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    RESULTS & DISCUSSION

    FINDINGS

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# TRADE BETWEEN INDIA AND ASEAN COUNTRIES FOR AGRICULTURAL AND MINERAL PRODUCTS: EXPLORING COMPATIBILITY THROUGH REVEALED COMPARATIVE ADVANTAGE

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*MARGAO*

## ABSTRACT

*In the post 1990 liberalized economic environment, India made concerted efforts to improve trade relations with ASEAN countries which culminated in signing of the India – ASEAN Free Trade Agreement in August 2009. India - ASEAN FTA in trade in goods which will come to effect from 1st January 2010 envisages reduction and elimination of tariffs in 89.34 percent of the product lines where as the remaining 10.66 percent product lines are kept outside the ambit of tariff reduction in the negative list. For any Regional Trade Agreement (RTA) to be successful, it is imperative on partner countries to have complementary trade structure to be exploited for mutual benefit. Countries which got complementary trade structure are likely to trade more where as economies with similar trade structure often struggle to improve trade share unless there is substantial intra industry trade. Revealed Comparative Advantage (RCA) indices, despite their limitations, provide a useful guide to underlying comparative advantage and offer a further insight into the competitiveness of participating countries and hence reveal the possibility of increased trade cooperation between them. In this direction the paper computed RCA between India and ASEAN countries for Agricultural Products and Mineral Products to understand the trade structure between them. Computation of RCA at finer levels of disaggregation helped to identify complementarity trade structure existing between India and ASEAN.*

## JEL CLASSIFICATION
F10, F14, F15

## KEYWORDS
Agricultural Products, ASEAN, India, Regional Trade Agreements, Revealed Comparative Advantage.

## INTRODUCTION

I t is generally understood that complementarity in the trade structure of the countries facilitates more export and import between them and there is scope for mutual benefit from this increased trade. Hence identifying and measuring trade complementarity is an important task in realizing trade potential and for forging trade cooperation among countries. Regional Trade Agreements are effective and successful only if they are carefully designed by identifying and collating complementary products and sectors. There are different indices developed to examine the trade pattern and to see whether increased cooperation is possible between nations. In this paper an attempt is made to construct Revealed Comparative Index (RCA) for Agricultural and Mineral Products between India and ASEAN and to see whether increased trade cooperation between these two trading partners is possible or not in these very important sectors.

## REVEALED COMPARATIVE ADVANTAGE (RCA) INDEX

Revealed Comparative Advantage Index shows how comparative is a product in countries export compared to the products share in world trade. A product with high RCA is competitive and can be exported to countries with low RCA. Measures of revealed comparative advantage (RCA) have been used to help assess a country's export potential. The RCA indicates whether a country is in the process of extending the products in which it has a trade potential, as opposed to situations in which the number of products that can be competitively exported is static. It can also provide useful information about potential trade prospects with new partners. Countries with similar RCA profiles are unlikely to have high bilateral trade intensities unless intra-industry trade is involved. RCA measures, if estimated at high levels of product disaggregation, can focus attention on other nontraditional products that might be successfully exported. The RCA index of country 'i' for product j is often measured by the product's share in the country's exports in relation to its share in world trade:

$$RCA_{ij} = \frac{(x_{ij}/X_{it})}{(x_{wj}/X_{wt})}$$

Where $x_{ij}$ and $x_{wj}$ are the values of country i's exports of product j and world exports of product j and where $X_{it}$ and $X_{wt}$ refer to the country's total exports and world total exports. A value of less than unity implies that the country has a revealed comparative disadvantage in the product. Similarly, if the index exceeds unity, the country is said to have a revealed comparative advantage in the product.

Revealed Comparative Advantage (RCA) for ASEAN countries is calculated at two levels namely Commodity Groups and, HS-2 levels and compared against India's RCA to see trade complementarity between these trading partners. At the aggregate level, RCA is calculated for eight ASEAN countries for Agriculture and Mineral Products for 17 years to identify specific advantage in trade. Data for calculating RCA is collected from IMF, WTO and ASEAN Secretariat.

RCA for ASEAN countries taken together at HS-2 classification for the year 2008 is calculated and compared against India for getting a picture on India - ASEAN trade complementarity. Data pertaining to Brunei, Laos, Indonesia, Myanmar and Vietnam is not included for non availability of data. The following section provides the analysis of RCA for Agricultural commodities and Mineral Products for between India and ASEAN countries.

## AGRICULTURAL PRODUCTS

India's RCA for agricultural products for the year 2006 is 1.53 which illustrated that India's agricultural exports are higher than share of agricultural exports in world trade. The RCA for agricultural products among ASEAN countries are high for Indonesia, Malaysia, Thailand and Vietnam. That means India can have higher agricultural exports with other ASEAN countries such as Brunei, Cambodia, Philippines and Singapore.

### TABLE 1: RCA FOR AGRICULTURAL PRODUCTS IN INDIA AND ASEAN

| Year | INDIA | BRU | CAM | INDO | MALA | PHIL | SING | THAI | VIET |
|------|-------|-----|-----|------|------|------|------|------|------|
| 1990 | 1.6224 | 0.0571 | | 1.3455 | 2.1177 | 1.7242 | 0.6458 | 2.8070 | |
| 1995 | 1.8084 | | | 1.5813 | 1.3717 | 1.2300 | 0.4407 | 2.1597 | |
| 2000 | 1.7649 | | 0.4485 | 1.3871 | 0.9534 | 0.5951 | 0.3157 | 2.0677 | 3.1900 |
| 2001 | 1.6164 | 0.0061 | 0.3966 | 1.3698 | 0.9139 | 0.6707 | 0.3034 | 2.0756 | 3.3025 |
| 2002 | 1.5754 | 0.0030 | 0.3249 | 1.5757 | 1.0727 | 0.6274 | 0.2966 | 2.0201 | 3.0619 |
| 2003 | 1.4925 | | 0.2846 | 1.6530 | 1.2193 | 0.7270 | 0.2534 | 2.0823 | 2.8072 |
| 2004 | 1.3166 | | 0.3343 | 2.0105 | 1.2158 | 0.7539 | 0.2532 | 2.0784 | 2.6359 |
| 2005 | 1.3353 | | 0.2979 | 1.9899 | 1.1680 | 0.8143 | 0.2435 | 1.9904 | 2.6154 |
| 2006 | 1.5331 | | 0.3070 | 2.2647 | 1.2399 | 0.8363 | 0.2395 | 2.1111 | |

*Source: Computed from WTO database*

The RCA for the period 1990 to 2006 (seventeen years) provide the long term trend for each product. The mean RCA for agricultural commodity is above one for India, Indonesia, Malaysia, Philippines, Thailand and Vietnam and below one for Brunei, Cambodia and Singapore. This means there is a scope to trade agricultural Commodities between India and low RCA countries of ASEAN such as Brunei, Cambodia and Singapore. Fig. 1 diagrammatically represents the RCA for ASEAN countries and India for the period 1990 to 2006.

**FIG. 1: RCA FOR AGRICULTURAL PRODUCTS IN INDIA AND ASEAN**
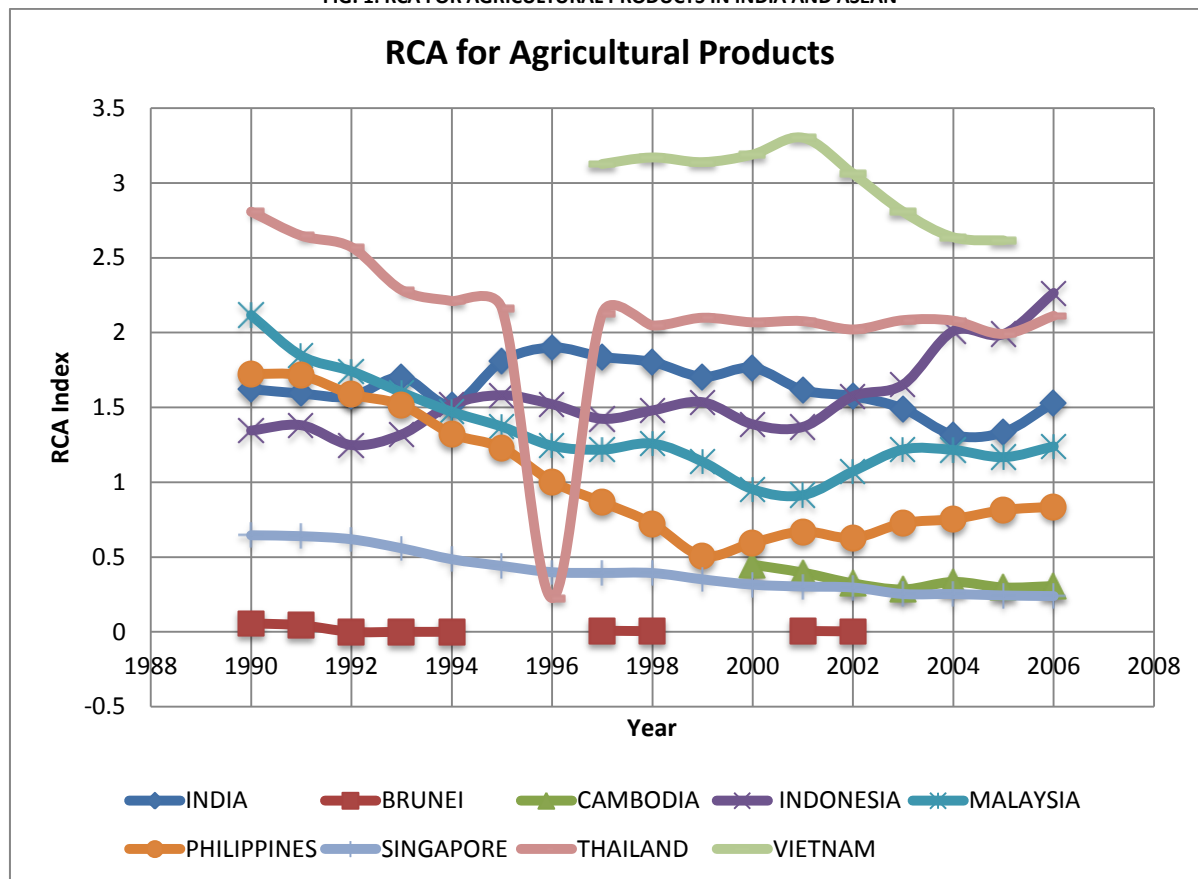


## FOOD

Food items form part of agricultural products and resemble the same pattern of RCA that of agricultural products. RCA for food is high for India, Indonesia, Malaysia, Thailand and Vietnam and low for Brunei, Cambodia, Philippines and Singapore. The average RCA showed that the two ASEAN countries namely Vietnam and Thailand are having a strong RCA of above two. But Brunei, Cambodia and Singapore got a very low RCA in food and India which got a mean RCA of 1.8374 can export food articles to these nations. It is also revealed from the table 4.6 that Philippines and Thailand which had high RCA for food items in the early nineties weakened its RCA over the period time. Table 2 and Fig. 2 provide the RCA for food items for India and ASEAN.

**TABLE 2: RCA FOR FOOD IN INDIA AND ASEAN**

| Year | INDIA | BRU | CAM | INDO | MALA | PHIL | SING | THAI | VIET |
|------|-------|-----|-----|------|------|------|------|------|------|
| 1990 | 1.6922 | 0.0741 | | 1.2146 | 1.2743 | 2.0625 | 0.5694 | 3.1323 | |
| 1995 | 2.2018 | | | 1.2994 | 1.0817 | 1.4593 | 0.4505 | 2.1973 | |
| 2000 | 2.062 | | 0.1442 | 1.2631 | 0.8278 | 0.6818 | 0.3353 | 2.0985 | 3.7839 |
| 2001 | 1.864 | 0.0054 | 0.1674 | 1.2172 | 0.8451 | 0.7656 | 0.3182 | 2.2969 | 3.8486 |
| 2002 | 1.8012 | 0.0053 | 0.1079 | 1.4514 | 1.0273 | 0.7134 | 0.3134 | 2.0040 | 3.4874 |
| 2003 | 1.6585 | 0.0060 | 0.0632 | 1.4431 | 1.1815 | 0.8243 | 0.2659 | 1.9374 | 3.1470 |
| 2004 | 1.488 | | 0.1590 | 1.7704 | 1.1622 | 0.8553 | 0.2654 | 1.8903 | 3.0291 |
| 2005 | 1.416 | | 0.1413 | 1.7379 | 1.0646 | 0.9298 | 0.2531 | 1.7821 | 2.9978 |
| 2006 | 1.4928 | | 0.1464 | 1.8487 | 1.1133 | 0.9639 | 0.2489 | 1.8010 | |

*Source: Computed from WTO database*

**FIG. 2: RCA FOR FOOD IN INDIA AND ASEAN**



## RCA for Food Products
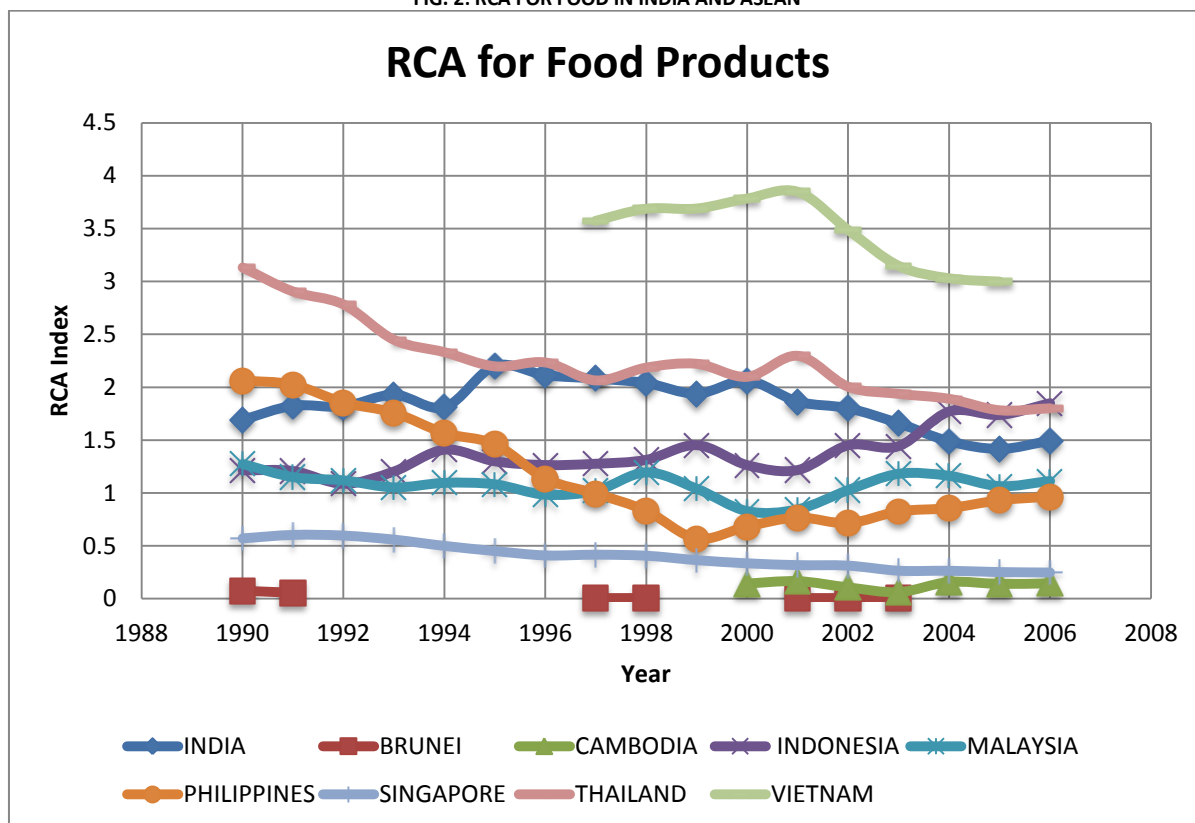
## FUELS AND MINING PRODUCT

Fuel and Mining are resource based products depending on the natural endowments of the country. But industries can be established to process and refine these products. For Mining and Fuels, RCA is high in Brunei, India, Indonesia, and Vietnam and low in Cambodia, Malaysia, Singapore and Thailand. The three oil rich countries of ASEAN are Brunei, Indonesia and Vietnam and they export petroleum related products to other parts of the world. India has a rich deposit of mineral ores and export them to the mineral scarce countries of ASEAN and rest of the world. India is a huge importer of petroleum crude and its requirements are surging ahead every year and they can look forward to ASEAN oil exporters to meet the demand. Table 3 gives the RCA for fuels and Mining products taken together for India and ASEAN countries.

**TABLE 3: RCA FOR FUELS AND MINING PRODUCTS IN INDIA AND ASEAN**

| Year | INDIA | BRU | CAM | INDO | MALA | PHIL | SING | THAI | VIET |
|------|-------|-----|-----|------|------|------|------|------|------|
| 1990 | 0.6106 | 6.8225 | | 3.3997 | 1.4410 | 0.7339 | 1.3900 | 0.1323 | |
| 1995 | 0.5136 | | | 2.9650 | 0.7881 | 0.5456 | 0.8347 | 0.1267 | |
| 2000 | 0.5727 | | 0.0005 | 2.1471 | 0.7942 | 0.2102 | 0.8080 | 0.1498 | 2.0004 |
| 2001 | 0.6609 | 6.8003 | 0.0004 | 2.3121 | 0.8481 | 0.2111 | 0.6887 | 0.2342 | 1.8595 |
| 2002 | 0.8381 | 7.0537 | 0.0001 | 2.5573 | 0.7896 | 0.2190 | 0.7373 | 0.3150 | 1.8086 |
| 2003 | 0.8507 | 6.4454 | 0.0016 | 2.6073 | 0.8607 | 0.2574 | 0.7492 | 0.2850 | 1.6552 |
| 2004 | 1.1596 | 5.9856 | 0.0006 | 2.4236 | 0.8962 | 0.2585 | 0.7901 | 0.3322 | 1.7611 |
| 2005 | 1.14 | 5.1412 | 0.0002 | 2.1663 | 0.8426 | 0.2424 | 0.7748 | 0.3254 | 1.4371 |
| 2006 | 1.0606 | | 0.0003 | 2.0348 | 0.7994 | 0.3483 | 0.7688 | 0.3419 | |

*Source: Computed from WTO database*

The mean RCA shows, Brunei and Indonesia got strong RCA for fuel and mining products while Vietnam got high RCA and they can export fuel products to Cambodia, Philippines and Thailand who have weak RCA and India, Malaysia and Singapore who have low RCA. This showed there is complementarity in trading fuel products in the ASEAN region. With regard to the mining products alone, India got the comparative advantage in many product categories and can export them to most of the ASEAN countries.

FIG. 3: RCA FOR FUELS AND MINING PRODUCTS IN INDIA AND ASEAN



RCA for Fuels and Mining Products
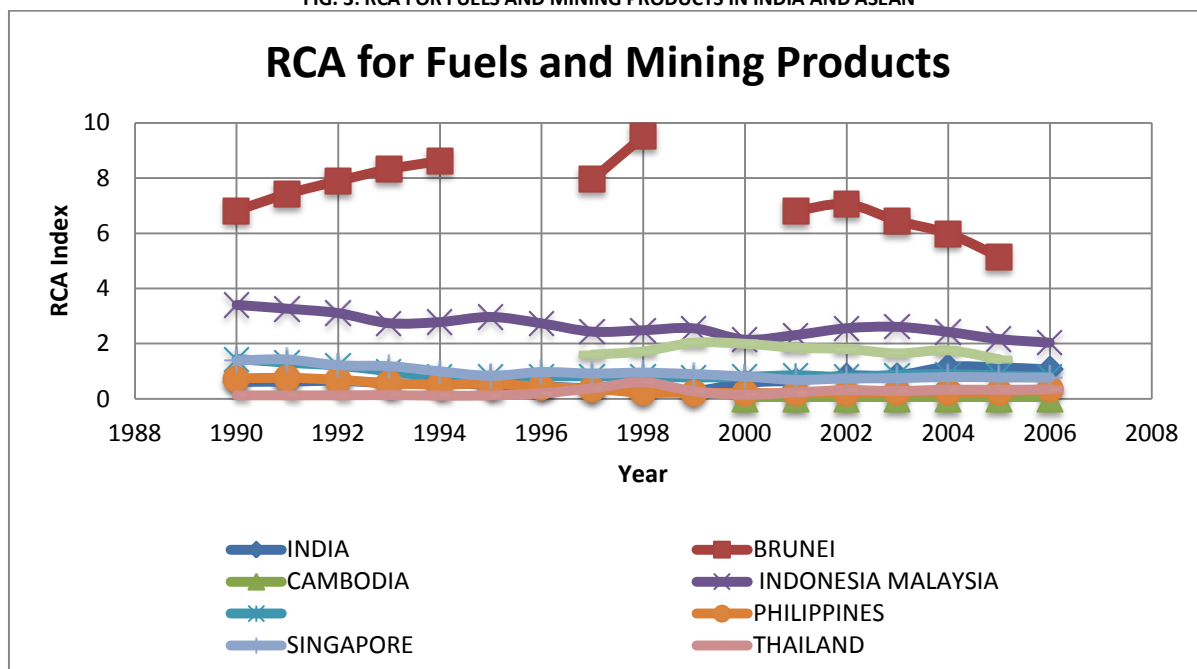
## FUELS

If we consider fuel separately; Brunei, Indonesia and Vietnam got a high comparative advantage. Brunei's single most item of export is petroleum and enjoys the mean RCA of 7.7632. Indonesia is a member of OPEC and Vietnam is exploring new wells to increase petroleum export. Singapore and Malaysia got high RCA in fuels for refining and exporting the products to other countries. India, Cambodia, Philippines and Thailand got weak RCA and import large quantity of fuel from other countries.

TABLE 4: RCA FOR FUELS IN INDIA AND ASEAN

| Year | INDIA | BRU | CAM | INDO | MALA | PHIL | SING | THAI | VIET |
|------|-------|-----|-----|------|------|------|------|------|------|
| 1990 | 0.2766 | | | 4.1639 | 1.7431 | 0.2639 | 1.7256 | 0.0792 | |
| 1995 | 0.2353 | | | 3.4809 | 0.9586 | 0.2062 | 1.0513 | 0.0988 | |
| 2000 | 0.4448 | | 0.0001 | 2.2144 | 0.9246 | 0.1221 | 0.9350 | 0.1157 | 2.5388 |
| 2001 | 0.5203 | 8.8049 | 0.0003 | 2.2390 | 0.9939 | 0.0850 | 0.7745 | 0.2156 | 2.3419 |
| 2002 | 0.589 | 9.1306 | 0.0001 | 2.7467 | 0.9233 | 0.1276 | 0.8383 | 0.2876 | 2.2870 |
| 2003 | 0.6228 | 8.1856 | 0.0001 | 2.7555 | 1.0072 | 0.1553 | 0.8451 | 0.2636 | 2.0520 |
| 2004 | 0.8229 | 7.7207 | 0.0001 | 2.7599 | 1.0554 | 0.1152 | 0.9128 | 0.3238 | 2.1480 |
| 2005 | 0.871 | 4.9744 | 0.0000 | 2.0658 | 0.9670 | 0.1364 | 0.8863 | 0.3145 | 1.6958 |
| 2006 | 1.0095 | | 0.0000 | 1.9545 | 0.9371 | 0.1495 | 0.8954 | 0.3396 | |

*Source: Computed from WTO database*

FIG. 4: RCA FOR FUELS IN INDIA AND ASEAN



RCA for Fuels
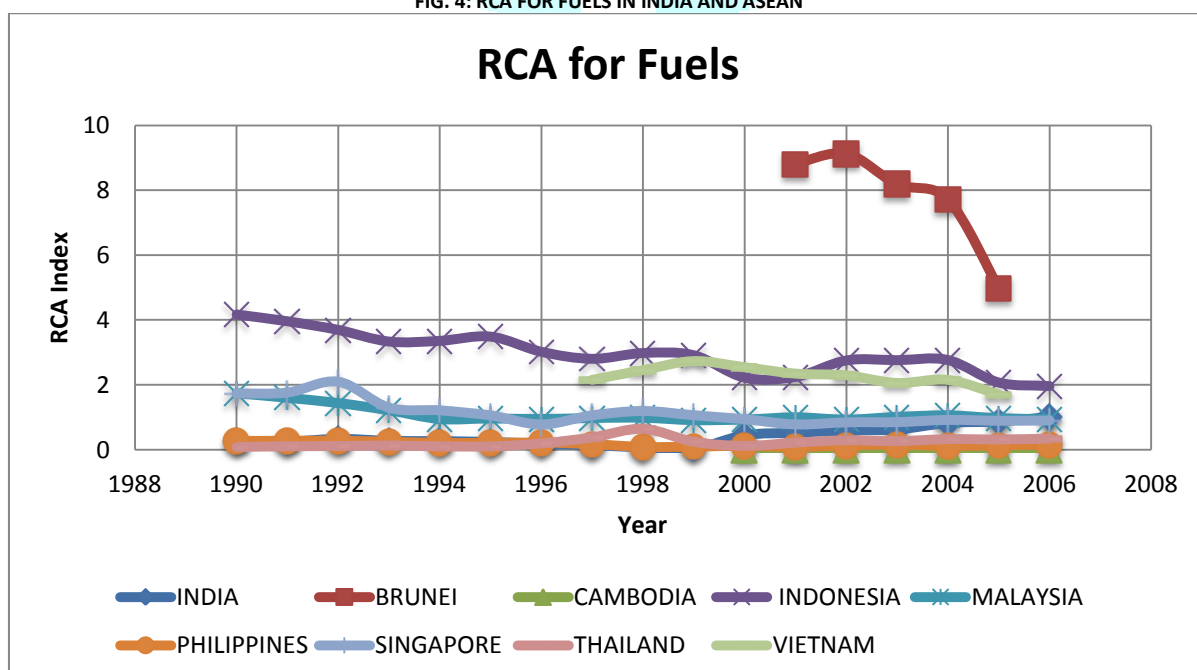
## REVEALED COMPARATIVE ADVANTAGE FOR HS-2 CLASSIFICATION

In order to get product level comparative advantage, Revealed Comparative Advantage (RCA) for HS-2 digit classification of Agricultural commodities and Minerals are calculated for India and ASEAN countries for the period 2003 to 2006. The Data pertaining to HS2 classification of commodity exports and imports are extracted from DOTS of WITS (World Integrated Trade Solutions). RCA for the period 2003-2006 is calculated for India and combined ASEAN countries and a mean RCA is obtained for comparison.  The HS-2 data is not available for some ASEAN countries and only available data is taken for calculating RCA for ASEAN group.  The absolute difference in RCA between India and ASEAN is obtained to understand the extend of complementarity in commodities. This is supplemented with trade performance under HS-4 digits classification to know finer specialization of products by India and ASEAN countries. The results of RCA for HS-2 products for India and ASEAN are discussed below.

Table 5 showed the mean RCA, RCA category and absolute difference in RCA between India and combined ASEAN for agricultural commodities in HS-2 digit classification. Of the 24 HS-2digits commodities, 9 categories showed trade complementarity between India and ASEAN. These include Edible vegetables and certain roots(HS-07 ),Edible fruit and nuts; peel of citr (HS-08), Prod.mill.indust; malt; starches (HS-11 );  Oil seed, oleagi fruits; miscellgr (HS-12 ), Animal/veg fats & oils & their clea (HS-15), Prep of meat, fish or crustaceans(HS-16),Residues & waste from the food industry (HS-23) and Tobacco and manufactured tobacco su (HS-24). The highest RCA for India in agricultural products is in Vegetable plaiting materials; veget (HS14) and Coffee, tea, matï and spices (HS-09) and for ASEAN is Animal/veg fats & oils & their clea (HS15) and Prep of meat, fish or crustaceans (HS-16). The highest absolute difference in RCA is for Vegetable plaiting materials; veget (HS-14) and Coffee, tea, matï and spices (HS-09).

**TABLE 5: RCA FOR AGRICULTURAL PRODUCTS IN HS2 CLASSIFICATION**

| HS Code | Commodity Name | Mean RCA of India | Mean RCA of ASEAN | RCA category-India | RCA Category-ASEAN | Absolute difference in RCA |
|---|---|---|---|---|---|---|
| 01 | Live animals | 0.0514 | 0.2266 | weak | weak | 0.1752 |
| 02 | Meat and edible meat offal | 0.8696 | 0.0751 | low | weak | 0.7946 |
| 03 | Fish & crustacean, mollusc& other | 2.4041 | 1.6525 | strong | high | 0.7516 |
| 04 | Dairy prod; birds' eggs; natural ho | 0.3893 | 0.2745 | weak | weak | 0.1148 |
| 05 | Products of animal origin, nes or | 0.7329 | 0.2131 | low | weak | 0.5197 |
| 06 | Live tree & other plant; bulb, root | 0.5906 | 0.2919 | low | weak | 0.2987 |
| 07 | Edible vegetables and certain roots | **1.4093** | **0.4803** | **high** | **weak** | **0.9290** |
| 08 | Edible fruit and nuts; peel of citr | **1.6377** | **0.4496** | **high** | **weak** | **1.1881** |
| 09 | Coffee, tea, matï and spices. | 5.3282 | 1.1762 | strong | high | 4.1520 |
| 10 | Cereals | 3.5873 | 1.3762 | strong | high | 2.2112 |
| 11 | Prod.mill.indust; malt; starches; | **0.5891** | **1.0784** | **low** | **high** | **0.4892** |
| 12 | Oil seed, oleagi fruits; miscellgr | **1.4195** | **0.1055** | **high** | **weak** | **1.3140** |
| 13 | Lac; gums, resins & other vegetable | **9.9841** | **0.4704** | **strong** | **weak** | **9.5137** |
| 14 | Vegetable plaiting materials; veget | 5.7112 | 1.2402 | strong | high | 4.4710 |
| 15 | Animal/veg fats & oils & their clea | **0.8091** | **4.4486** | **low** | **strong** | **3.6395** |
| 16 | Prep of meat, fish or crustaceans, | **0.5465** | **3.0308** | **low** | **strong** | **2.4844** |
| 17 | Sugars and sugar confectionery. | 2.0349 | 1.1313 | strong | high | 0.9037 |
| 18 | Cocoa and cocoa preparations. | 0.0352 | 0.8690 | weak | low | 0.8338 |
| 19 | Prep.of cereal, flour, starch/milk; | 0.3507 | 0.7988 | weak | low | 0.4481 |
| 20 | Prep of vegetable, fruit, nuts or o | 0.4113 | 0.8604 | weak | low | 0.4491 |
| 21 | Miscellaneous edible preparations. | 0.5320 | 0.8521 | low | low | 0.3201 |
| 22 | Beverages, spirits and vinegar. | 0.0784 | 0.3768 | weak | weak | 0.2984 |
| 23 | Residues & waste from the food indu | **3.3460** | **0.5091** | **strong** | **low** | **2.8370** |
| 24 | Tobacco and manufactured tobacco su | **1.3953** | **0.6878** | **high** | **low** | **0.7075** |

*Source: Calculated from data extracted from WITS*

India enjoys comparative advantage in many mineral products compared to ASEAN countries. These include Iron and steel (HS-72) Articles of iron or steel (HS-73), Copper and articles thereof (HS-74) and Zinc and articles thereof (HS-79) in which India got high RCA against ASEAN. ASEAN's comparative advantage lies in Tin and articles thereof (HS-80) and India can import this from ASEAN as the absolute difference is highest in this category.

**TABLE 6: RCA FOR MINERAL PRODUCTS IN HS2 CLASSIFICATION**

| HS Code | Commodity Name | Mean RCA of India | Mean RCA of ASEAN | RCA category-India | RCA Category-ASEAN | Absolute difference in RCA |
|---|---|---|---|---|---|---|
| 72 | Iron and steel. | **1.5293** | **0.3017** | **high** | **weak** | **1.2275** |
| 73 | Articles of iron or steel. | **1.5586** | **0.5872** | **high** | **low** | **0.9714** |
| 74 | Copper and articles thereof. | **1.7848** | **0.6129** | **high** | **low** | **1.1719** |
| 75 | Nickel and articles thereof. | 0.0746 | 0.1882 | weak | weak | 0.1136 |
| 76 | Aluminium and articles thereof. | 0.5731 | 0.3871 | low | weak | 0.1861 |
| 78 | Lead and articles thereof. | 0.4707 | 0.7170 | weak | low | 0.2463 |
| 79 | Zinc and articles thereof. | **1.6277** | **0.4693** | **high** | **weak** | **1.1585** |
| 80 | Tin and articles thereof. | **0.6575** | **7.1447** | **low** | **strong** | **6.4872** |
| 81 | Other base metals; cermets; article | 0.1696 | 0.2006 | weak | weak | 0.0310 |
| 82 | Tool, implement, cutlery, spoon | **1.0636** | **0.5422** | **high** | **low** | **0.5214** |
| 83 | Miscellaneous articles of base meta | 0.5790 | 0.4598 | low | weak | 0.1192 |

*Source: Calculated from data extracted from WITS*

ASEAN has strong RCA for Electrical machinery, equipments, parts thereof (HS-85) and high RCA for Nuclear reactors, boilers, machinery (HS-84) against India and export lot of items to India. On the other hand India's RCA include Ships, boats and floating structure (HS-89), Clocks and watches and parts thereof (HS-91) and Works of art, collectors' pieces etc. (HS-97).

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## CONCLUSION

The Revealed comparative Advantage Index showed that there are trade complementarity between India and some ASEAN countries. For both agricultural Commodities and Food articles, India got comparative advantage and it can export to Brunei, Cambodia, Singapore and Philippines. India got comparative advantage in Mineral Products, but comparative disadvantage in fuel. India can import fuel from Brunei and Indonesia as it imports large volume from the Gulf countries. RCA for HS-2 digit classification shows there are strong complemetarity in products like edible vegetable, edible fruits, malt, gums and resins, animal or vegetable fat, fish or crustaceans etc. In the area of Mineral products there is a trade complementarity in Iron and steel, Articles of iron or steel, Copper and articles thereof, Zinc and articles thereof, Tin and articles thereof and Tool, implement, cutlery, spoon. It reveals there is scope for enhanced trade cooperation between India and ASEAN.

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