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An Analysis of Bilateral Trade between Iran and D-8 Countries

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An Analysis of Bilateral Trade between Iran and D-8 Countries

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Abstract - This paper investigates intra-trade and welfare effects for Iran and D-8 countries preferential trade agreement by reviewing the possibility of comprehensive trade liberalization through expanding coverage of preferential tariff reduction. A quantitative analysis is applied for economic effects of a free trade arrangement between Iran and other contracting countries. An important objective of this research is to appraise evidence of significant gains in intra-trade and welfare amongst Iran and D-8 countries when tariff barriers and enhancement measures are dismantled. Therefore, this study uses indices in international trade as an input into the process of evidence-based policymaking in the area of trade policy for D-8 countries.

Keywords : D-8 countries, Trade Liberalization, Preferential Trade Arrangement, Economic Integration.

I. INTRODUCTION

The Developing 8 (D-8) countries consists' of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan and Turkey. D-8 countries are an alliance of developing Muslim countries who are members of the Organization of Islamic Conference (OIC), which is established as an economic association. This group of countries was set up on June 15, 1997 after a declaration in Istanbul Turkey. The declaration included a plan to progressively diminish tariffs on particular goods between member-states, with supervision of the process by a supervisory committee. The purpose of this association of countries is a reduction of barriers to enable free trade between member countries, and to encourage inter-state cooperation. Despite the importance of D-8 countries, empirical literature analyzing D-8 member's countries trade with each other is limited. Thus, it is of interest to investigate trade among member countries exhaustively by reviewing trade relations and calculating trade indices such as Trade Intensity Index, Trade Complementarity Index, Trade Bias Index, Trade Creation and Diversion Index. Such indices can be used to give insights into the effects of regional trading arrangements among member countries. It can also explain as well as evaluate trade relationships and trade

patterns of D-8 countries. Such indices can be used as D-8 countries monitors trade flows and trends among member countries.

In an economic integration study on the effects of trade flows, the methodology employed is a descriptive scheme. This method depends on a static frame work and the results are dependent on the level of aggregation. A study done by Drysdale and Garnaut (1982) initiated applying indices to analyze bilateral trade flows. This was followed by many other research studies whereby indices were applied to study bilateral trade patterns. For instance, Hill (1985) studies the pattern of international trade between Australia and the Philippines for two decades from the years 1962-1981 using three indices to analyze and clarify patterns, composition and trends. Similarly, Zhang (1997) examine the potency of trade relations between China and Japan during the years from 1965-1993 by employing three indices. Bano (2002) used Intensity indices to measure modification among New Zealand and its main trading partners' trade relationship for the years 1981-1999. In relation to other methods, Ng and Yeates (2003) applied Intensity index to analyze and measure East Asian intra-regional trade that explained Distance Adjusted Trade Intensity Index. Creamer (2003) measured open regionalism in Andean communities' effect on inter-region and intra-region trade for the years 1990-2000 by using a Trade Intensity Index. Furthermore, Trade Intensity Index is used by Bhattacharya and Bhattacharyay (2007) to evaluate the trade potential between China and India. These studies used a variety of indicators to determine regional trade relationship between countries.

II. METHODOLOGY

The composition of trade determines the degree of bilateral matching of commodities of an exporter with the demands of an importer. The gravity model does not explicitly show commodity matching of an importer and exporter. As an alternative, this paper applies Trade Intensity Index to explain commodity compositions' effects on bilateral trade. According to Drysdale (1967), by employing a decomposition method, this paper intends to demonstrate the quantity of effects on trade volume is caused by complementarity and country bias.

a) Export Intensity Index

Trade Intensity Index explains whether a county

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exports more to a particular region as compared to the world on average. Therefore, Trade Intensity Index can be used as a uniform export share. The statistics are comparable across countries, and during the period of consideration are not influenced by any 'size' bias.

$$XI_{ij} = \left(\frac{X_{ij}}{X_i} \right) / \left(\frac{M_j}{M_w - M_i} \right) \quad (1)$$

Where

X_{ij} : country i's export to country j

X_i : country i's total export

M_j : country j's total import

M_w : world's import

M_i : country i's import

Trade Intensity Index lies on the range 0 and $+\infty$. Values more than 1 indicate an 'intense' in trade flows.

b) Import Intensity Index

Import Intensity Index explains whether a country imports more from a particular region compared to the world on average. Similar to Export Intensity Index, Import Intensity Index is interpreted by using the same approach by approximating standardized import share. The statistics are comparable across countries, and for the period of consideration are not influenced by any 'size' bias.

$$MI_{ij} = \left(\frac{M_{ij}}{M_i} \right) / \left(\frac{X_j}{X_w - X_i} \right) \quad (2)$$

Where

M_{ij} : country i's import from country j

M_i : country i's total import

M_i : country i's total import

X_j : country j's total export

M_i : world's import

X_w : world export

X_i : country i's total export

c) Trade Complementarity Index

Trade Complementarity Index evaluates the level of export patterns of one country matches the import pattern of another country. In other words, the Complementarity Index measures the degree of overlap between the export profile of the source and the import profile of the destination. Trade Complementarity Index is considered as overlap indices. High level of this index is implicit in a successful trade arrangement signifying favorable prospects. The index trend during the consideration period describes whether trade profiles are becoming more or less compatible. The Complementarity Index is converted to percentage. This index gets a value between "0" and "100". A "100" value explains a "perfect overlap" and "0" values indicating "no overlap" in trade flows.

i. Export Complementarity Index

This index evaluates the level of export pattern of one region (country) matches the import pattern of another region (country).

$$XC_{ij} = \sum_k \left[\frac{X_i^k}{X_i} \cdot \frac{M_w - M_i}{M_w - M_i^k} \cdot \frac{M_j^k}{M_j} \right] \quad (3)$$

XC_{ij} : Export complementarity index country i to j

X_i^k : Exports of commodity k by i country

X_i : total export of country i

M_w : the total world's import flow

M_i : country i's total import

M_w^k : Imports of commodity k by world

M_j^k : Imports of commodity k by j country

M_i^k : Imports of commodity k by i country

M_j : country i's total import

ii. Import Complementarity Index

This index evaluates the level of import patterns of one region matches the export pattern of another region.

$$MC_{ij} = \sum_k \left[\frac{M_i^k}{M_i} \cdot \frac{X_w - X_i}{X_w - X_i^k} \cdot \frac{X_j^k}{X_j} \right] \quad (4)$$

MC_{ij} : Import complementarity index country i from j

X_i^k : Exports of commodity k by j country

X_i : total export of country i

X_w : total world's export flow

M_i : country i's total import

X_w^k : Exports of commodity k by world

M_i^k : Imports of commodity k by i country

X_j^k : Total exports of commodity k by j country

X_j : country i's total export

d) Trade Bias Index

Trade Bias Index indicates the degree of resistance to i's trade with j relative to the average degree of resistance in i's other bilateral trading relationship.

$$B_{ij} = \frac{X_{ij}}{\sum X_i^k \left(\frac{M_j^k}{M_w - M_i^k} \right)} \quad (5)$$

Where

X_{ij} : Country i's export to j

X_i^k : Exports of commodity k by i country

M_j^k : Imports of commodity k by j country

M_w^k : Imports of commodity k by world

M_i^k : Imports of commodity k by i country

When the Trade Bias Index is less than one, trade policies will provide incentives for import substitution. On the other hand, if B is greater than one, then trade policies will promote exports. For a special

case of where the Trade Bias Index is equal to one, trade policies is said to be neutral and the economy operates at close to free trade. Jagdish Bhagwati (1993) called these instances, import substitution, ultra export promotion, and export promotion respectively.

e) Trade Creation Index

Economist's who adhere to Jacob Viner's (1950) classic study, have argued that static and dynamic distortions are produced through preferential trade agreements (PTA's). Discussions on trade creation taking place when member countries substitute domestically less efficient producers with efficient, low-cost imports from member countries.

$$TC_{IR} = ME_{IR} \cdot EM_{IR} \cdot \frac{dT_A}{1+T_A} \quad (6)$$

TC_{IR} : Trade creation of Iran

ME_{IR} : Iran's import from D8

EM_{IR} : Price elasticity of import demand

T_A : Import tariff in Iran

$dT_A/(1+T_A)$: change of import's tariff rates

dT_A : After setting union tariff – before setting union tariff

f) Trade Diversion Index

Preferential trade agreements can guide trade diversions if member countries switch from efficient non-member countries producers and import from inefficient producers in other member countries of the preferential trade agreement (PTA). The net welfare effect of a PTA depends upon having two effects dominate.

$$TD_{IR} = MR_{IR} \cdot EM_{IR} \cdot \frac{(t_{IR} - c_{IR})}{1+t_{IR}} \quad (7)$$

R : Trade diversion of Iran

MR_{IR} : Iran's import from the word (except D8)

EM_{IR} : Price elasticity of import demand

t_{IR} : Import tariff for Iran

c_{IR} : Common external tariff among members

If $C_{IR} > t_{IR}$: Trade diversion will be positive ($TD > 0$). In this situation, trade creation and intra regional trade will increase.

But if $C_{IR} < t_{IR}$: Trade diversion will be negative ($TD < 0$). Then intra regional trade declines and in this situation trade diversion will appear.

III. RESULT AND DISCUSSION

In this section, we attempt to measure the effects of regional trading arrangements among member countries by explaining and evaluating the state of trade relationship and trade patterns of D-8 countries and monitoring trade flows and trends or across member countries by applying trade indices.

Bilateral trade data, to calculate the TII, was gathered from IMF Trade Statistics, 2010, with trade intensity indices calculated for the years 1998-2008.

By using the equation (1) we try to assess the intensity of export among the economies of D-8 countries. The results are shown in the Table 1.

Table 1 : Export Intensity Index for Iran and D-8 (1998-2008)

Year	Bangladesh	Egypt	Indonesia	Malaysia	Nigeria	Pakistan	Turkey
1998	0	0	0	0.65	0	2.99	4.58
1999	0	0	0	0.18	0	3.04	4.93
2000	0.48	0	0.49	0.27	0.01	6.38	3.19
2001	0.3	0.2	1.03	0.49	0.02	5.18	4.91
2002	0.27	0.19	0.46	0.35	0.05	3.88	3.96
2003	0.4	0.25	0.51	0.25	0.01	4.79	5.87
2004	0.27	0.27	0.27	0.47	0.01	2.93	3.93
2005	0.27	0.2	0.19	0.49	0.01	2.33	5.7
2006	0.47	0.27	0.21	0.78	0.01	2.7	7.44
2007	0.33	0.23	0.14	0.47	0.01	2.86	6.38
2008	0.36	0.23	0.18	0.58	0.01	2.63	6.51

We attempt to investigate the import intensity of trade relations among the D-8 countries, by using Import intensity Index (equation 2). Bilateral trade data have been used to calculate the Import Intensity Index, Data have been gathered from IMF Trade Statistics, 2010,

and trade intensity indices have been calculated for the years 1998-2008.

The results are shown in the Table 2 for Iran and D-8 countries for the years 1998-2008.

Table 2 : Import Intensity Index for Iran and D8 (1998-2008)

Year	Bangladesh	Egypt	Indonesia	Malaysia	Nigeria	Pakistan	Turkey
1998	0	0	0	0.5	0	0	3.83
1999	0	0	0	0.5	0	0	3.63
2000	2.2	1.24	1.01	0.53	0	1.91	3.55
2001	2.35	0.52	0.49	0.63	0	2.15	2.88
2002	1.95	0.71	0.49	0.55	0	1.92	2.64
2003	1.35	0.2	0.49	0.65	0	2.07	2.58
2004	1.18	0.22	0.5	0.62	0	1.71	2.92
2005	1.35	0.26	0.58	0.58	0	2.04	3.03
2006	0.87	0.19	0.44	0.55	0	2.4	2.53
2007	1.29	0.54	0.57	0.73	0	2.77	3.42
2008	1.19	0.33	0.53	0.62	0	2.52	3.16

We conducted our empirical investigation on Export and Import Complimentarity Index (equation 3 and 4) using annual bilateral manufacturers exports data from the U.N. Commodity Trade Statistics Database (COMTRADE) for Iran and the other developing eight countries at three data points, i.e. year 2000, year 2006 and year 2008. The estimation results are shown in Table 3 and Table 4.

It should be noted the results are gathered by disaggregated individual trading products to 5 main groups based on Standard International Trade Classification (SITC). Food products (codes number 4, 22, 10), agriculture (code 2-codes number 27,22and 28), Ores and minerals (codes 28, 27, 68), Mineral fuel (code 3) and manufactured goods (codes 5 to 8).

Table 3 : Export Complimentarity Index for D-8 countries (Year 2000-2008)

Country	Bangladesh	Egypt	Indonesia	Iran	Malaysia	Nigeria	Pakistan	Turkey
Iran								
2000	0.719	0.891	1.507		0.558	0.219	3.212	1.391
2006	0.916	1.169	1.594		0.698	0.708	1.674	0.407
2008	0.846	1.207	1.576		0.653	0.474	2.330	1.152

Table 4 : Import Complimentarity Index for D-8 countries (Year 2000-2008)

Country	Bangladesh	Egypt	Indonesia	Iran	Malaysia	Nigeria	Pakistan	Turkey
Iran								
2000	0.964	1.208	0.79		0.91	0.797	0.908	0.834
2006	0.207	0.198	0.183		0.204	0.156	0.224	0.117
2008	0.462	0.521	0.165		0.621	0.403	0.573	0.472

Based on Standard International Trade Classification (SITC), using annual bilateral manufacturers exports data from the U.N. Commodity Trade Statistics Database (COMTRADE) Trade Bias Index (equation 5) results have been calculated for Iran and D-8 countries at three data points; year 2000, year 2006 and year 2008 (Table 5).

Table 5 : Trade Bias Index for D-8 countries (Year 2000-2008)

Country	Bangladesh	Egypt	Indonesia	Iran	Malaysia	Nigeria	Pakistan	Turkey
Iran								
2000	0.66	0	0.33		0.49	0.03	1.99	2.29
2006	0.52	0.23	0.13		1.12	0.1	1.61	18.28
2008	0.58	0.16	0.14		0.87	0.04	1.78	12.63

By using equation (6) we calculate the trade creation for Iran for the years 1998– 2007. The data is collected from the Institute for Trade Studies and Research of Iran.

For estimating of DT in four different conditions, by reducing 10 percent, 20 percent, 30 percent and 40 percent respectively, we use the following equations:

$$TD_1 = \frac{dT_A}{1+T_A} = \frac{(T_A - 0.1T_A) - T_A}{1+T_A} = \frac{-0.1T_A}{1+T_A} \quad (8)$$

$$TD_2 = \frac{dT_A}{1+T_A} = \frac{(T_A - 0.2T_A) - T_A}{1+T_A} = \frac{-0.2T_A}{1+T_A} \quad (9)$$

$$TD_3 = \frac{dT_A}{1+T_A} = \frac{(T_A - 0.3T_A) - T_A}{1+T_A} = \frac{-0.3T_A}{1+T_A} \quad (10)$$

$$TD_4 = \frac{dT_A}{1+T_A} = \frac{(T_A - 0.4T_A) - T_A}{1+T_A} = \frac{-0.4T_A}{1+T_A} \quad (11)$$

Trade creation index for Iran in period of 1998-2007 by considering four possibilities to be calculated and the result are shown in Table 6.

Table 6 : Trade Creation Index of Iran for the years 1993-2007

Year	10%	20%	30%	40%
1998	11.3	22.6	33.9	45.2
1999	19.87	39.73	59.6	79.46
2000	22.53	45.06	67.6	90.13
2001	26.21	52.43	78.64	104.85
2002	37.35	74.7	112.05	149.4
2003	65.63	131.26	196.89	262.53
2004	89.14	178.29	267.43	356.58
2005	108.79	217.58	326.36	435.15
2006	148.47	296.65	445.15	593.51
2007	192.71	384.05	577.09	769.43

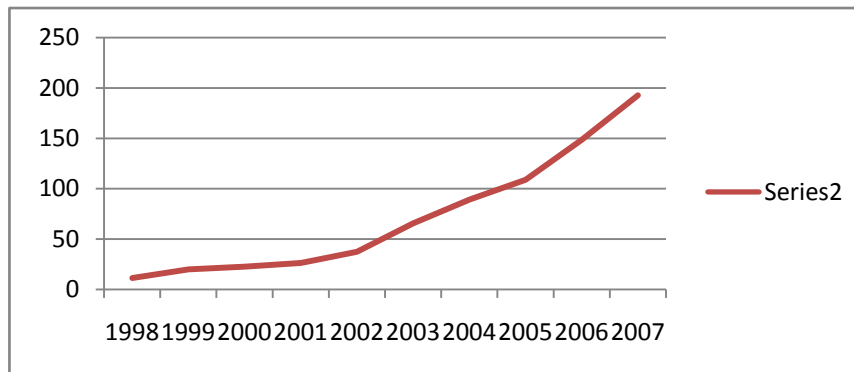


Figure 1: Trade Creation Index of Iran from Year 1998-2007 (10%)

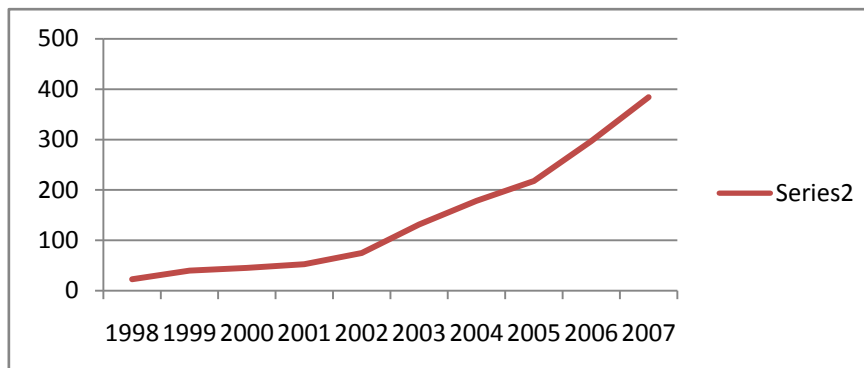


Figure 2 : Trade Creation Index of Iran from Year 1993-2007 (20%)

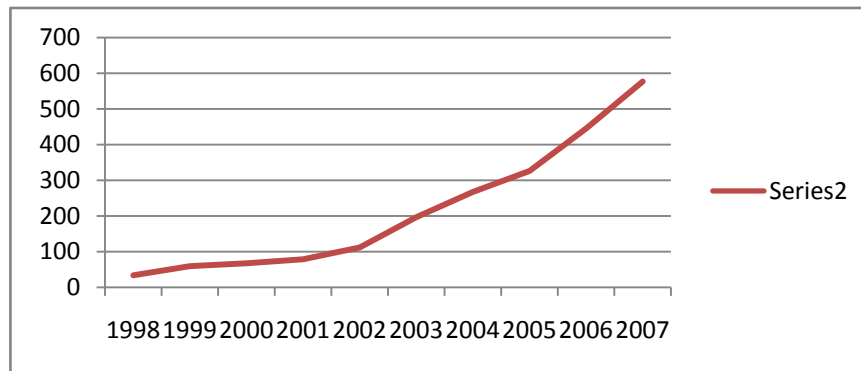


Figure 3 : Trade Creation Index of Iran from Year 1998-2007 (30%)

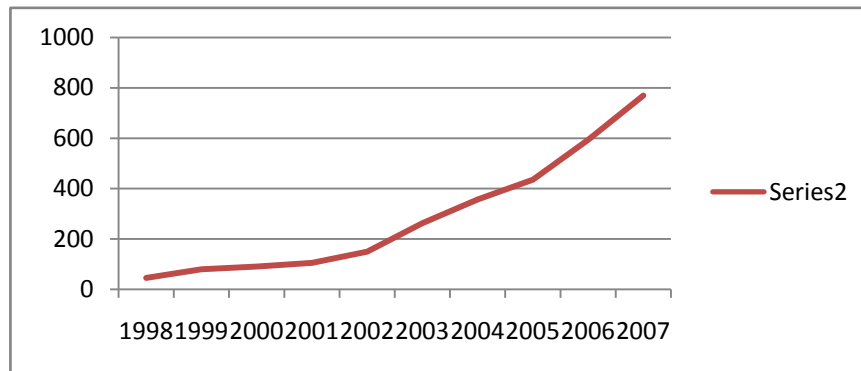


Figure 4 : Trade Creation Index of Iran from Year 1998-2007(40%)

The results show's by reducing tariff rates, trade creation increases. Therefore if the D-8 countries preferential trade agreements (PTA's) leads to reducing the tariff's rate, trade and competitiveness will increase between Iran and D-8 countries. The Trade Creation Index pattern and trends for the years 1998-2007 explains that the index is ascending.

We estimate Trade Diversion Index in four conditions: C_{IR} = 10, 20, 30 and 40 percent for the years 1998-2007. The results have been shown in Table 7. The data is collected from the Institute for Trade Studies and Research of Iran.

Table 7 : Trade Diversion Index of Iran from Year 1993-2007

Year	10%	20%	30%	40%
1998	-1352.14	380.5	2113.14	3845.79
1999	-4318.46	-3054.41	-1790.35	-526.3
2000	-3445.28	-1896.85	-348.43	1200
2001	-5206.05	-3374.74	-1543.43	287.88
2002	242.43	13244.49	26246.55	39248.61
2003	-986.93	14580.42	30147.77	45715.12
2004	-2221.67	20002.41	42226.48	64450.56
2005	-441.66	25769.02	51979.7	78190.38
2006	2164.11	32815.37	51460.45	69007.93
2007	21443.75	40792.38	42619.13	42758.38

The results show that there is an increasing common external tariff from 10 percent to 40 percent for the years 1998-2007 leading to a positive trade diversion ($TD > 0$). Therefore, it is concluded that trade creation occurred. With a reduction of common external tariffs trade diversion that is negative, intra regional trade declines but external regional trade increased.

With a 10 percent reduction of common external tariffs, it is observed in the period of study, trade diversion is negative and intra regional trade declined. But in the other three conditions of 20 percent, 30 percent and 40 percent reduction in common external tariffs, trade creation occurred and intra regional trade increased.

a) *State Of Iran's Trade With Other D-8 Member Countries*

The findings show that the index is greater than one, for Iran's export to Turkey and Pakistan therefore, this could be regarded as highly intense. It is correct to say that intensity has improved from the time the agreement was signed in 1997. Iran and Turkey's bilateral trade surged from year 2003 onwards but Export Intensity Index for Iran and Pakistan declined from year 2000 whereas the index increased for Pakistan's export to Iran. This means that Iran's tendency to import from Pakistan has increased.

The findings also show Iran's exports to Turkey and Pakistan is more than Iran's imports from the world. In other words, trade share between Iran and Turkey and Iran and Pakistan is more than their shares in world's trade. In contrast, the index was high even before the time the agreement was signed in 1997. This could be attributed to geographic proximity and relative isolation from other markets.

The index is shown to be lower than one, for Iran's export to other D-8 countries (Indonesia, Malaysia, Egypt, Nigeria and Bangladesh) indicating that the share of Iran's trade with these countries is less than a proportion of Iran's share of world trade. This implies Iran's export to other D-8 countries is low.

Import Intensity Index indicates the share of Iran's imports from Turkey, Pakistan and Bangladesh is more than a percentage of their share of world trade. The index trends shows from year 2003, share of Iran's import from Turkey and Turkey's import from Iran is becoming higher. This further implies that the tendency of bi-lateral trade between the two countries has increased.

From year 2000, Import Intensity Index of Iran from Pakistan has risen, while Index decreased for import of Pakistan from Iran. This result shows that only Iran's tendency to import from Pakistan has increased.

Since the index is greater than one, for Iran's import from Bangladesh, this relationship could be considered as highly intense. But since year 2000, the trend is descending; reflecting a tendency of imports from Bangladesh to be declining. It should be noted Export Intensity Index for the two countries that is Iran and Bangladesh, is less than one, indicating that Iran's export to Bangladesh is not significant.

According to table 9, Import Intensity Index for Iran and other D-8 countries (Egypt, Indonesia, Malaysia and Nigeria) is less than one, emphasizing the share of Iran's import from these countries is less than a proportion of their share of world trade.

Comparing Indices Export Intensity Index and Export Complimentarity Index between Iran and Turkey shows a considerable difference that is; Export Complimentarity Index is less than Export Intensity Index. This means despite Iran and Turkey's export is

more than a proportion of share of world trade, but the small difference of Trade Complimentarity Index explains export patterns of Iran do not match the import patterns of Turkey.

Furthermore, investigations in Export Intensity Index and Export Complimentarity Index trends for the years 1998-2006, shows Export Intensity Index trend is ascending but the Export Complimentarity Index trend is descending. In other words, in spite of the increasing tendencies of trade between Iran and Turkey, the export pattern of Iran does not match the import patterns of Turkey.

By observing indices that is Export Intensity and Export Complimentarity Index between Iran and Pakistan shows a difference; but the difference of these two indices is smaller than for indices for Iran and Turkey. Therefore, Trade Complimentarity Index for Iran and Pakistan is higher than Iran and Turkey's. This implies export pattern of Iran matches the import pattern of Pakistan, in comparison to Turkey's.

The Export Complimentarity Index for Iran and Indonesia is bigger than export intensity in the years 2000 and 2006, indicating although the share of Iran and Indonesia's export is less than a proportion of their share of world trade, but the export pattern of Iran indicates a match to the import pattern of Indonesia. The Import Complimentarity Index between these countries also accepts this result. The results also indicate that the Trade Bias Index for Iran and Turkey for the 3 data points that was tested in this study is less than Trade Bias Index for Turkey and Iran. This means that Iran's access to Turkey's market is limited and Turkey gets an advantage of the bilateral trade partnerships and preferential facilities. Although, findings of this study show Turkey has more freedom to enter Iran's market. Trade Bias Index trend shows a downward decline before year 2000, but after this period the trend shows a pattern that is surging upwards. This would explain Iran's access to Turkey's market has become more restricted. The results show a similar issue occurring between Iran and Pakistan. Trade Bias Index for Iran and Pakistan is less than the Trade Bias Index for Pakistan and Iran. In other words, despite the liberal access by Pakistan to Iran's market, this is not reciprocal as Iran's access to Pakistan's market is quite limited.

IV. CONCLUSION

In summary, the findings indicate that while D-8 countries intra-trade is expected to increase substantially, but not all countries will experience a welfare gain under a free trade arrangement. Likewise, impact on economic sectors differs substantially across countries.

The findings of this paper may serve as recommendations for policy makers to improve bilateral trade flows amongst D-8 countries, and signify the importance of trading partners. The purpose of this paper is to use indices in international trade as an input into the process of evidence-based policymaking in the area of trade policy for D-8 countries.

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