically accepted as determinants of export performance in the literature (Bhavani and Tendulkar, 2001; Sterlacchini, 2001). A similar framework has been used in previous work exploring the relationship between subsidy and export performance (Girma et al., 2009). Standard errors are clustered at the product level.

Because the data consist of repeated cross sections rather than a firm-level panel, identification does not rely on within-firm variation over time. Accordingly, the estimated coefficients capture conditional associations between subsidy rate categories

and export shares rather than causal effects.

Infrastructure Interactions. To examine whether the effectiveness of subsidy rate categories varies systematically with local export conditions, we augment the baseline specification by interacting the subsidy category indicators with a state-level export infrastructure index. Specifically, we estimate regressions of the form

$$\text{ExportShare}_{ipst} = \sum_k \beta_k 1\{\text{RateCat}_{pt} = k\} + \sum_k \gamma_k \left(1\{\text{RateCat}_{pt} = k\} \times \text{Infra}_s\right)$$
$$+ \alpha_s + \lambda_t + X_{ipst} + \varepsilon_{ipst}, \tag{2}$$

where Infra_s denotes a standardized measure of export infrastructure quality in state s as obtained from the export ecosystem pillar of the Niti Aayog Export Preparedness Index. The interaction terms allow the relationship between subsidy exposure and export share to vary with infrastructure quality, while state fixed effects absorb all level differences across states. As a result, the coefficients γ_k are identified from differential responses to the same subsidy rate category across states with different infrastructure levels, rather than from cross-state differences in export outcomes. This specification is designed to assess whether subsidies operate as complements or substitutes to export infrastructure and to provide insight into the sources of heterogeneity observed in state-level subsidy effects.

6 Results

6.1 Baseline pooled results

Table 2 reports baseline pooled regressions of firm-level export share on categorical subsidy rate exposure. The dependent variable is the firm's overall export share, and the sample is restricted to single-product firms observed in two repeated cross sections. Columns (1)–(4) progressively introduce fixed effects and firm-level controls.

Column (1) presents unconditional associations between subsidy rate categories and export share. Firms exposed to subsidy rate categories 2 and 3 exhibit substantially higher export shares relative to the omitted category, with the effect for category 3 particularly large and statistically significant. These estimates suggest a strong positive correlation between higher subsidy rates and export orientation in the raw data.

Column (2) adds state fixed effects, thereby absorbing time-invariant differences across states such as export infrastructure, geography, and institutional quality. While the coefficient on rate category 2 remains positive and statistically significant, the estimate for category 3 declines in magnitude but remains large and significant. This attenuation indicates that part of the unconditional relationship reflects cross-state heterogeneity, but meaningful within-state variation in subsidy exposure continues to be associated with export shares.

Column (3) further includes year fixed effects to control for aggregate shocks and national policy changes. The estimated effects of subsidy categories are largely stable relative to column (2), suggesting that the results are not driven by year-specific macroeconomic conditions. In particular, firms in subsidy rate category 3 continue to exhibit significantly higher export shares relative to the baseline category.

Column (4) introduces a rich set of firm-level controls, including measures of size, age, productivity, factor intensity, foreign ownership, R&D activity, and import behavior. After conditioning on these observable characteristics, the coefficient on subsidy rate category 3 remains positive and statistically significant, though somewhat reduced in magnitude. In contrast, the coefficients on lower and higher subsidy categories are smaller and imprecisely estimated. Among the controls, export shares are positively associated with rural location and negatively associated with firm age, consistent with prior evidence on export participation and firm dynamics.

Overall, the baseline pooled results indicate a strong conditional association between exposure to intermediate subsidy rate categories and higher export shares. The persistence of the category 3 coefficient across specifications suggests that this relation-

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ship is not solely driven by cross-state differences or observable firm characteristics. The results reveal a non-monotonic relationship between subsidy intensity and export share. While firms exposed to intermediate subsidy rate categories exhibit significantly higher export shares, both lower and higher subsidy categories are associated with smaller and statistically insignificant effects. This pattern suggests the presence of threshold effects or diminishing returns to subsidy intensity, indicating that increases in subsidy rates do not translate linearly into higher export participation.

6.2 State-Level Heterogeneity in Subsidy Effects

To unpack the pooled relationships documented in Table 2, Figure 2 presents state-specific estimates of the subsidy rate category coefficients obtained from regressions estimated separately by state. Each panel corresponds to a subsidy rate category, plotting point estimates and confidence intervals for individual states, with the vertical line denoting zero. This exercise allows us to assess whether the average effects observed in the pooled regressions mask meaningful heterogeneity across states.

Two patterns stand out. First, there is substantial cross-state variation in the magnitude and statistical significance of subsidy effects across all rate categories. For lower subsidy categories (Rate Categories 1 and 2), most state-level coefficients cluster close to zero and are imprecisely estimated, indicating limited and uneven associations with export share. This is consistent with the pooled results, where the average effects of these categories were small and sensitive to the inclusion of fixed effects and controls.

Second, and more strikingly, Rate Category 3 exhibits large and positive coefficients in several states, including Rajasthan, Haryana, Gujarat, and Uttar Pradesh, while effects are smaller or statistically indistinguishable from zero in other states. This pattern mirrors the baseline pooled findings, where Rate Category 3 consistently showed the strongest and most robust association with export share. However, the state-level estimates reveal that this average effect is driven by a subset of states rather than representing a uniform national response. For Rate Category 4, estimates are

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Table 2: Impact of tax based export subsidy on export performance

Dep var: Firm export share	(1)	(2)	(3)	(4)
RateCat=1	7.641	-2.721	-2.060	-3.490
	(7.287)	(3.882)	(4.141)	(3.790)
RateCat=2	14.054**	3.750	4.328	2.822
	(6.899)	(6.126)	(6.285)	(5.917)
RateCat=3	37.418***	27.871***	28.418***	28.284***
	(4.960)	(6.977)	(7.115)	(7.125)
RateCat=4	1.023	5.473	5.807	5.832
	(14.292)	(14.947)	(15.033)	(15.818)
Year=2022			-1.206	-0.935
			(1.502)	(1.401)
Rural				-5.426***
				(1.713)
No. of units				1.255
				(1.314)
Fixed assets				0.046**
turnover ratio				(0.018)
Capital intensity				-0.905
ratio				(13.098)
Mandays worked				0.011
				(0.009)
Age of firm				-0.261***
				(0.056)
Any foreign				0.682
ownership				(3.023)
Any R&D unit in your				-1.230
				(3.107)
Total imports				0.003*
				(0.002)
Labour productivity				-94.627
				(58.152)
Constant	45.977***	55.367***	55.362***	62.367***
	(2.271)	(3.723)	(3.713)	(4.247)
State FE	No	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
Controls	No	No	No	Yes
Observations	2,796	2,796	2,796	2,796
R-Squared	0.034	0.240	0.240	0.257

The analysis includes single product firms with the firm's export share regressed on the category of subsidy rate on the product. Rate category 0 includes the products whose rate is 0%, category 1 includes those whose subsidy rate is greater than 1% and less than equal to 2%, 3 includes those whose subsidy rate is greater than 2% and less than equal to 3%, category 4 includes those whose rate is greater than 3% and less than equal to 4% and category 5 includes those whose rate is greater than 4% and less than equal to 5%. Category 0 is the omitted category. Standard errors are clustered at the product level.Statistical significance at 1, 5, and 10 percent levels are denoted by ***, **, and *, respectively.

again heterogeneous and generally weaker, with positive effects concentrated in a limited number of states.

Overall, Figure 2 demonstrates that the pooled estimates reported earlier conceal substantial heterogeneity in subsidy effectiveness across states. While intermediate subsidy rates are strongly associated with higher export shares on average, this relationship is concentrated in particular states and absent in others. These findings motivate the subsequent analysis, which formally examines whether differences in state-level export infrastructure help explain the observed variation in subsidy responsiveness.

Figure 2: Impact of tax based incentives on export performance: State level
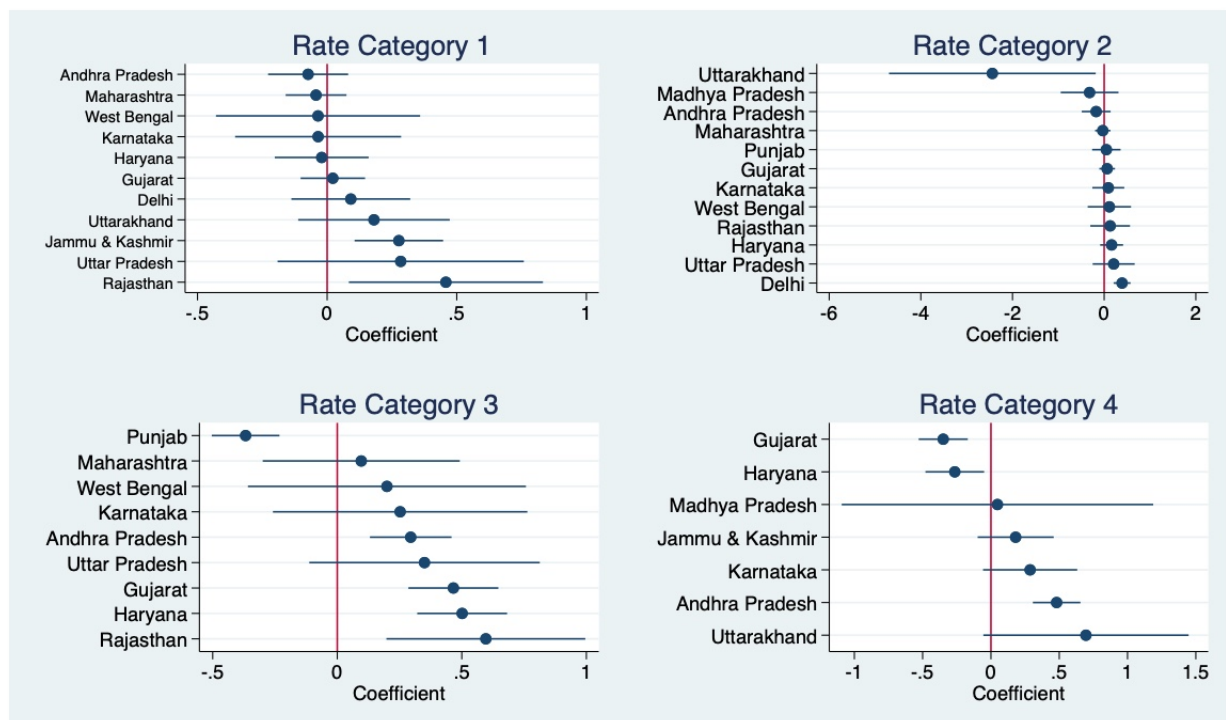
6.3 Importance of state level export infrastructure

Table 3 reports results from regressions that interact subsidy rate categories with a state-level export infrastructure index in order to assess whether the effectiveness of export subsidies varies systematically with local export conditions. The specification

Table 3: Impact of tax based export subsidy on export performance by state level export infrastructure

Dep var: Firm export share	(1)
RateCat=1	-3.441
	(3.847)
RateCat=2	2.824
	(5.929)
RateCat=3	21.488*
	(11.513)
RateCat=4	4.851
	(14.432)
RateCat=1×ExportInfra	-2.720
	(2.488)
RateCat=2×ExportInfra	-3.202
	(4.078)
RateCat=3×ExportInfra	-13.708
	(9.099)
RateCat=4×ExportInfra	-0.154
	(7.959)
Year=2022	-1.035
	(1.404)
Constant	62.318***
	(4.282)
Observations	2,796
R-Squared	0.260

The analysis includes single product firms with the firm's export share regressed on the category of subsidy rate on the product. Rate category 0 includes the products whose rate is 0%, category 1 includes those whose subsidy rate is greater than 1% and less than equal to 2%, 3 includes those whose subsidy rate is greater than 2% and less than equal to 3%, category 4 includes those whose rate is greater than 3% and less than equal to 4% and category 5 includes those whose rate is greater than 4% and less than equal to 5%. Category 0 is the omitted category. Standard errors are clustered at the product level. Statistical significance at 1, 5, and 10 percent levels are denoted by ***, **, and *, respectively.

builds on the baseline pooled model by allowing the relationship between subsidy exposure and export share to differ across states depending on infrastructure quality.

The main effects of the subsidy rate categories capture the association between subsidy exposure and export share in states with average infrastructure. Consistent with the baseline pooled results, firms exposed to the intermediate subsidy rate category (Rate Category 3) exhibit a large and positive association with export share. In contrast, the coefficients on lower and higher subsidy categories are smaller and imprecisely estimated, suggesting non-linear effects of subsidy intensity.

The interaction terms provide the central insight of this analysis. For Rate Categories 1 through 3, the interaction coefficients with export infrastructure are negative, with particularly large magnitudes for the intermediate subsidy categories. This indicates that the export share response to a given subsidy rate declines as infrastructure quality improves. In other words, subsidies are most effective in states with weaker export infrastructure, while their marginal impact diminishes in states with more developed export ecosystems. The interaction term for Rate Category 3, although imprecisely estimated, is economically sizable, reinforcing the view that the strong average effect observed in pooled regressions is driven by states with relatively low infrastructure.

These results point to a substitution relationship between export subsidies and export infrastructure rather than complementarity. In high-infrastructure states, firms already benefit from lower trade costs and better access to export markets, limiting the incremental gains from additional financial incentives. By contrast, in low-infrastructure states, subsidies appear to partially compensate for missing public inputs by easing fixed costs, liquidity constraints, or access barriers associated with exporting. This interpretation is consistent with the substantial state-level heterogeneity documented earlier and helps explain why the pooled effects mask divergent responses across states.

Overall, the infrastructure interaction analysis suggests that the effectiveness of ex-

port subsidies is highly context-dependent. While subsidies are associated with higher export shares on average, their impact is strongest in environments where export infrastructure is relatively weak, underscoring the importance of considering local conditions when designing and evaluating subsidy policies.

7 Conclusion

This paper studies the relationship between export subsidy rates under the Remission of Duties and Taxes on Exported Products (RoDTEP) scheme and firm-level export intensity using repeated cross-sectional data on single-product manufacturing firms. Baseline pooled regressions relate firms' export shares to categorical subsidy exposure while progressively controlling for state and year fixed effects and firm characteristics. The results show a robust positive association between intermediate subsidy rate categories and export shares, while lower and higher subsidy categories exhibit weaker and less precisely estimated effects. These patterns point to non-linear responses to subsidy intensity and highlight the importance of conditioning on firm-level heterogeneity and local environments.

We further demonstrate that these average effects mask substantial cross-state heterogeneity. State-level regressions reveal that positive subsidy effects are concentrated in a subset of states, with limited responses elsewhere. Interacting subsidy categories with a state-level export infrastructure index shows that subsidy effectiveness declines with infrastructure quality, indicating a substitution rather than a complementary relationship. Subsidies appear most effective in states with weaker export infrastructure, where they may offset binding constraints to exporting, while their marginal impact is more limited in high-infrastructure states. Together, these findings underscore the context-dependent nature of export subsidies and caution against evaluating such policies based solely on pooled estimates.

Our research offers several important contributions to both theory and practice.

Theoretically, we advance the institution-based view by demonstrating that firms can not only navigate but also actively benefit from periods of institutional transitions. Instead of viewing institutional transitions solely as a source of uncertainty and cost, our findings highlight the potential for agile firms to identify and capitalise on new opportunities arising from institutional transitions. This contributes to the understanding of firm-level behaviour in emerging economies, where institutional instability is a common feature. Practically, our results provide valuable insights for policymakers. The efficacy of a WTO-compliant scheme like RoDTEP in stimulating exports, even with frequent amendments, suggests that well-designed and adaptable policies can be highly effective. The moderating role of sub-national institutional quality highlights the need for a coordinated approach, where national-level export promotion efforts should be complemented by state-level institutions to improve the business ecosystem; otherwise, the national policy effect dissipates.

The results offer a critical, two-tiered mandate for export policy. While affirming that the RoDTEP mechanism is effective in boosting aggregate export intensity, its contingent nature demands a shift toward targeted policy intervention. The national government must explicitly align trade incentives with efforts to enhance institutional quality in lagging sub-national regions. Without addressing these foundational, state-level institutional hurdles, national policies will only perpetuate and exacerbate the divergence in export performance of firms between high and low-performing regions.

Our study establishes clear directions for future scholarly work. First, researchers could explicitly test the proposed link to innovation by analyzing firm-level data on R&D investment and patenting to determine if the tax rebates from RoDTEP translates directly into capability-building innovations. Second, a longitudinal analysis is necessary to investigate firms' long-term behavior: whether those in low-quality states eventually divest from exporting or if the national policy eventually forces institutional convergence across sub-national regions.

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