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# Analysis of Agriculture Trade Creation and Diversion: India-Japan FTA

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## ABSTRACT

*Agriculture remains a crucial sector of India's economic development, supporting a large share of the population, contributing to rural livelihoods, and ensuring food security. Given this, there are significant concerns about how Free Trade Agreements (FTAs) will affect agricultural trade and, consequently, development outcomes as India becomes more integrated into the global economy. With an emphasis on Trade creation (TC) and Trade diversion (TD), this study investigates how the India–Japan Comprehensive Economic Partnership Agreement (CEPA) affects agricultural trade. Although Free trade agreements (FTAs) are supposed to increase efficiency and welfare by fostering trade, their effects on agriculture are often influenced by enduring distortions, such as tariffs, subsidies, and strict non-tariff measures, including phytosanitary and sanitary standards. These factors are particularly relevant in the context of India and Japan because structural disparities and regulatory barriers may limit the realisation of potential trade benefits. Using panel data for India and its major trading partners from 2004 to 2020 and a gravity model framework, the study empirically evaluates the extent to which the India-Japan CEPA has facilitated agricultural trade. The results indicate that although there is some evidence of trade creation, it remains relatively small, and non-tariff barriers continue to restrict the market access of Indian agricultural exports. TD, however, suggests a reorientation of trade flows, which might not always increase overall efficiency.*

***Keywords**: Agriculture Trade, Economic Development, Rural Livelihoods, Food Security, India-Japan CEPA.*

## Introduction

In this era of Globalisation, economic development is incomplete without International Trade. International trade facilitates increased business activity, improved quality of life, job creation, and a greater variety of consumer goods. Trade and diplomatic ties between countries have become increasingly important for policy-making in recent decades. By entering into trade agreements with member nations, policymakers frequently lower or remove both tariff and non-tariff barriers as foreign policy instruments.

The exponential increase in the number of economic integration agreements (EIAs) over the past 20 years has been the most remarkable development in the world economy, to expedite trade among members and thereby accelerate integration into the global economy (Joshi, 2010). Over the past quarter-century, economic regionalism has spread rapidly worldwide. There are 380 Regional Trade Agreements (RTAs) as of 2026(World Bank). RTAs are defined as groups of countries formed to lower trade barriers between members and are therefore viewed as a path to economic prosperity. Balassa (1961) categorises five types of regional integration according to the degree of integration. These are

Free Trade Area (FTA), Customs Union (CU), Common Market (CM), Economic Union (EU) and Total Economic Integration.

The global economy is currently coping with the aftermath of a global recession and seeking new drivers of growth. In this context, Asia provides some optimism for a model of long-term regional growth based on Asian savings and demand, propelled by regional integration and cooperation. Asian economic integration has evolved in a context of substantial strategic complexity, marked by the economic rise of India and China and the concurrent emergence of production networks across sub-regions.

Asia's economies have undergone market integration over the past two decades, earning it the title of "world factory" (Yang et al., 2013). Since the 1997 financial crisis, Asia has been moving toward greater regional economic integration, as evidenced by the growth of monetary cooperation among neighbouring countries and the proliferation of bilateral free trade agreements.

India has signed multiple FTAs in the previous two decades, mostly bilateral. Although the growth of FTAs and the expansion of international trade have profoundly changed the dynamics of global trade, their effects are not consistent across sectors. Due to its economic, social, and political sensitivity, agriculture holds a special place among these, especially in developing nations like India. In contrast to manufacturing, agricultural trade is still influenced by a complicated system of tariffs, subsidies, and strict non-tariff regulations that affect competitiveness and market access. Because of this, FTA effects in agriculture frequently deviate from theoretical predictions, making it a crucial area for empirical research.

Analysing TC and TD in the agricultural sector becomes particularly pertinent in this context. By allowing nations to import from more productive producers within the agreement, tariff reductions under free trade agreements are anticipated to promote trade creation. However, due to non-tariff barriers and domestic agricultural support policies, FTAs can also lead to TD, in which imports shift from more efficient non-member countries to less efficient partner nations. As a result, the agricultural industry offers a crucial lens through which the true efficacy of FTAs can be evaluated, particularly with respect to trade efficiency and welfare implications.

In light of this, analysing specific bilateral agreements enables a more sophisticated understanding of how these theoretical results manifest in practice. IJCEPA is one such significant accord. Both Japan and India have gradually moved away from a multilateral trade liberalisation strategy under the WTO framework over the last 20 years and toward bilateral and regional trade agreements. A significant step toward strengthening economic ties between the two countries was the signing of IJCEPA on February 16, 2011, which went into effect in August of the same year following lengthy negotiations.

The IJCEPA case is especially pertinent to the analysis of agricultural trade because, despite significant tariff reductions, the sector is still only partially liberalised. Agricultural trade remains severely hampered, even though both nations agreed to remove tariffs on a sizable share of traded goods—India on about 90% of imports from Japan and Japan on about 97% of imports from India. The complex trade environment created by Japan's strict sanitary and phytosanitary (SPS) regulations and India's domestic support policies may limit trade creation while also potentially causing trade diversion. Therefore, examining bilateral agricultural trade flows under IJCEPA provides important insights into whether FTAs lead to significant trade growth in sensitive industries such as agriculture (Mouzam, Mahadevaiah, Kallumal, & Jagdambe, 2016; Mouzam, 2017; Raghavan, 2011).

- **India-Japan Trade**

In both the import and export baskets, Japan is currently India's more important partner than India is for Japan. India's importance in Japanese exports has increased. Its importance in imports, however, has all but stagnated. On the other hand, Japan's importance to India has diminished during the period in question, in both imports and exports (Das 2014), as shown in Fig. 1 below. There is a substantial gap between India's merchandise exports and imports with Japan. From 2000 onward, India’s imports to Japan totalled $2.21 billion, while exports were only $1.8 billion. This gap widened further in 2010, when both exports and imports increased fourfold, raising it to $3.46 billion. Post the signing of the India-Japan CEPA, trade between the two countries increased significantly. In 2021, India imported $14.41 billion of goods, while exports also expanded to $8.3 billion.

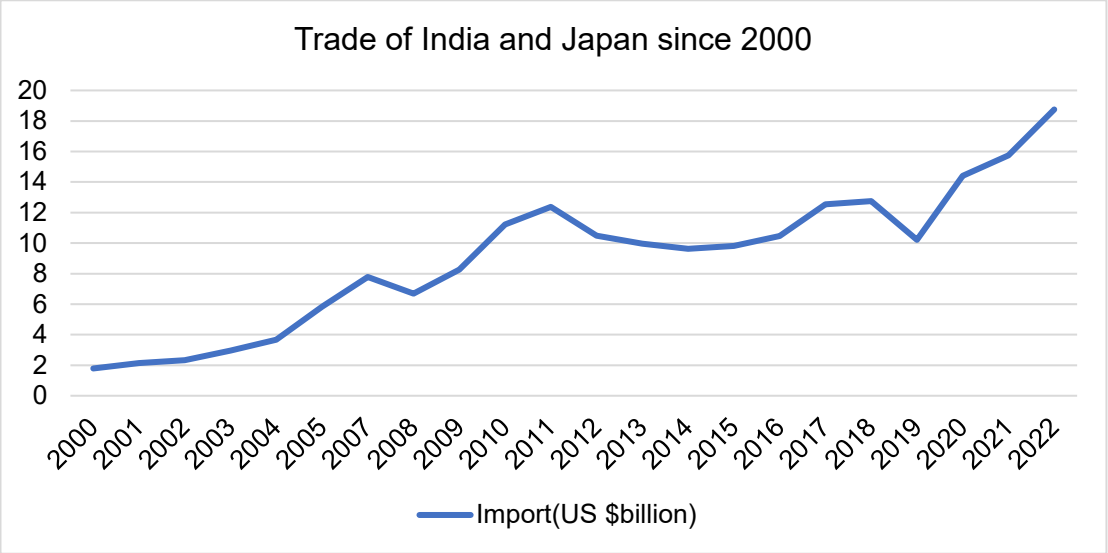


**Figure 1: India's Merchandise Trade with Japan**

Source: Author's calculation from data available on UNCOMTRADE

As an agriculturally abundant country, India primarily exports agricultural goods, as shown in Figure 2. India's agricultural exports to Japan are relatively large in comparison to imports. For instance, in 2011, when the IJCEPA agreement was signed, Indian agricultural exports to Japan were $823093 billion, while imports were merely $ 5740 billion.

Given this trend in agricultural exports, this paper focuses on the analysis of agricultural trade between India and Japan.

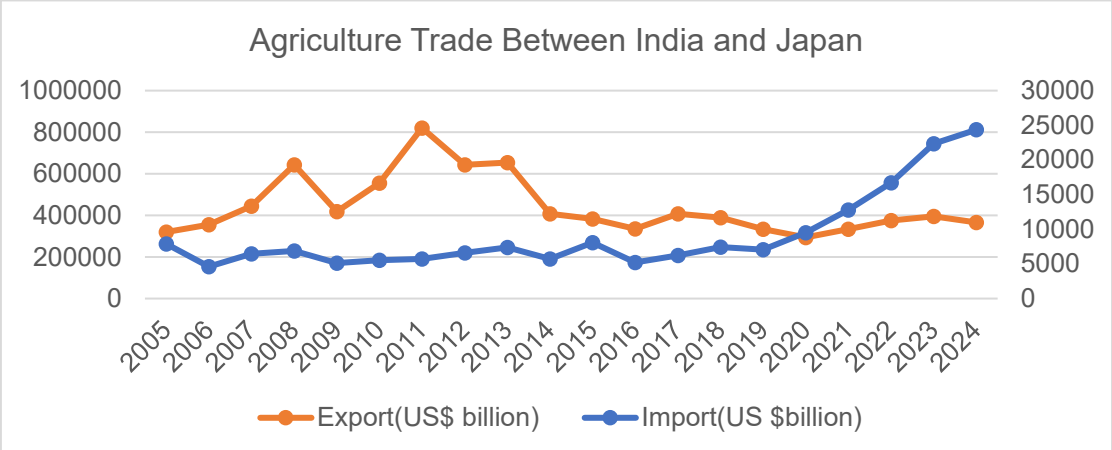


**Figure 2: India's Agricultural trade with Japan**

Source: Author's calculation from data available on UNCOMTRADE

**Review of Literature**

Numerous studies have analysed India's FTAs, including **Ahmad (2005),** who investigated the sectoral economic impact of the India-ASEAN FTA using the GTAP and SMART models. **Raihan and Salim (2009)** attempted to evaluate the economic effects of three preferential trade agreements involving India: the South Asian Free Trade Agreement (SAFTA) and the India-Singapore Comprehensive Economic Cooperation Agreement (CECA). The study concluded that IAFTA will benefit both parties in terms of welfare, the economy, and employment, but the specific benefits for India-Japan relations are few.

**Mouzam (2011)** studied the impact of India-Japan CEPA on agricultural goods. The study sought to identify commodities for which India should adopt a defensive trade stance with Japan, as well as potential agricultural products that would benefit from increased exports. The goods were selected using Revealed Comparative Advantage (RCA) and Bilateral Revealed Comparative Advantage (BRCA) for the time period of 2007 to 2018. Due to Japan's high non-tariff barriers, the competitiveness of agricultural commodities declined after the FTA was signed, from 466 agricultural and allied products with a BRCA index exceeding 1 to 441. Additionally, the agreement opened export markets for several goods by eliminating tariffs. Following tariff liberalisation, some commodities experienced notable increases in exports, including chickpeas, sesame oil, cottonseed oilcake, and opium sap. The need for cautious trade strategies and protective measures was underscored by the potential risks posed to domestic producers by rising imports of sensitive products. Overall, the study shows that while the FTA created new export opportunities, the impact on India's agricultural trade with Japan remains shaped by non-tariff barriers and heightened import competition.

**Bhattacharyay and Mukhopadhyay (2015)** analysed the advantages and challenges of the 2011 Comprehensive Economic Partnership Agreement (CEPA) between Japan and India, focusing on how to optimise the benefits of their complementary economies, trade, and FDI ties. Additionally, it quantifies the partnership's contribution to regional and global integration and its overall economic impact. Given the other nation's significance in global trade, trade intensity indices indicate that bilateral trade flows are minimal, suggesting substantial room for improvement. According to the computable general equilibrium (CGE) analysis of CEPA's overall economic impact, tariff reductions will marginally boost output growth in both Japan and India relative to the business-as-usual scenario.

**Gaurav and Bharti (2018)** studied the services under the India-Japan CEPA. This study employed both qualitative and quantitative methods. To assess the policy-level pledges and obligations, a qualitative analysis of the General Agreement on Trade in Services and the Comprehensive Economic Partnership Agreement between India and Japan was conducted. Using the Revealed Comparative Advantage (RCA) index, the quantitative study examined key prospective sectors for services trade between Japan and India. In total, 12 services were considered for the study. The RCA index results confirmed that India has a comparative advantage in commercial services, other business services, and computer and information services. In contrast, Japan has a comparative advantage in transportation, construction, and royalty and licence fee services. As a result, the two nations can complement one another. This demonstrated significant overlap between Japan and India across many service categories and highlighted substantial potential to expand their service trade.

It is crucial to empirically investigate whether FTAs result in net welfare gains through TC or losses through TD, given agriculture's strategic significance and the asymmetric nature of trade agreements.

The analysis of TC and TD in the agricultural sector will be the particular focus of this paper.

The Data will be collected from the following sources

**Table 1: List of Descriptions of Variables and their respective Data Sources.**

| Description of Variables | Sources of Data |
|---|---|
| Agricultural Exports | Trade Map & UN COMTRADE |
| GDP | WB-WDI |
| Population | WB-WDI |
| Distance | CEPII |
| Common Official Language | WB-WDI |
| Adjacency | WB-WDI |
| FTA | CEPII |

**Model**

There are multiple strategies for empirically evaluating FTAs. Baier and Bergstrand (2004) employed a qualitative choice model within a complex general equilibrium framework. To evaluate the trade, tariff revenue, and welfare consequences of FTAs, a partial equilibrium model, such as Software for Market Analysis and Restrictions on Trade (SMART), can be employed. Although SMART's main advantage is its ability to produce product-level estimates, the analysis it provides is highly sensitive to the elasticity values used in the model.

As a result, Veeramani and Saini (2011) used an alternate strategy—estimating a gravity model—to support the findings from the SMART analysis. Unlike the SMART model, the gravity model is independent of any pre-established elasticity parameters. Therefore, the gravity model's projected import estimates complement the results from SMART simulations. Evaluating trade flows and the consequences of FTAs, customs unions, tariff effects, and other factors has been extensively studied using the gravity model, an econometric framework. This model can be used to understand the effects of FTAs on TC and TD. The fundamental advantage of using the gravity model is that it allows one to examine the effects of a single variable while controlling for other variables that influence trade flows.

In social science and economics, the gravity model is a theoretical framework that explains how two entities interact based on their sizes and the distance between them.

One important analytical tool for determining how trade policies affect trade flows is the gravity model. Tinbergen first applied the gravity model to international trade in 1962.

This event represented a significant advancement in global trade. The Gravity model was employed by Pöyhönen (1963), Anderson (1979), and Bergstrand (1985, 1989) to analyse international trade flows. Linnemann (1966) expanded the gravity model by incorporating additional variables that affect trade flows. trade. One of the primary critiques of the gravity model concerned its perceived theoretical weaknesses. However, several scholars, including Anderson (1979), Bergstrand (1985, 1989), Deardorff (1995), Helpman (1987), and Helpman and Krugman (1985), have addressed this critique by extending the gravity equation to incorporate established trade theories. Rather than being used for future forecasting, the gravity model is a retrospective model that assesses the consequences of policies that have already been put into place. This is an example of a gravity analysis constraint. According to Greenaway and Milner (2002), the effects of FTAs on TC and TD have been evaluated using the gravity model.

The study will employ a specific gravity model specification, utilising a dummy variable for FTA membership, to assess the effects of TC and diversification. The aforementioned model can be applied to datasets comprising country-pairs for a single year (cross-sectional data) or for multiple years (panel data), and it aims to analyse time-series data. The primary application of gravity modelling has been to investigate trade effects, rather than welfare effects.

Sir Isaac Newton is credited with developing the law of universal gravitation. According to the law of universal gravitation, which was developed by Sir Isaac Newton, the degree of attraction between two objects is inversely proportional to the square of their separation and directly proportional to the product of their masses. Tinbergen (1962) used a gravity model to predict international trade volumes. As suggested by Head (2003) in International Trade, a more comprehensive expression of economic interactions can be derived from Newton's law of universal gravitation. One popular model in the analysis of international trade is the gravity equation. It illustrates how two nations' trade flows relate to each other based on their respective economic sizes and distances. One popular model in the analysis of international trade is the gravity equation. It illustrates how two countries' trade flows relate to each other based on their respective economic sizes and distances.

$$F_{jk} = G\frac{M_j M_k}{D_{jk}^c} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1.1)$$

Here,

$F_{jk}$ represents the force of attraction, $M_j$ = Mass of the object j,$M_k$= Mass of the object k,$D_{jk}$ = Distance between $M_j$ and $M_k$, and G = Gravitational Constant

Timbergen (1962) used a similar gravity-type framework and provided a more general expression for the study of trade flows (Head, 2003).

$$X_{jk} = P\frac{M_j^a M_k^b}{D_{jk}^c} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1.2)$$

Here,

Where:

- $X_{jk}$represents the bilateral interaction between countries $j$and $k$;
- $P$denotes a constant parameter;

- $M_j$and $M_k$represent the economic sizes of the exporting and importing countries, respectively; and
- $D_{jk}$measures the geographical distance between the two trading partners.

Where, a=b=1, and c=2

Equation (1.2) corresponds to Equation (1.1)

Taking the logarithm of equation (1.2), the equation can be represented as

$$\ln X_{jk} = \ln P + \alpha \ln M_j + \beta \ln M_k - c \ln Dis_{jk} \quad \text{..... (1.3)}$$

**Econometric Expression of the Gravity Equation**

Representing the basic form of the gravity equation in the log form as :

$$\ln X_{jk} = \alpha + \beta \ln M_j + \gamma \ln M_k + \varepsilon \ln Dis_{jk} + \varepsilon_{jkt} \quad \text{.....(1.4)}$$

In this specification, bilateral trade flows between country *j* and country *k* are captured by $X_{jk}$, which serves as the dependent variable. The economic sizes of the two countries are proxied by their respective Gross Domestic Products, represented by $M_j$and $M_k$. The geographical separation between the two trading partners is measured by $D_{jk}$, which reflects transport costs and other distance-related trade barriers. An error term is included to account for unobserved factors influencing trade flows.

The rationale for performing a logarithmic transformation of variables is to facilitate the analysis of associations when a nonlinear relationship exists between the independent and dependent variables. In addition, the parameters indicate the degree of elasticity between the dependent and independent variables. This validates the interpretation that the parameters indicate the elasticities of the explained variable with respect to the explanatory variables after taking logarithms of the variables. Examining equation (1.4), β (the estimated coefficient of the gross domestic product) shows that a 1% increase or decrease in GDP is expected to result in a β-point increase in trade.

- **The Augmented Gravity Model**

Traditionally, the gravity model was constrained to a limited set of explanatory variables. Nonetheless, additional variables have been incorporated to assess their effects on bilateral trade. Equation (1.5) presents the augmented gravity model, in which all continuous variables are expressed in logarithmic form. The research conducted by Martínez-Zarzoso, Felicitas, and Horsewood (2009), which examined the expanded dimensions of TC and TD through exports and imports, introduced three Free Trade Agreement (FTA) dummies to address the trade effects of FTAs on both member and non-member entities.

$$\boldsymbol{\ln Y_{jk} = \beta_0 + \beta_1 GDP_{jt} + \beta_2 \ln GDP_{kt} + \beta_3 \ln Pop_{jt} + \beta_4 \ln Pop_{kt} + \beta_5 \ln Dis_{ij} + \beta_6 Adj_{jk} + \beta_7 ComLang_{jkt} + \beta_8 ICJEPAboth_{jkt} + \beta_9 ICJEPAexp_{jkt} + ICJEPAimp_{jkt} + \varepsilon_{jkt}} \quad \text{..... (1.5)}$$

In equation 1.5, agricultural trade flows between country pairs at time *t* serve as the dependent variable. The constant term is represented by $\beta_0$. The economic size of the trading partners is captured through their respective Gross Domestic Products, denoted as $GDP_{jt}$and $GDP_{kt}$, while population variables $Pop_{jt}$and $Pop_{kt}$are included to reflect market size effects.

The geographical distance between the two countries, $Dis_{jk}$It is incorporated as a proxy for transport costs and other trade frictions. This distance is calculated using the great-circle distance formula based on the latitudes and longitudes of the respective capital cities, following Ruiz and Vilarrubia's approach.

Additional dummy variables are included to capture bilateral characteristics that may facilitate trade. The variable $Adj_{jk}$accounts for geographical contiguity, taking the value 1 when the two countries share a common border and 0 otherwise. Similarly, $ComLang_{jk}$reflects the presence of a shared official language between trading partners.

To evaluate the effects of the India–Japan Comprehensive Economic Partnership Agreement, a set of policy dummies is introduced. The variable $IJCEPA_{jkt}^{both}$captures intra-regional trade effects when both countries are members of the agreement in a given period. A positive, statistically significant coefficient for this variable indicates trade creation, whereas a negative, significant coefficient suggests trade diversion.

Furthermore, asymmetric effects are examined through two additional variables. The term $IJCEPA_{jkt}^{exp}$ identifies situations where only the exporting country is a member of the agreement, thereby capturing export-side effects. Likewise, $IJCEPA_{jkt}^{imp}$ reflects cases in which only the importing country participates in the agreement, enabling identification of import-side impacts. The sign and significance of these coefficients determine whether the agreement leads to trade creation or diversion in each case.

Finally, the error term $\varepsilon$ captures all other unobserved factors influencing bilateral trade flows.

Various methods, such as ordinary least squares, maximum likelihood estimation, and panel data techniques, can be used to estimate the parameters of the gravity model and to conduct regression analysis, which is widely used across various fields of study. Unobserved variables may correlate with the observed explanatory variable. In this scenario, Ordinary Least Squares (OLS) estimates will be biased. In contemporary literature, panel data methodologies have been utilised to address the heterogeneity commonly encountered in ordinary least squares (OLS) estimates. Fixed Effects (FE) and Random Effects (RE) are commonly employed to estimate gravity models in panel data settings. The fundamental principle of FE estimation is that the intercept terms are assumed to differ across individuals while remaining constant over time. Unlike the RE model, it assumes that intercepts are randomly distributed and not contingent on the independent variable. The Hausman test is commonly used to determine whether to use an FE or an RE model. FE are a useful method for estimating coefficients in panel data analysis. However, it is important to note that FE are not appropriate for estimating coefficients on variables that remain constant over time, such as distance, a common official language, and contiguity. Due to multicollinearity issues. The basic gravity equation typically incorporates factors such as distance, adjacency, and shared official language to account for trade costs. Anderson and van Wincoop (2003) proposed that the aforementioned factors may not be reliable indicators of trade costs. In the gravity literature, the notion of Multilateral Trade Resistances (MTRs) was first introduced by Anderson (1979). Moreover, the utilisation of MT was popularised by Anderson and van Wincoop in 2003.

The study will use panel data covering the period from 2005 to 2024. The Cross-Sectional units will comprise 20 countries, including India and Japan, as well as India's top 20 trading partners in 2022. These 20 countries together account for approximately 80% of India's total trade.

**Results**

The results of the gravity model are shown in Table 2. The baseline results from pooled OLS are first shown in column 1 (Table 4.5). We also use OLS with FE, such as year and country-pair FE, to evaluate whether unobserved heterogeneity across time and country pairs affects the outcomes. The results are shown in Column 2 (Table 5). Finally, to address heteroskedasticity and zero trade flows, we estimate the model using PPML with year and country-pair FE. Column 3 of Table 4.5 displays the findings.

**Table 2: Results of the Gravity Model**

| | (1) | (2) | (3) |
|---|---|---|---|
| **Variables** | **Pooled OLS** | **OLS with FE** | **PPML with FE** |
| *lnGDPjt* | .4575206*** (0.176189) | -0.0016817 (.053237) | - |
| *lnGDPkt* | .3456035*** (.0121192) | .5746775*** (.0402698) | - |
| *lnPopjt* | .2972337*** (.0137748) | -.3291847*** (-.0931732) | |
| *lnPopkt* | -.05788175*** (.015025) | .4794878*** (.0898723) | |
| *Disjk* | -.6678143*** (.030063) | - | - |
| *Adjjk* | .7651701*** (.109358) | - | - |
| *ComLangjk* | .9462977*** (0.0893056) | - | - |
| *IJCEPAbothjkt* | -1.177523*** (.2832787) | .3691802** (.1874877) | -.581391*** (0.0965913) |
| *IJCEPAexpjkt* | -1.136457*** (.0868757) | -.1313513** (.0931732) | .2233041** (.1141467) |
| *IJCEPAimpjkt* | 1.561904*** (.948655) | .145749** (.4794878) | -.1630426 (.1300033) |

Note: Standard errors are written in parenthesis *** p< 0.01, **p<0.05, * p<0.1
Source: Author's compilation

In Table 2 above, Column (1) reports the results from pooled OLS estimation. The coefficients for both exporting and importing countries are positive and significant, indicating that, as GDP increases, agricultural trade flows increase. Trade flows between partners increase by 0.34%, and agricultural trade by 0.45%, for every 1% increase in the exporting nation's GDP. A 1% increase in the number of exporters boosts agricultural trade by 0.29%, according to the positive and significant coefficient on the population of exporters.

Trade flows between partners increase by 0.34%, and agricultural trade by 0.45%, for every 1% increase in the exporting nation's GDP. A 1% increase in the number of exporters boosts agricultural trade by 0.29%, according to the positive and significant coefficient on the population of exporters. If countries share a border and a common language, trade tends to flow more in agricultural goods, as the results suggest. Dummies *IJCEPAbothjkt* and *IJCEPAexpjkt* are negative and significant, while the coefficient of *IJCEPAimpjkt* is positive and significant.

Column (2) in Table (2) represents the gravity model results of OLS withFE. The GDP of the exporting country is surprisingly negative, though insignificant. The GDP of the importing country is negative and significant. The population of the exporting country is negative, while the population of the importing country is positive. Dummy coefficients *IJCEPAbothjkt* and *IJCEPAimpjkt* are positive, while that of *IJCEPAexpjkt* is negative.

Column (3) displays the primary model we used, PPML, with country-pair and year FE. Variables that do not vary over time across countries become perfectly collinear with the fixed-effects dummies and will be automatically excluded from the estimation, as this study used PPML with FE (country-pair and year). IJCEPAexpjkt has a positive coefficient, whereas IJCEPAbothjkt and IJCEPAimpjkt have negative coefficients.

The percentage effects of TC and TD of agricultural goods were computed using the transformation [( $e^{\beta}$- 1) x 100][1]. The findings show conflicting evidence across different estimation methods, as shown in Table 3. With intra-bloc trade falling by 69.2% and import diversion rising sharply by 375.6%, the pooled OLS estimates indicate substantial TD. With intra-bloc trade rising by 44.6% and comparatively smaller diversion effects, the OLS model with FE, on the other hand, demonstrates evidence of trade creation. The PPML estimates, which are considered more reliable in gravity models, show a 44.1% decrease in intra-bloc trade, a 25% increase in exports, and a 15% decrease in imports. Overall, the PPML results point to TD rather than TC as a result of the agreement. This suggests that the FTA may not have significantly increased trade among member nations and may have redirected trade away from more productive non-member partners.

**Table 3: Estimated TC and TD effects for agricultural products under the India–Japan CEPA**

| Trade Creation/Diversion | Pooled OLS | OLS with FE | PPML |
|---|---|---|---|
| Intra-block Trade | -69.2% | 44.6% | -44.1% |
| Export Effect | -67.9% | -12.3% | 25.0% |
| Import Effect | 375.6% | 15.7% | - |
| Overall Effect | TD | TC | TD |

Note: Only significant coefficients have been included
Source: Author's own calculation

## Conclusion

Using a gravity framework, this study looked at how the FTA affected agricultural trade. Pooled OLS, FE OLS, and PPML models were used to estimate the effects. The results show conflicting evidence for different estimation methods. The pooled OLS and PPML estimates indicate TD effects, whereas the fixed-effects OLS results indicate trade creation.

The PPML results reveal decreases in intra-bloc agricultural trade and asymmetric export and import responses, which are thought to be more robust in the presence of heteroskedasticity and zero trade flows. This suggests that trade in the agricultural sector has not increased significantly as a result of the agreement and may have instead been diverted from more productive non-member nations.

Overall, the findings point to the FTA's continued limited success in fostering agricultural trade integration. The results emphasise the critical need to address structural limitations that could constrain the potential benefits of trade agreements in agriculture, such as non-tariff barriers, supply-side inefficiencies, and disparities in comparative advantage.

[1] based on the expression used by Plummer, Cheong and Hamanaka (2010)

To ensure that FTAs result in meaningful TC rather than diversion, the study recommends that future trade policy focus on increasing competitiveness, improving market access, and reducing trade frictions.

**Industrial Goods**

Throughout the analysis, a common basket of industrial products was used to guarantee comparability across the three FTAs. This method makes it possible to attribute discrepancies in estimated trade effects more to the agreements than to differences in product composition.

The analysis concentrates on a few key industrial products because there isn't a consistent aggregate industrial trade series for the whole study period. The industrial trade dataset was created by combining these products, which were selected based on their importance in India's trade with each FTA partner.

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