Modelling and Patterns of Intra-Industry Trade
(Iran's Case Study)

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Abstract:

The aim of this paper is to provide an empirical analysis of Intra-Industry Trade (IIT) in Iran from a number of perspectives. Theoretical background of intra-industry trade will be discussed and then the pattern of IIT will be identified across categories of SITC and trends in this pattern examined. Bilateral trade data at the three-digit level of SITC between Iran and the selected OECD countries over the period 1997-2001 are used for this analysis. Indeed, the Grubel – Lloyd intra- industry trade (IIT) index is an indicator of the degree of industrial specification to study Iran ability to compete in a more open trade setting. The results of the paper shows that Iran IIT levels with OECD rend to Zero and thus Iran does, have a very low industrial base relative to these countries.

Keywords: Intra-Industry Trade, Iran's Trade, Grubel – Lloyd Index

Introduction

Intra-industry trade (IIT), two-way trade or trade overlap is the simultaneous exports and imports of similar goods within an industry. Today approximately one forth of world trade has intra-industry nature. In 1960s, the evidence of IIT between countries of similar development levels severely limited the scope of traditional theories of international trade. Theories such as comparative advantages or factor endowments, states that countries with different resources or factor endowments will trade with each other. But, empirical evidences show that countries with similar endowments do more trade these days. Based on new theories, monopolistic competition and increasing returns leads to IIT between similar countries, whereas the old comparative advantage is still be applied for countries separated by a high economic distance (i.e. a large differences in factor endowment, technology levels, etc.)

This essay aims to measure the extent of IIT between Iran and selected OECD (Organisation of Economic Co-operation and Development) countries. As what mentioned above, we don't expect to see high degree of IIT between Iran and these countries.

Why Intra-Industry Trade is Important?

IIT shows trade in close substitute goods that are demanded by consumers from different countries with different preferences. Many studies suggest that the more developed countries, the more specialised trade structure and thus the higher IIT would be. Thus, industrialised countries like some OECD members expected to have very small IIT. In fact, Iran does not have competitive power relative to them. But, examining IIT variations in time can yield useful insights for adopting suitable trade policies. Also, by considering IIT in different categories of products, we can determine categories which they are significant advantages for specialisation in them. This is helpful in trade decision making and to some extent determine how well we can compete in new trade environment and what adjustments are required.

The increasing extent of intra-industry trade in the world trading system has some important implications for adjustment of economies to increase trade. By increasing trade, the size of economic sectors may change. Sector experiences increase in imports and exports, simultaneously. Therefore, there is no need of shift in resources between sectors. It will decrease the adjustment of trading. As "Grimwade" says: "Intra-industry specialisation is likely to give rise to fewer adjustment problems than Inter-industry specialisation necessitates a movement of resources from import-competing to export-competing industries. Adjustment problems can arise where resources, especially labour, are geographically and occupationally immobile in the short run. Large-scale structural employment might result. To large extent, intra-industry specialisation is achieved without the necessity for workers to leave a particular industry or region. The risk of structural unemployment is reduced (Grimwade, 1989).

Since Iran applied for membership in WTO (World Trade Organisation), and it is suffering from high rate of unemployment, openess of economy may make a huge changes in its economic structure. A thorough knowledge of its own trade pattern will help it to adopt better policies.

Intra-Industry Trade (IIT) Measurement

Early works on IIT measurement were included the IIT degrees and the pattern of trade. Schumacher (1983), Greenaway & Milner (1989), Havry-lyshyn (1983) etc are some works on measuring IIT. Even, recent empirical works on this subject have a section about measurement of IIT degree. As mentioned before, approximately one-forth of world trade is of Intra-industry trade (see Krugman and Obstfeld, 2000). There is, even, empirical evidence that IIT degree is increasing among Asian countries (Wakasugi, 1997, Hu & Ma, 1999). The first measurement was proposed by Balassa, in 1966. He proposed that it be measured by the extent to which exports of a given good are offset by imports of an equivalent good:

$$A_j = \frac{\left| X_j - M_j \right|}{X_j + M_j}$$

where Xj (Mj) is the value of the export (import) of commodity j by a country. A_j is Inter – industry trade (INTE) and shows trade in different products. This index has not found much favour, because when there is no IIT, the index value is 1 and when there is "perfectly matching" intra-industry trade, it takes 0.

Grubel and Lloyd (1975) studied the case of to countries of OECD. Through this study they established a new index:

$$B_i = \frac{(X_i + M_i) - \left| X_i - M_i \right|}{(X_i + M_i)} = 1 - \frac{\left| X_i - M_i \right|}{(X_i + M_i)} = 1 - A_j$$

where Xj and Mj are as before and b_j is IIT index. It is clear that intra-industry trade is the proportion of trade that is not inter-industry. If there is no intra-industry trade, one of X_i or M_i will be zero so that the IIT index will be zero, Similarly, if all trade is intra-industry, $X_i=M_i$ and hence the IIT index will be equal to 1.

Empirical Results

We will use Grubel and Lloyd index in this study. We tried to measure IIT at the 4-digit levels. But if we did so, it might be zero for all categories! So, we used data at 3-digit levels to measure the extent of IIT between Iran and selected countries of OECD, in the period of 1997-2001. These countries are: Australia, England, France, Germany, Greece, Italy, Japan, Korea, the Netherlands, Spain, Sweden and Turkey. Table 1 shows IIT levels calculated for Iran and considered countries. Here, the aggregated IIT index is calculated for all industries. That is, it is aggregated by using the weighted mean:

$$AIIT = \frac{\sum_{i=1}^{n} (X_i + M_i) - \sum_{i=1}^{n} |X_i - M_i|}{\sum_{i=1}^{n} (X_i + M_i)}$$

of course, this aggregated measure has often been criticised as being biased down ward by the degree of trade imbalance. But , previous studies have shown that we can use and have argued that no adjustment to the imbalance has been calculated.

Table 1: IIT at 3-digit level for Iran and the selected OECD countries

Year \ Country	1997	1998	1999	2000	2001
Australia	0.3897	0.00	0.00	0.00	0.00
England	0.0409	0.0162	0.00	0.0484	0.00
France	0.0605	0.0629	0.1104	0.0680	0.0525
Germany	0.2315	0.00	0.0300	0.00	0.7710
Greece	0.1085	0.00	0.2110	0.2675	0.2888
Italy	0.00	0.00	0.1138	0.1332	0.4477
Japan	0.3588	0.00	0.00	0.00	0.0093
Korea	0.0448	0.00	0.00	0.4290	0.00
Netherlands	0.3494	0.3088	0.0272	0.00	0.0423
Spain	0.00	0.00	0.00	0.00	0.00
Sweden	0.00	0.0083	0.0250	0.00	0.00
Turkey	0.6287	0.00	0.7547	0.7333	0.8133

As you can see in Table 1, IIT indices between Iran and the most considered countries are zero for the most years. There is no intra industry trade between Iran and Spain during this period. It also is zero for more than three years for countries like Australia, Japan, Korea and Sweden. These results suggest that Iran has not any competitive power relative these countries. It is because of the very different development and specialization levels between Iran and them. Hence, as it was predictable, most and even all trade between Iran and these countries is inter-industry. Consider countries like Turkey, the Netherlands, Italy and Greece. Except Netherlands, Iran IIT has increased with the other three countries during this period. It indicates that some Iranian products can compete in markets of these countries. In other words, consumers of countries the Italy, Turkey and Greece tend to consume Iranian products and this willingness has increase over time.

Table 2: IIT at three digit SITC between Iran and the Selected OECD Countries

Year Sector	1997	1998	1999	2000	2001
Food and live animals	0.1576	0.00	0.00	0.00	0.00
Beverage and tobacco	0.00	0.00	0.00	0.00	0.00
Crude material	0.00	0.1281	0.00	0.00	0.2697
Mineral fuels	0.8983	0.00	0.00	0.00	0.00
Animal and vegetable oil	0.00	0.00	0.00	0.00	0.00
Chemicals	0.9855	0.1102	0.0272	0.2505	0.2496
Manufactured goods	0.1645	0.3380	0.7190	0.3155	0.5090
Machinery and transport equipment	0.0686	0.0196	0.0866	0.0499	0.1204
Miscellaneous manufactured goods	0.00	0.00	0.00	0.8591	0.8191

Thus, we can expand trade relations with them by adopting suitable policies. The trend shows a downfall in the case of Netherlands. Ignoring some years from analyses, it has an increasing trend in trading with Turkey and Greece than with developed countries like the UK, Netherlands and Japan. What is common in these cases is that the increasing or decreasing trend is taking place with an increasing rate. Implicitly, IIT will be higher

when trading partners are geographically close either because proximity means lower transport cost or because physical proximity is positively correlated with similarity of cultures and tastes. We can see this matter in the case of Turkey. May be we can say the same in the case of the other three countries. Obviously, it has an inverse influence in the case of Netherlands. Similarity of calture (in parts) or in taste between Italy, Greece and Iran might be one of the factors that influence the IIT between these countries. As a whole, the most Iran's IIT is with Turkey among considered countries and more than half of total trade between Iran and Turkey has been intra-industry. In contrast, there was no intra-industry trade among Iran and Spain in the time period.

As we can see in Table 2, within the period 1997-2001, there is no IIT in categories 4 and 1; animal and vegetable oil, beverages and tobacco. Just categories 5 and 7 have a sequence flow of IIT during the period mainly for chemicals, manufactured goods, machinery and transport equipments. Even these three categories have no significant figure but the higher IIT is in category 8 (miscellaneous manufactured goods). This group of commodities are relatively labour intensive. Whereas labour endowment is not expensive in Iran but it means that Iran has a potential capability in manufactured and miscellaneous manufactured goods.

Table 3: Total IIT index of Iran with the OECD Countries

Year	Exports (Xi)	Imports (Mi)	IIT (Total)
1997	60302702	400933360	0.26
1998	4212368	5053224930	0.08
1999	11498997	104201790	0.25
2000	19841065	243685220	0.15
2001	12136763	196270370	0.116

As we can see in Table 3 the total IIT has a downward trend which is more significant in 1999 and 2000.

Conclusions

This paper indicated empirically that that IIT is high among developed countries or newly industrial countries but there is theoretical and empirical evidences that a low IIT exists

among developed and developing countries (Halvin 1994) and most of OECD members are among high income countries. Since Iran is one of the developing countries, we have no expectation to consider high IIT between Iran and these countries. Economic distance, large difference in factor endowments and technology levels are important reasons of low IIT in this study. On the other hand there are many aggregations among European countries and most of them are members of WTO. This will make more trade barriers for non-members countries. This could be strong reason of large fall in IIT. As Iran is a labour abundant country concentrating on miscellaneous labour intensive manufactured goods seems to be a good strategy to boom export similarity in some extents. Lack of enough data sources which is common for the most developing countries was the most important obstacle to determine the dynamic of IIT but further analyses could be expanded if more disaggregated data are available.

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