Relationship Between FDI and Exports in the Indian Food and Beverage Sector : An Empirical Study

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Abstract

Purpose : The current study focused on analyzing the effect of foreign direct investment (FDI) on export performance and identifying the factors responsible for the diverse export performance of the food and beverage sector of the Indian economy. The fundamental incentive for conducting such a study is the growing relevance of exports and FDI in the internationalization process as well as their role in corporate efficacy.

Methodology : Besides FDI being the central variable, certain firm-level variables, namely capital intensity, debt-to-equity ratio, in-house R&D expenditure, embodied technology, disembodied technology, labor productivity, marketing costs, size, and age, were introduced as control variables. The Heckman and Tobit regression approaches were two-panel data techniques used to analyzed and compare the results. Furthermore, the results were computed and analyzed separately for the food, beverage, and manufacturing sectors (comprising the food and beverage sectors taken together).

Findings : The findings revealed that regarding the variable FDI, the results were significantly negative, connoting that the nature of FDI is market-seeking intended to capture a more significant share of the domestic market without a subsequent increase in exports. FDI and exports were, hence, substitutes. In-house research and development and disembodied technology have an insignificant impact on export intensity. Capital intensity, debt-to-equity ratio, and embodied technology were significant variables and gave the same results across the methodologies used for the analysis. The results were different across the methods for labor productivity, marketing costs, size, size square, age, and age square.

Practical Implications : From the point of view of policymakers, there was no increase in exports as FDI was market-seeking. The Government should formulate policies appropriately to draw in additional FDI that seeks efficiency. Additionally, while capital intensity and debt-to-equity ratios were highly detrimental, exports could be increased in India through labor-intensive technology and better financial conditions. Furthermore, importing raw materials and capital goods should be eased as this improves the quality of products produced for exports.

Originality : To the best of our knowledge, this study is the first attempt to investigate the relationship between FDI and exports in the Indian economy's food and beverage industry in the presence of heterogeneous firm-related characteristics. Understanding this link could help uncover the variables other than FDI that are responsible for varied export performance.

Keywords : **export intensity, FDI, heterogeneity, panel data**

JEL Classification Codes : C23, F14, F23

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Governments undertook massive liberalization programs to increase exports and market access to one's country's products. They pursued free trade agreements and more so in the period of globalization. The importance of exports in the growth of an economy and the contribution of GDP in raising the country's exports is an important area of research with significant policy implications. Many studies have empirically

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confirmed the "export-led growth hypothesis" and "growth-led export hypothesis." Kumari and Malhotra (2015) and Kaur and Dhami (2016) reached the same conclusion in their study.

Moreover, recently, the vital role played by exports in the growth of the Indian economy during the pandemic is a well-known fact. India's merchandise exports touched a record high of $418 billion in April 2022. Merchandise export increased by 46.53% between April and January (2020–2021) and April and January (2021–2022) (Ministry of Commerce and Industry, Department of Commerce, Government of India, n.d.).

On the other hand, to attract foreign direct investment (FDI) into the country to enhance growth and the various benefits that FDI brings, the government of India has been following an easy FDI policy since the 1990s. More specifically, FDI improves the balance of payment position, creates employment, and is an earner of foreign exchange for the country. India received the highest-ever annual FDI inflow of $83.57 billion in 2021–2022. Despite COVID-19, FDI inflows into India surged 23% between March 2020 and March 2022, to USD 171.84 billion, compared to USD 140.10 billion in the pre-COVID period (February 2020 to February 2022). India is also becoming a popular destination for foreign manufacturing investments. According to the Press Information Bureau (2022), FDI equity inflows into manufacturing climbed from USD 12.09 billion in 2020–2021 to USD 21.34 billion in 2021–2022. Another important function of FDI is to promote exports in host countries.

FDI increases domestic firms' exports by providing sophisticated technology and the necessary capital to finance exports, inducing competition in the domestic market, which forces domestic producers to produce advanced quality products and access to advanced distribution and marketing channels for selling in international markets, and finally by imparting skills to workers and improving domestic firms' management practices. Goh et al. (2017); Ahmad et al. (2018); Rahmaddi and Ichihashi (2013). Dunning (1977) postulates that MNCs possess superior assets over domestic firms, which spill over to local firms through FDI. The positive spillover effect of FDI on exports is called export spillover. By assumption based on the literature, FDI increases the extensive margin (number of firms engaged in exporting) and the intensive margin (increase in the volume of goods exported by each firm). However, empirically, the relationship between FDI and firm-level exports is inconclusive because of heterogeneity across countries, firms, and motives for undertaking FDI. In this context, the present study contributes to the existing literature on whether FDI leads to an increase in exports level for the food and beverage sector of the Indian economy in the presence of firm heterogeneous factors. In particular, whether FDI and exports are complementary or substitutes in nature.

Earlier studies had focused on accessing the relationship between FDI and exports primarily at a macro level. While some other studies examined the supply and demand side factors affecting exports at the country level. However, very few studies have analyzed the supply and demand side factors affecting exports at the firm level. Data restrictions at the firm level can be the primary reason for this. Thus, this study tried to amalgamate both these aspects, i.e., whether FDI leads to an increase in exports in the presence of firm-specific characteristics responsible for diverse firm-level export performance. The study contributes to the literature in multiple ways. First, minimal studies have explored the relationship between FDI and exports and the heterogeneity of factors at the sectoral level for the Indian economy. Second, this study uses a more recent period, i.e., 2010–2020, for doing analyses; as such, the results obtained are the latest and more relevant. Finally, the heterogeneity among various industries within manufacturing is not representative of an aggregate industry-level assessment of the manufacturing sector alone. Therefore, the study's objective is to analyze the relationship at the disaggregated level and compare the results with the manufacturing sector (food and beverage sectors taken together).

The Food and Beverage Industry

Despite a drop in Indian exports in 2020 due to a COVID-induced lockout, the food and beverage sector's exports remained strong. The sector's share of Indian exports climbed from 9.97% to 12.26% between 2016 and 2020, according to George (2022). According to the Reserve Bank of India (2020), 12% of the sector's output is

exported. The automated path opened the food processing industry to 100% FDI in 2016. According to the Reserve Bank of India (2020), the government route has been fully available since 2017. The sector contributes to job creation, around 11.4% of organized manufacturing employment. Because of its labor-intensive nature, it has risen to prominence in manufacturing employment, with ramifications for the economy. Roy and Das (2018) concluded that technology advancement and allocative efficiency were the main contributors to total productivity growth (TFPG) for India's food, beverage, and tobacco industries between 1981–1982 and 2010–2011, using the stochastic production frontier approach. The government unveiled the ₹ 10,900 crore PLI scheme to support the sector, which intends to significantly enhance food and beverage exports and help India become a major player in the global value chain. Over six years, the scheme has employed about three lakh workers in SME industries (PLI for food processing, 2021). From 2016 to 2021, the top exported food and beverage with the highest CAGR values were sugar and sugar confectionery, milling sector goods, meat and fish preparations, cereals, and animal and vegetable fats.

Literature Review

Increased production productivity due to FDI inflows led to an increase in the volume of domestic exports, which was described in the literature as export intensity/export share/intensive margin. Second, it assists local enterprises in broadening their reach to new global markets, i.e., deciding whether to enter foreign markets, which was previously known as export propensity/probability/extensive margin. The empirical evidence yielded conflicting results. Chen et al. (2013) and Hu and Tan (2016) discovered a positive effect in China. Duran and Ryan (2014) found a negative impact on Chilean enterprises in their analysis. The literature on the impact of FDI on exports examines both direct and indirect impacts via spillovers.

The conclusions of various studies on export performance heterogeneity varied significantly. It was due to differences in firm characteristics, FDI motives, industries/sectors chosen for analysis, and methodology used for the examination. Nagaraj (2014) discovered a high link between enterprises' decisions to enter export markets and financial limitations. According to the study, eliminating financial restraints impacted the extensive export margin, and only the healthiest financial enterprises entered the export market. Furthermore, financial difficulties did not affect export volume, indicating that an intensive margin of exports existed. Based on technical efficiency heterogeneity, Foreign enterprises outperform local rivals in the chemical, mechanical, electronics, and transportation industries, according to Sahu (2015). On the other hand, domestic enterprises showed higher mean technical efficiency in food and beverage, basic metals, and textiles industries than foreign firms.

Another study by De and Nagaraj (2017) examined the effect of foreign investment at various levels, i.e., in terms of percentage of foreign equity, and found that the relationship between foreign ownership and exports is nonlinear, i.e., the lower the share of foreign equity, the higher the export share, and the higher the amount of foreign ownership, the lower the export share. Using firm-level data for the post-reform period in India, Ghosh and Roy (2018) determined that the export performance of foreign and local companies was the same due to the presence of MNCs. Heterogeneity in terms of sunk costs, raw materials, foreign technological know-how imports, and in-house R&D investment resulted in variations in company performance, which enhanced firm-level exports.

Furthermore, in analyzing the indirect impact of FDI on exports, Mondal and Pant (2020) focused on horizontal export spillover channels in their study on Indian manufacturing firms from 1994 to 2010. Their study found no significant effect of the foreign presence on domestic firms, as competition and skill spillovers reported a negative impact, with the R&D spillover channel reporting an insignificant effect. The study also considered the heterogeneity aspect, with positive results found in the case of the import of raw materials and internal R&D significantly impacting domestic firm export performance. Rijesh (2020) confirmed that during the period 1995–2016, technology imports (both embodied and disembodied) and investment in local technological

competence (in-house R&D) had a complementing relationship with India's manufacturing exports. Furthermore, using OLS, RE, FGLS, and Tobit regression and manufacturing base categorization, the study determined that imports of embedded technology positively influenced exports of intermediate and capital products. On the other hand, disembodied technology imports aided exports of consumer and capital products while having little impact on exports of basic items.

Mohapatra (2022b) has evaluated the export performance and determinants of labor-intensive and capital-intensive industries for the Indian manufacturing sector, determined the favorable impact of a foreign share, real effective exchange rate, and in-house R&D. Additionally, business size had a negative impact on firm exports. Furthermore, the research found that labor-intensive sectors were more export-oriented than capital-intensive industries. Sahoo et al. (2022) evaluated the relationship between exports, productivity, and competitiveness in the Indian manufacturing industry from 1997 to 2017. The investigation proved the presence of the "learning by exporting" idea while rejecting the "self-selection" criterion claim.

Hypotheses Development

↳ **Hypothesis 1 :** FDI raises the extensive margin of export, implying that FDI improves the likelihood of more firms entering the export market.

High costs and information lacunas are associated with foreign markets. Foreign direct investment can help domestic firms access information related to foreign markets through their international connections in terms of distribution networks, customers, and sophisticated marketing research intelligence techniques, which helps lower the sunk costs associated with the export market entry for domestic firms. Moreover, a firm's decision to enter the export market is highly persistent in time, i.e., if the firm has been exporting in the past, it has incurred the sunk costs associated with exporting. Henceforth, it will continue to keep exporting in the current period. Thus, it depends upon its past exporting experience (Nguyen & Sun, 2012).

↳ **H1 :** Export participation is positively associated with FDI.

↳ **Hypothesis 2 :** FDI increases the export intensity/quantity of firms already exporting.

At the microeconomic level, whether FDI increases the exports of firms is dependent upon the motives of FDI. If the objective of FDI is for productivity/efficiency-seeking, then FDI increases exports. However, if the goal is market-seeking, then FDI will lead to a decrease in exports. The effect of FDI on exports also depends upon firm-level characteristics or heterogeneity in terms of size, age, import of raw materials, sunk costs, import of capital goods, import of technology, credit availability, and productivity (Ghosh & Roy, 2018). However, generally, it is assumed that FDI boosts a firm's export intensity.

↳ **H2 :** Export intensity is positively associated with FDI.

Methodology : Variables, Data Sources, Sample Frame, and Empirical Model

Export Intensity

Firms decide how much to export, according to Goldar (2013), Goldar and Banga (2020), and Ghosh and Roy (2018). In this case, the paper measures and defines exports as a percentage of sales.

FDI

FDI plays an instrumental role in facilitating exports in recipient economies as foreign firms have advanced technologies, more accessible access to finance, an efficient and skilled labor force, and advanced marketing and distribution channels. Thus, such foreign enterprises enhanced local firms' competence and efficiency in producing high-quality items for their export markets, allowing them to expand into new markets (Popovici, 2018; Sun, 2012). This paper features a dummy variable that indicates that if the foreign promoter equity share is greater than or equal to 10%, it is 1 and 0.

Capital Intensity

Firms can create technologically advanced export items by importing technology and investing in new capital. As a result, the availability of capital input influenced enterprises' ability to export and produce higher-quality goods. Furthermore, capital intensity reduced the marginal cost of production since more capital-intensive enterprises have higher productivity, which helps reduce expenses (Anwar & Sun 2016). Thus, in the current study, export and capital intensity have a positive association. This paper calculates capital intensity by dividing gross fixed assets by sales.

Credit Availability

Firms have to finance their initial export costs to enter the export markets. As such, financially unstable firms are less likely to export. The availability of subsidized credit increases the export performance of firms. Financially sound firms self-select into exporting (Manova, 2013; Nagaraj, 2014; Padmaja & Sasidharan, 2021). The proxy used for credit availability is the debt-to-equity ratio in the study.

Inhouse R & D

By investing in sophisticated technology, firms reduce operating costs and improve the quality of their products for exporting. Moreover, spending on R&D facilitates firms to absorb externalities related to exporting efficiently. Thus, in-house technological development capabilities are more important than external sources of technology acquisition. The effect of in-house R&D on exports is assumed to be positive (Mohapatra, 2022a; Sun & Anwar, 2017). It measures the firm's indigenous technological capability and, in this paper, is captured by R&D divided by sales.

Import of Technology

Firms in India need additional resources, skilled human capital, and scientific competence to undertake R&D indigenously. In such a scenario, technology importation is paramount for a technologically deficient country to develop its technological capabilities. Technology acquired from MNCs can boost productivity and lower costs for domestic firms, leading to a rise in exports (Ma & Rauf, 2020). Technology imports consist of embodied technology (payment for importing raw materials and capital goods divided by sales) and disembodied technology (payment for royalties and technical fees abroad divided by sales). A priori, a positive relationship between exports and imports of technology is assumed.

Productivity

The fact that companies operating in worldwide markets should have competitive pricing structures and use their

existing resources more effectively highlights the importance of productivity. According to studies on productivity heterogeneity, more profitable firms that can afford to absorb high entrance costs into international markets choose to enter the export market. In contrast, the least productive firms exit the market. Literature in this respect points toward both aspects of highly efficient firms self-selecting themselves and learning by exporting hypotheses where productivity is a consequence of continued exporting experience (Gupta et al., 2019 ; Siba & Gebreeyesus, 2016).

Sunk Costs

Firms must have a strong international marketing, sales, and distribution network to increase customer awareness of their products, create brand loyalty, and strategically position their products compared to competitors' products. Several studies have found a link between the ability to bear sunk costs and export performance (Bernard & Jensen, 2004; Das et al., 2007). In this paper, sunk costs are proxied by marketing costs (expenditure on advertisement, marketing, distribution, and selling divided by sales).

Size

Larger firms have abundant resources, achieve economies of scale, and have a risk appetite to bear the sunk costs of export market entry. As a result, they tend to sell more in domestic and foreign markets (Bernard & Jensen, 2004). However, literature also points toward a nonlinear relationship between size and export intensity as a positive effect from size is available up to a particular range beyond diseconomies and scale (Kumar & Siddharthan, 1994). A nonlinear relationship is captured in this paper by including a square term of size, and size is measured by log sales.

Age

Older firms that have continued with exports have acquired tactical knowledge about the export markets and are well informed about the perceived risks and thus are better placed to absorb risks associated with sunk costs of entry into the foreign markets. On the other hand, younger firms export more because they use relatively modern technology, increasing their productivity and product quality, leading to more exports, as assumed in the literature by Kuntluru et al. (2012). As a result, a positive and negative link between age and exports is assumed. Age Square depicts the nonlinear link between age and exports (Goldar & Banga, 2020; Ghosh & Roy, 2018). Age subtracts the years since incorporation from the reporting year for each firm as defined in this paper.

Table 1 shows the explanatory variables together with their related symbols.

Expint = ƒ (*Fdidum, Kint, Debt-equity, Rdint, Embodtech, Disembtech, Labpditivity, Mktgcosts, Size, Size Square, Age, and Age Square*).

Table 1. ***Description of Explanatory Variables***

Variable	Symbol	Definition
Decision to export	*Dexp*	Dummy variable if firm exported during the year = 1; 0 otherwise.
Export intensity	*Expint*	The ratio of exports/sales in %.
FDI	*Fdidum*	Dummy variable = 1 if the firm foreign promoter equity shareholding >=10%; 0 otherwise.
Capital intensity	*Kint*	Gross fixed assets/sales turnover.
Debt-to-equity ratio	*Debtequity*	Debt-equity-ratio.

In-house R&D expenditure	*Rdint*	Expenditure on R&D divided by sales of a firm.
Embodied technology	*Embodtech*	Expenditure on raw material and capital goods import divided by sales of a firm.
Disembodied technology	*Disembtech*	Expenditure on royalty and technical fees payment made abroad divided by sales of a firm.
Labor productivity	*Labpditivity*	The ratio of output divided by salaries and wages.
Advertising, marketing, selling, and distribution costs	*Mktgcosts*	Expenditure on advertising, marketing, selling, and distribution costs incurred by the firms divided by the firm's sales.
Size	*Size*	Log (total sales).
Size Square	*Size Square*	(Size)^2.
Age	*Age*	Difference between the year of reporting and the incorporation year.
Age Square	*Age Square*	(AGE)^2.

Data Source and Sample Frame

The prowess database, Centre for Monitoring Indian Economy (n.d), is used to extract data for the study. Prowess uses information from the audited balance sheets and income statements of large and small firms, both listed and non-listed, across a wide range of manufacturing, financial, utilities, and service sectors. The database covers 60–70% of organized manufacturing, paying up to 75% corporate taxes and excise duty of over 95% collected by the Government of India. The data set consists of food and beverage enterprises retrieved annually at the five-digit level to provide comprehensive/exhaustive coverage of firms based on the National Industry Classification (NIC-2008).

From 2010 to 2020, data for 1,786 enterprises in the food and beverage sector were collected. The prowess-IQ (version-1.96) database analyzes and visualizes the findings. The food sector accounts for 1,467 of the entire sample frame of 1,786 enterprises, while the beverage sector accounts for 362. The firms were chosen based on the available data for the variables in the study.

Empirical Model

The modeling of the firms' export behavior is a two-stage decision process. In the first stage, firms decide whether to undertake exports, and in the second stage, once the firm is engaged in exporting, they decide how much to export. The data analysis employed Heckman's (1979) and Tobin's (1958) models. To obtain the best-expected results, a sample should include both exporting and nonexporting firms. All the sample firms would not have information on the dependent variable, i.e., exports, so there will be many zero observations in the sample, i.e., clustering of data points around value zero. For such a censored model, it is more appropriate to use the Tobit model than the OLS model, as OLS gives biased results.

The following equation is used to analyze the results through the Tobit model :

$$Expint_{it} = \beta_0 + \beta_1 Fdidum_{it} + \beta_2 Kint_{it} + \beta_3 Debtequity_{it} + \beta_4 Rdint_{it} + \beta_5 Embodtech_{it} + \beta_6 Disembtech_{it} + \beta_7 Labpditivity_{it} + \beta_8 Mktgcosts_{it} + \beta_9 Size_{it} + \beta_{10} Sizesquare_{it} + \beta_{11} Age_{it} + \beta_{12} Agesquare_{it} + \varepsilon_{it} \quad (1)$$

if RHS > 0
= 0 otherwise

The Tobit model's drawback is that it uses the same set of explanatory factors to predict both the decision to export and the intensity of exports, as pointed out in the study by Bhat and Narayanan (2009). However, in the

present paper, results are also analyzed through the Heckman sample selection procedure, which assumes that all the explanatory can be identical. However, at least one of the variables used to determine the selection and outcome equation should be different (Heckman, 1979). Firms that have high productivity self-select themselves into exporting activities. Heckman's model removes this selection bias problem by considering both exporting firms and nonexporting firms and thus improves upon the OLS model, which ignores the selection bias and results in biased estimates. The Heckman model has two stages: the first stage involves firms deciding whether or not to enter the export market, and the second stage involves firms deciding how much quantity to export for firms that have decided to enter the market in stage one. The first step equation (sometimes known as the selection equation) is as follows:

$$Dexp_{it} = \beta_0 + \beta_1 Fdidum_{it} + \beta_2 Kint_{it} + \beta_3 Debtequity_{it} + \beta_4 Rdint_{it} + \beta_5 Embodtech_{it} + \beta_6 Disembtech_{it} + \beta_7 Labpditivity_{it} + \beta_8 Mktgcosts_{it} + \beta_9 Size_{it} + \beta_{10} Sizesquare_{it} + \beta_{11} Age_{it} + \beta_{12} Agesquare_{it} + Dexpt_{it-1} + Indstry_{it} + v_{it} \quad (2)$$

The second equation is as follows (known as the outcome equation):

$$Expint_{it} = \beta_0 + \beta_1 Fdidum_{it} + \beta_2 Kint_{it} + \beta_3 Debtequity_{it} + \beta_4 Rdint_{it} + \beta_5 Embodtech_{it} + \beta_6 Disembtech_{it} + \beta_7 Labpditivity_{it} + \beta_8 Mktgcosts_{it} + \beta_9 Size_{it} + \beta_{10} Sizesquare_{it} + \beta_{11} Age_{it} + \beta_{12} Agesquare_{it} + Indstry_{it} + \mu_{it} \quad (3)$$

where, v_i and μ_i are random errors in the selection and outcome equation and are assumed to follow $v_i \sim N(0, 1)$, $u_i \sim N(0, \sigma^2)$, if correlation $\rho \neq 0$, then the distribution of the error term follows a bivariate normal distribution. If $\rho = 0$, then OLS provides consistent and unbiased estimates. $Dexp_{it}$ denotes lagged exports and hence only added in Eq. (2). It is a binary dependent variable with 1 if firms export and 0 otherwise; $Expint_{it}$ of Eq. (3) being the dependent variable measured as export intensity. $Indstry_{it}$ is an industry dummy variable included to account for possible industry effects. As evident from Eqs. (2) and (3), all the regressors are the same in both equations except one variable, $Dexp_{it-1}$ is lagged export, which is included in selection Eq. (2), connoting that if the firm exports in time t, it would also export in time $t + 1$, i.e., the firm's decision to enter the export market depends upon their previous period's export status.

Empirical Analysis and Results

This section presents the results of the Tobit and the Heckman models. The results of the food and beverage sectors are analyzed separately using the Tobit and Heckman models before being compared to the manufacturing sector (combined food and beverage). To begin, the findings are analyzed using the Tobit model. *Fdidum*, i.e., the FDI variable, is strongly negative in the food and manufacturing sectors but nonsignificant in the drinks sector, as seen in Tables 2 and 3. As a result, export and FDI are mutually substitutable in India's food sector. As a result, hypothesis H2, that FDI has a beneficial influence on exports, is rejected. This finding contradicts the findings of Charoenrat and Amornkitvikai (2021) and Mohapatra (2022a, 2022b), who found that FDI and exports were complementary.

The capital intensity variable, *Knit*, is significantly negative, as hypothesized in the food and manufacturing sector, and nonsignificant for the beverages sector. The results show that a higher K/L ratio does not contribute to export competitiveness in India, where capital is scarce and labor is abundant. Instead, labor-intensive production helps in cost competitiveness, making firms competitive internationally.

The *debtequity* ratio gauges credit availability and the results are significantly negative for the food and manufacturing sectors. It is valid for a nation like India, where financial markets should expand and diversify to increase firms' likelihood of meeting their financial demands. As a result, their export performance is affected because they are financially constrained. Allen et al. (2012) conclude similar results. In this paper, technology is captured by two variables: in-house R&D (*Rdint)* and import of technology (via *embodtech* and *disembtech* technology).

Table 2. ***Results from the Tobit and Heckman Selection Models with Exports as the Explained Variable***

	TOBIT MODEL		HECKMAN MODEL			
Variables	**Food Sector**	**Beverage Sector**	**Export Decision of Food Sector**	**Export Intensity of Food Sector**	**Export Decision of the Beverage Sector**	**Export Intensity of Beverage Sector**
Fdidum	–23.95***	–7.191	0.396**	–11.49*	0.186	3.660
	(4.866)	(6.857)	(0.124)	(5.667)	(0.288)	(9.188)
Knit	–4.261***	–0.465	–0.0736***	–2.662**	–0.00594	0.737
	(0.822)	(0.416)	(0.0135)	(0.930)	(0.0200)	(1.028)
Debtequity	–0.519***	–0.00622	–0.00493*	–0.182**	–0.0000892	–0.0284
	(0.122)	(0.0191)	(0.00221)	(0.131)	(0.000545)	(0.105)
Rdint	63.59	58.42	7.844	–344.0	–36.28	1054.9
	(216.4)	(566.7)	(5.165)	(241.6)	(27.33)	(942.3)
Embodtech	46.03***	3.937**	0.985***	33.69***	0.574*	10.12**
	(5.725)	(3.466)	(0.129)	(8.685)	(0.242)	(26.85)
Disembtech	–527.4	–43.26	2.940	–173.6	0.0748	–35.84
	(153.1)	(36.07)	(3.237)	(179.3)	(0.790)	(44.08)
Labpditivity	–0.0331***	–0.259***	–0.000985***	0.0604***	–0.00748***	0.255***
	(0.00574)	(0.0390)	(0.000145)	(0.00846)	(0.00141)	(0.0673)
Mktgcosts	2.584***	36.75***	0.0381**	–24.84**	1.858***	–49.36**
	(0.719)	(9.510)	(0.0147)	(14.72)	(0.413)	(16.90)
Size	12.38***	1.873	0.193***	–7.508*	0.521***	–8.791
	(2.378)	(2.438)	(0.0580)	(3.526)	(0.144)	(5.209)
Size Square	–0.352*	0.170	0.000535	–0.0505	–0.0165	0.0761
	(0.164)	(0.171)	(0.00400)	(0.234)	(0.00947)	(0.342)
Age	0.789***	–0.0624	0.0121***	–0.290**	–0.00717	0.0536
	(0.113)	(0.187)	(0.00260)	(0.150)	(0.00768)	(0.291)
Age Square	–0.00733***	0.00181	–0.0000944***	0.00131	–0.000208*	–0.00442
	(0.00105)	(0.00219)	(0.0000234)	(0.00139)	(0.0000894)	(0.00337)
$Dexp_{it-1}$			0.0291***		0.0491***	
			(0.00100)		(0.00412)	
Constant	–110.2***	–38.91***	–2.353***	143.8***	–3.613***	111.8***
	(9.210)	(8.941)	(0.218)	(14.45)	(0.546)	(20.72)
Inverse mills ratio (λ)			–56.61***		–36.05***	
			(2.475)		(4.168)	
Observations	7,706	1,846	6,538	6,538	1,583	1,583

Note. *, **, *** represent the 5%, 10%, and 1% significance levels. The values in parentheses are standard errors.

R&D expenditure (*Rdint*) has an insignificant impact on the food, beverage, and manufacturing sectors. In the case of India, where R&D spending accounts for less than 1% of GDP, this outcome is expected. According to Kapoor and Sinha (2021), India will spend roughly 0.7% of GDP on R&D in 2021. On the other hand, results for embodied technology (*Embodtech*) are significant at 1% for both the food and beverage and manufacturing sectors. It signifies that importing raw materials and capital goods used as inputs in producing intermediate or

Table 3. ***Results for the Manufacturing Sector from Tobit and Heckman Model with Exports as the Explained Variable***

	Tobit Model	Heckman Model	
Variables		**Export Decision of all Manufacturing Sector**	**Export Intensity of all Manufacturing Sector**
Fdidum	–11.63*	0.323**	–11.04*
	(4.926)	(0.123)	(5.627)
Knit	–4.008***	–0.0663***	–1.894*
	(0.566)	(0.0137)	(0.872)
Debtequity	–0.414***	–0.00452*	–0.157**
	(0.106)	(0.00207)	(0.119)
Rdint	114.2	8.183	–332.0
	(205.6)	(5.108)	(230.4)
Embodtech	32.79***	0.840***	29.65***
	(4.133)	(0.113)	(8.033)
Disembtech	–238.0	–0.513	–23.36
	(65.28)	(1.112)	(69.16)
Labpditivity	–0.0338***	–0.00113***	0.0650***
	(0.00541)	(0.000145)	(0.00806)
Mktgcosts	2.398***	0.0406**	–26.25*
	(0.629)	(0.0133)	(10.95)
Size	8.988***	0.174***	–5.635**
	(1.982)	(0.0527)	(3.114)
Size Square	–0.132*	0.00299	–0.192
	(0.138)	(0.00363)	(0.206)
Age	0.757***	0.0123***	–0.312*
	(0.102)	(0.00240)	(0.136)
Age Square	–0.00685***	–0.0000904***	0.00128
	(0.000960)	(0.0000220)	(0.00128)
Indstry	–52.98***	–0.680**	12.63
	(7.864)	(0.238)	(9.537)
$Dexp_{it-1}$		0.0305***	
		(0.000991)	
Constant	–45.21***	–1.699***	123.9***
	(10.47)	(0.298)	(15.06)
Inverse mills ratio (λ)		–54.46***	
		(2.194)	
Observations	9,180	7,782	7,782

Note. *, **, *** represent the 5%, 10%, and 1% significance levels. The values in parentheses are standard errors.

final goods is helping to build technologically advanced goods, thereby increasing the competitiveness of exporters in international markets. The study's findings support Ma and Rauf's (2020) evidence that technology

imports positively impact the recipient firm's export intensity. Disembodied technology (*Disembtech*), on the other hand, reports insignificant impacts.

Productivity (*Labpditivity*) negatively affects the exports of the food and beverage and manufacturing sectors at a 1% significance level. This result contradicts the result hypothesized in theory by Melitz (2003). It means that increases in labor productivity are not causing exports to increase; instead, when productivity increases, firms are expanding their sales by concentrating on the home market. The coefficient of the specific costs (*Mktgcosts*) is significant in our study across both industries and the manufacturing sector, implying that firms' contribution toward payment for marketing, advertisement, and distribution helps firms create awareness about their products, thereby increasing their exports. This result corroborates the study by Ghosh and Roy (2018). Size and age are other firm-specific variables that contribute significantly to explaining firm performance. *Size*, measured by the log (sales), has a positive coefficient in the food and manufacturing sector, while the beverage sector reports no effect. These findings suggest that these are larger firms with enormous resources, taking benefits due to increased size in production by exploiting economies of scale and, lastly, have the risk capacity to overcome sunk costs of exporting and thus achieve greater efficiency, which is finally having an impact on exports. Charoenrat and Harvie (2017) corroborated the same result. Only the food sector reports a nonlinear relationship, signaling that if firms are increasing their size beyond a threshold, there are diseconomies of scale, and it negatively impacts their exports.

The coefficient of *age* for the manufacturing and food products sectors, calculated as the difference between the reporting year and the year of incorporation, is significant because it indicates that older firms can export more readily as they have developed the knowledge and skills necessary to enter international markets through their continued operation and additionally can bear the risks of export market entry. Amornkitvikai et al. (2012) confirmed a positive and significant effect between firm age and export performance. In contrast, the coefficient of age has no impact in the beverage sector, suggesting that firms in this sector continued to focus on the domestic market despite the opening up of the economy. At a 1% level, the age square, which denotes a nonlinear relationship, is statistically negatively significant. It suggests that younger firms, since they are established relatively after the older firms, use more advanced technology, enabling them to penetrate export markets easily and, therefore, are more export-oriented than older firms.

Now, we will present the results of the Heckman model for the food and beverage sector and compare it with the manufacturing sector. Tables 2 and 3 reveal a selection bias issue in the entire sample since the *inverse mill ratio* (λ) is significant at the 1% level; hence, export decision and export intensity are associated (Ha et al., 2020). As a result, the purpose of the study is to understand the behavior of exporting and nonexporting enterprises. So, in order to address the issue of selection bias, the Heckman model is used.

Determinants of the Decision to Export

The variable $Dexp_{it-1}$ denotes lagged exports. It is highly significant and positive, reflecting that exports show persistence in time, i.e., if firms export in the "*t*" period, they will also export in the "*t*+1" period. For the firms looking to enter the export market, FDI (*fdidum*) is a determining variable for firms existing in the food sector and manufacturing. This result leads to accepting hypothesis H1, i.e., export participation and FDI are positively related. However, it is insignificant for the beverages sector. The capital intensity (*Knit*) result is substantial, with a negative indication for the food and manufacturing industry since India lacks a competitive advantage in capital and must use the limited resources and the existing technology at its disposal. The beverages sector reports an insignificant effect. The *debtequity* ratio has a detrimental impact on a firm's decision to enter the export market, showing that financially trapped firms are reluctant to do so because they cannot afford the sunk costs associated with export market entry and instead prioritize serving the domestic market. In-house or domestic R&D activity (*Rdint)* has an insignificant impact on the food and beverage and manufacturing sectors. This finding is different

from the result hypothesized in the literature. The import of technology positively impacts the decision to export through embodied technology (*Embodtech),* as it enhances the production process and results in high-quality goods that meet international standards. The coefficient on disembodied technology (*Disembtech*) has an insignificant effect on the decision of firms to enter the export market. The decision to export is negatively impacted by labor productivity (*Labpditivity*), indicating that most firms operate in their home markets since the perceived risk of doing business abroad is greater than that of doing it domestically.

According to Tables 2 and 3, marketing cost heterogeneity (*Mktgcosts*) benefits a firm's decision to enter the export market. In this opinion, such expenditures help boost awareness of the company's products. The coefficient of *size* significantly impacts the firm's decision to join the export market, as large firms can bear the sunk costs associated with exports. The *age* coefficient positively impacts the food and manufacturing sector, confirming that old-age firms can conveniently enter the export markets as they have gained expertise while operating in the industry, facilitating them to enter new markets. The results confirm the nonlinearity of the *age square* variable with a negative sign.

Determinants of Export Intensity

Among the variables affecting the export intensity of domestic firms, the FDI (*Fdidum*) variable is significant and negative. It signifies that FDI, which is coming, is market-seeking and not export-oriented, as it captures a more substantial share of the domestic market by reducing the percentage of domestic producers and their exports. The findings contradict those of Charoenrat and Amornkitvikai (2021), who discovered a favorable link between FDI and export performance. The capital intensity (*Knit*) and *debtequity* ratio results are similar to the Tobit technique and have the same rationale.

Among the two technology variables, embodied technology (*Embodtech*) is significant with a positive sign. This result is like the one achieved under Tobit. At the same time, the coefficient of R&D (*Rdint*) and disembodied technology (*Disembtech*) have an insignificant effect on export Intensity. This result contradicts the empirical findings by Charoenrat and Pholphirul (2022), which found a positive relationship between R&D and export performance. According to Tables 2 and 3, productivity (*Labpditivity*) benefits the manufacturing sector and across specific industries, in contrast to the Tobit method's result. This conclusion implies that after a firm has opted to enter the market, productivity becomes the decisive criterion for them to continue exporting and for existing exporters. One with great productivity will remain in the market, while others will exit (Sun, 2012). Across all sectors, the heterogeneity evaluated regarding sunk costs, i.e., marketing costs (*Mktgcosts*), is negatively significant. These results suggest that investment in these costs has reached a threshold limit beyond which any expenditure by the firm in these specific costs only adds to production costs raising per unit costs and thus decreasing their export competitiveness.

Furthermore, suppose enterprises can create demand for their product in the home market or improve their market share of current items due to the investment in these costs. In that case, they will sell more domestically rather than export. Increased investment in these costs will reduce exports for such enterprises (Roy & Ghosh, 2018). This result contradicts that produced by the Tobit method.

As far as the variable of size and age is concerned, the coefficient of *size* is significant and negative for the food and manufacturing sector, suggesting that smaller-sized firms have greater export intensity, and this could be due to structural reforms in the industry which could have endowed them with advanced technology and hence making them export more. The coefficient of *size square* is insignificant across industries and for the manufacturing sector. The estimation results also reveal that younger enterprises are more export-oriented than older firms since the *age* coefficient is negatively significant in the manufacturing and food sectors but insignificant in the beverage sector. A nonlinear relationship does not exist in this case.

Conclusion and Policy Implications

This research investigates the impact of FDI on firm-level export performance in the Indian food and beverage manufacturing sector. Heckman and Tobit's methodology examines export performance that includes firm-specific characteristics. From the analysis, we find that FDI significantly determines export performance. Consistent with previous studies, FDI coming to India is still attracted to low-wage and low-skill labor-intensive sectors like food and beverage. Furthermore, research is needed to establish whether India can attract FDI in high-capital-intensive industries and how this will affect exports now. Firm heterogeneity, as measured by FDI, capital intensity, debt-equity ratio, productivity, embodied technology, sunk costs, size, and age, has a significant impact on firm-level export intensity, according to the study's findings. A nonlinear relationship is also observed for the variable's size and age. In general, the government should identify sector-specific obstacles while considering the unique characteristics of specific industries and then create policies that can contribute to increased FDI and export in the sectors involved.

Managerial and Theoretical Implications

According to the paper's empirical evidence, government programs and processes should be such to draw efficiency-seeking FDI, which can help recipient country firms increase their exports and discourage market-seeking FDI, which would otherwise create competition in the domestic economy and drive out domestic firms by capturing their market share. In addition, restrictions related to the import of capital goods and raw materials should be eased along with the reduction in import tariffs, as this would help produce technologically advanced goods that use them as inputs. Furthermore, because India has a competitive edge in labor-intensive products, policymakers should emphasize adopting labor-intensive technologies. To support exports, a policy framework to establish financial markets and institutions that can provide enough credit to exporters and insurance to cover the risks involved with export market entry is thus necessary.

Productivity and human capital skills should be improved by developing appropriate programs to foster them, as productivity increases can lead to efficiency gains in production and cost reduction benefits, allowing only high-productivity firms to enter export markets and produce technologically advanced products.

Limitations of the Study and Scope for Further Research

While evaluating the firms' export performance, the study did not look at improvements in export product quality or export diversification. Second, through spillovers, FDI has an indirect impact on exports. However, this study excludes the spillover variables that could have improved the research findings. Finally, due to data limitations, the problem of foreign capital country of origin's impact on Indian economy exports is not studied, which could serve as a future field of research to be undertaken by scholars.

Author’s Contribution

Gurpriya Sadana contributed to the conception, design, acquisition, analysis, and interpretation of the data.

Conflict of Interest

The author declares no potential conflicts of interest concerning this paper's research, authorship, and publication.

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