

India in the Global and Regional Trade: Aggregate and Bilateral Trade Flows and Determinants of Firms' Decision to Export

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Objectives of the Paper

- **To examine the impact of Regional Trade Agreements (RTAs)/Preferential Trade Agreements (PTAs) on India's trade flows**
- **To examine the incentives to export by firms in India (since 1995)**

Brief Literature Review

- **Conclusions from vast empirical literature on the preferential trade agreements have been ambiguous with some finding them to be trade creating and others diverting**
- **Important Recent Contributions: Soloaga and Winters (2001) - attempts to estimate the effect on a country's trade flows of its and its trading partners' membership (or otherwise) of a PTA**
- **Found no evidence that recent PTAs boosted intrabloc trade significantly but instead found trade diversion in the European Union (EU) and European Free Trade Area (EFTA)**
- **The model of Soloaga and Winters (2001) :**

$$\sum_k b_k P_{ki} P_{kj} + \sum_k m_k P_{ki} + \sum_k n_k P_{kj}$$

where P_{ki} (P_{kj}) = 1 if country i (j) is a member of the k^{th} PTA (Saloaga and Winters consider nine PTAs) and zero otherwise

Thus b_k measures the intra-bloc effect, i.e., the extent to which bilateral trade is larger than expected when both i and j are members of k ,

m_k measures the effect of i being a member of k on its imports from j (i.e., exports from j to i) relative to all countries and

n_k is the effect of j being a member of k on its exports to i (i.e., imports of i from j) relative to all countries

m_k and n_k measure the effects of general trade liberalization and trade diversion of discriminatory trade liberalization agreements, while b_k measures the effect on intra-bloc trade over and above the non-discriminatory trade effect

Adams, et al. (2003)

- **Their gravity model is very close to that of Soloaga and Winters**
- **Their full sample data consists of 116 countries over 28 years (1970-97)**
- **Their findings are:**
 - Out of 18 recent PTA, as many as 12 have diverted more trade from non-members than they have created among members**
 - Trade diverting PTAs, include the more liberal ones such as EU, NAFTA and MERCOSUR**

De Rosa (2007)

- **Critically examines the findings of Adams, et al. (2003) using the gravity model of Andrew Rose (2002) and incorporating Soloaga and Winters (2001) dummies for PTA membership**
- **Uses updated data cover the period 1970-99 and 20 PTAs, as compared to 1970-97 and 18 in Adams, et al.**
- **Did not find any major faults in the methodology of Adams, et al. (2003)**
- **Yet contrary to them found a majority of the 20 PTAs to be trade creating**

Our Model of India's Export Flows

The estimated model for India's export flows X_{jt} to country j in year t is:

$$\begin{aligned} \log X_{jt} = & \alpha_0 + \alpha_1 \log(GDP_{jt}) + \alpha_2 \log(Pop_{jt}) + \alpha_3 \log(Distance_j) + \alpha_4 \log TR_{jt} \\ & + \alpha_5 RER_{jt} + \alpha_6 Lang_{jt} + \alpha_7 D(t) + \sum_k \beta_k P_{kjt} + \sum_k m_k P_{kit} + \varepsilon_{jt} \end{aligned}$$

Where GDP_{jt} = GDP of country j in year t .

Pop_{jt} = Population of country j in year t .

$Distance_j$ = Distance between India and country, measured as the average of distance between major ports of India and j .

TR_{jt} = Average effective import tariff country j .

RER_{jt} = Bilateral Real Exchange Rate between India and country j , Rupees per unit of foreign currency.

$Lang_j$ = Measure of linguistic similarity between India and country j .

P_{kjt} = A dummy taking the value 1 if country j is a member of k^{th} PTA in year t . We consider 11 PTAs including SAFTA.

P_{kit} = A dummy which takes the value 1 if India is a member of k^{th} PTA in year t .

Assumptions

- Since we are estimating the flows of a single country, India, its GDP and population in year t and any other time varying aspects relating to India are common to all our trading partners and are captured in a time dummy $D(t)$
- Second, the parameter β_k combines the parameters b_k and n_k of Solaga and Winters (2001) model
- The model for import flows of India is basically the same except the tariff variable which refers to India's average effective import tariff, absorbed in the time dummy
- The model for total trade flows is the same as that for export flows

Data Sources

- The data used are annual bilateral trade flows of India for the period 1981-2006 for 189 countries.
- We have included a total of **21 PTAs**, some of which are bilateral trade agreements.
- Data on GDP, GDP per capita, population, total exports, total imports and exchange rates are obtained from the *World Development Indicators (WDI)* database of the World Bank, and the *International Financial Statistics (IFS)*.
- Data on India's exports of goods and services, India's imports of goods and services from and India's total trade of goods and services (exports plus imports) with the world are obtained from the *Direction of Trade Statistics Yearbook* (various issues) of IMF
- GDP, GDP per capita are in constant 1995 US dollars. GDP, total exports, total imports, India's exports, India's imports and India's total trade are measured in million US dollars.
- Population of the countries are in million.
- Data on the exchange rates are units in national currency per US dollar.

Data

MFN Tariff:

- **The MFN tariff is taken from UNCTAD Handbook of Statistics database**
- **Here the MFN is taken as a simple average of tariffs for "Manufactured Goods, Ores and Metals"**
- **The actual classification as per SITC code is**
- **Manufactured goods: 5+6+7+8-68**
- **Ores and Metals: 27+28+68**
- **5.0 Chemicals and related products**
- **6.0 Manufactured goods classified chiefly by material**
- **7.0 Machinery and transport equipment**
- **8.0 Miscellaneous manufactured articles**
- **27. Crude fertilizers and crude materials (Excluding Coal)**
- **28. Multi ferrous ores and metal scrap**

Findings

- **Greater distance reduces bilateral trade**
- **Larger GDP and Population enhance trade**
- **Similarity of language is also a significant determining factor**
- **Tariff of the importing countries is an important determining factor which affects India's export flows negatively. An increase by 1% of import tariff by the importing country shows a decline in India's export by more than 10% in FE, RE and Tobit models**
- **Increase/decrease in exchange rate in terms of INR increases/decreases India's import/export significantly**
- **Time dummy is significant for most of the years**

Export Flows

PTA_m	Impact
SAFTA	-ve (Pooled OLS)
Bangkok	-ve (Pooled OLS)
BIMSTEC	-ve (FE, RE, Tobit)
EU	+ve (Pooled OLS)
MERCOSUR	+ve (Pooled, FE, RE, Tobit)
ASEAN	+ve (FE, RE, Tobit)
SACU	+ve (Pooled OLS, RE, Tobit)
NAFTA	-ve (Pooled OLS, FE, RE, Tobit)
CIS	-ve (Pooled OLS, RE, Tobit)
EFTA	-ve (Pooled OLS)
EUSA	-ve (Pooled OLS, RE, Tobit)
EUALGR	-ve (Pooled OLS, FE, RE, Tobit)
EUTURK	-ve (Pooled OLS)
APEC	-ve (Pooled, Fe, RE, Tobit)
ANDEAN	-ve (Pooled OLS)
OECD	+ve (Pooled OLS)
CARICOM	+ve (Pooled OLS)

Import Flows

PTA_x	Impact
SAFTA	-ve (FE, RE, Tobit)
Bangkok	-ve (Pooled OLS)
BIMSTEC	+ve (Pooled OLS, FE, Tobit)
MERCOSUR	+ve (FE, RE, Tobit)
CIS	+ve (FE, RE, Tobit)
GCC	+ve (Pooled OLS)
NAFTA	-ve (FE, RE, Tobit)
ASEAN	-ve (Pooled OLS, FE, RE, Tobit)
SACU	-ve (Pooled OLS)
EUALGR	-ve (RE, Tobit)
APEC	+ve (Pooled OLS)
ANDEAN	-ve (Pooled OLS)
CARICOM	+ve (Pooled OLS)
AUSTNZ	-ve (Pooled OLS, FE, RE, Tobit)

Determinants of Export Decision of Firms

Brief Literature review

- **One robust finding of the literature(Bernard, Jensen, Redding and Schott (2007)), based on wide range of countries and industries, is - exporting firms tend to be larger, more productive, more intensive in skill and capital and pay higher wages than non-exporting firms**
- **Roberts and Tybout (1997) and Aitken, Hanson and Harrison (1997) examine factors influencing the export decision**
- **They found that sunk costs are important influences on the export performance of firms**
- **They also provide evidence supporting that firm characteristics are important and find that firm size, firm age and the structure of ownership are positively related to the propensity to export**
- **Melitz (2003) provides a mechanism for today's export decision by the firm to influence its future decision to export by incorporating entry costs in a dynamic framework**

Our Model of Determinants of Export Decisions of Indian Manufacturing Firms

- Specified the factors that increase the probability of exporting and the quantity of exports) and estimated their quantitative significance in the labour intensive sectors and manufacturing sectors in India**
- Specified a time lag for all firm characteristics and other exogenous variables of one year to avoid simultaneity problems**

Export Decision

- Firms' export decision (probability of exporting) is captured by the binary form of the export propensity as a 1 if the firm exported in year t and 0 otherwise. We estimate by using Probit and Logit models.
- The model postulated for the present study is as follows:

$$Y_{it}^* = \alpha + \beta X_{it-1} + \theta Y_{it-1} + \mu_{it}$$

Y_{it} = 1 if firm i exports at time t

= 0 otherwise with $\text{prob}(Y_{it}=1) = \text{prob}(Y_{it}^* > 0)$

X_{it-1} are the firm-specific characteristics like firm size, labour productivity, R&D, selling costs, wages & salaries, net fixed assets, foreign ownership dummy etc.

Y_{it-1} the lagged export status is the proxy for sunk costs

Export Performance

- Firms export performance (quantity of exports) is captured by the binary form of the export propensity as a percentage of total sales if the firm exported in year t and 0 otherwise. We estimate by using Tobit model with a binary variable

The structure of the Tobit model panel data with random effects would be:

$$Y_{it}^* = \alpha + \beta X_{it-1} + \theta Y_{it-1} + \mu_{it}$$

- $Y_{it} = Y_{it}^*$ if $Y_{it}^* > 0$ (the value exported as a percentage of sale by firm i in year t)
= 0 otherwise

where, Y_{it} is a linear function of (X_{it-1}) , the firm-specific characteristics like firm size, labour productivity, R&D, selling costs, value added per worker etc.

- Y_{it-1} is the lagged export

Determinants of Export Decision **of Indian Manufacturing Firms**

We assume that both firm heterogeneity and sunk costs are likely to be important in decision to export for all manufacturing firms, regardless of their labour-intensity

Sunk Costs

- **Sunk costs are costs associated with entering foreign markets and any fixed entry costs that may have the character of being sunk (i.e. once incurred can not be recovered) in nature**
- **Here sunk cost is inferred from the sequence of exporting and non-exporting years, rather than frequent and apparently random switching between the two**
- **Also lagged export status has been taken as the proxy for sunk costs**

Entry & Exit

- In **labour intensive activities** across all the 103 possible sequences of exporting and non-exporting for the seven years from 2000-2006 show that **33 % of firms exports in all seven years** and an equally large fraction, **30 %**, **never export**
- In the **all manufacturing firms** – fraction of **firms who never exported doubled to 41%** as compared to **21%** who exported throughout the period

Other Explanatory Variables

1. *Foreign Ownership* - dummy variable which is equal to 1 if firms either have a Joint ventures/Collaboration/foreign parent and 0 otherwise
2. *Size of the Firm* - measured by the value of its total production and total number of employees
3. *R & D* – R &D expenditure as proportion to sales
4. *Wages* – Total wage bill as proportion of sales
5. *Labour Productivity* – measured as net value added per worker and as a ratio of net value added to total wages and salaries
6. *Selling Cost* - Marketing and sales expenses as a percentage of sale
7. *Energy Intensity* - power and fuel expenditure as a proportion of sale
8. *Capital Intensity* – measured in terms of net fixed asset as a proportion of sale is $\frac{\text{total fixed assets net of accumulated depreciation}}{\text{sales}}$
9. *Profitability* – Profit before tax
10. *Import Intensity*

Data for Firm Level Study

- i) Centre of Monitoring Indian Economy (CMIE) data on firms producing labour intensive manufacturers (Sectors with a capital-labour value less than the simple average of 15.45 over all firms has been considered as labour intensive sector)**
- ii) Time-series data for the period 1995-2006 on manufacturing firms again from CMIE and**
- iii) Data from Confederation of Indian Industry (CII) for the year 2004-05 on manufacturing firms**

Findings

- Exporting firms are generally large, more productive, more R&D intensive, low wage intensive, low energy & capital intensive and more profitable → True for both labour-intensive sectors and all other manufacturing sectors
- Foreign ownership matters for firm's export performance

Hazard Model

- We estimate the probability of a firm exporting in any year based on its characteristics including its exporting history
- Data on manufacturing firms in India during 1995-2006 are used for this purpose

We first categorized all the firms into four categories as follows:

- Category 1 = exported in t and did not export in any of the prior years
- Category 2 = exported in t and exported at least in one of the prior years
- Category 3 = did not export in t and not prior to t
- Category 4 = did not export in t but at least in one of the prior years

- Let the probability of exporting in $t = \delta = 1/\{1 + \exp(-\eta)\}$ where $\eta = \eta(x_{it}, t)$ is a function of a vector x_{it} the relevant characteristics of firm i and year t
- In this general formulation η would vary over time and across firms
- For simplicity, consider the case in which η or equivalently δ , is constant over time for each firm.
- For simple model the probability P_{ijt} that firm found to be category j is given by

$$P_{i1t} = (1 - \delta)^{t-1} \delta \quad (1)$$

$$P_{i2t} = \delta \{1 - (1 - \delta)^{t-1}\} \quad (2)$$

$$P_{i3t} = (1 - \delta) (1 - \delta)^{t-1} = (1 - \delta) \quad (3)$$

$$P_{i4t} = (1 - \delta) \{1 - (1 - \delta)^{t-1}\} \quad (4)$$

- With $\delta = 1/\{1 + \exp(-\eta_i)\}$; η_i could be specified as a linear function:

$$\eta_i = \alpha_1 + b_1 * X_{1i} + b_2 * X_{2i} + b_3 * X_{3i} + \dots \dots \dots b_n * X_{ni} \quad (5)$$

where variables are the average value of the characteristics over all the observations for firm i

- The model which we estimated is a simpler multinomial Logit model for P_{ijt} .
 - In other words, given that $\sum_{j=1}^4 P_{ijt} = 1$ by definition treating the third category as the reference category we postulate that log odds of category j relative to 3 as

$$\text{Log} (P_{ijt} / P_{i3t}) = \alpha_j + \sum_{k=1}^n b_{jk} X_{kit}$$
 - for $j = 1, 2$ and 4
- $\{X_{kit}\}$ are characteristics of firms i in year t

Findings (Log likelihood Estimates)

- The exporting firms (either exported in current year or in prior years) are significantly bigger, more R&D intensive, low wage intensive, more profitable etc. than those who have never exported
- Probability of firms who fall in category 2 (exported in t and exported in at least one of the prior years) is highest as compared to the probability of firms being in category 1 (exported in t and did not export in any of the prior years)
- Survival of new firms is more difficult than those who have been exporting in the prior years

Conclusions

- Our result from OLS, Fixed Effects, Random Effects and Tobit from export, import and trade model broadly indicate that the PTA is counter productive
- From the firm- level data, firm heterogeneity is confirmed in the decision to export
- Exporting firms are generally large, more R&D intensive, low wage intensive and more profitable than non exporting firms
- Firms exported in the prior year are more likely to export in the current year than an otherwise comparable firm that has never exported

DESCRIPTIVE SURVEY RESULTS

Industry Segments	Respondents
Minerals & Fuels	81
Gems & Jewellery	85
Textiles & Apparels	95
Metals	39
Machinery	39
Chemicals	28
Plastics	5
Pharmacy	7
Leather	21
Total	400

Age of the Sample Firms

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Very Old (before 1950)	4	4	4	3	4
Fairly Old (1950-2000)	74	87	79	83	81
New Establishment (after 2000)	22	9	17	14	15
Total	100	100	100	100	

Size

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Small firms (Up to Rs 10cr)	20	19	13	20	16
Medium firms (> Rs 10-50cr)	22	30	37	23	32
Large firms (above Rs 50cr)	54	50	44	50	48
NR (non-respondents)	4	1	6	7	4
Total	100	100	100	100	

R&D

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%
Inducted (new technology)	64	78	76	78
Not Inducted (new technology)	36	22	24	23
Total	100	100	100	100

Experience in Exporting

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Short (Up to 2 years)	10	1	4	3	4
Medium (3 to 5 years)	20	23	17	5	18
Long (over 5 years)	70	76	79	92	78
Total	100	100	100	100	

Net profit after tax to sales

Export Intensity→ PAT to sale ↓	Below 10%	11-25%	26-50%	Over 50%	Total
Up to 2%	12	5	8	8	8
> 2 to 5%	8	5	5	5	5
>5%	28	20	22	32	24

Export Subsidy under export promotion schemes

Export Intensity %	Below 10%	11-25%	26-50%	Over 50%	Total
Receivers	86	81	70	85	76
Non Receivers	14	19	30	15	24
Total	100	100	100	100	100

Infrastructural Barriers

Telecommunication

- **A major portion (71%) of firms across all industry segments considers telephone as very important**
- **More than half of the responding firms do not consider inadequacy or inefficiency of telecommunication as an obstacle**

Electricity

- **Nearly half (44%) firms felt that the availability was limited and 35% indicated it to be of poor quality**

Transportation

- **50% accepted that there was limited availability of road transport system; 35% held these were of poor quality**

Tariff Rates on Exports

Export Intensity→ Tariff rate ↓	Below 10%	11-25%	26-50%	Over 50%	Total
0-15%	80	75	55	65	64
16- 25%	16	20	26	20	23
26-50%	4	3	16	13	11
Over 50%		2	3	3	2

THANK YOU