# 31 Years Intra-Industry Trade of Pakistan

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**Abstract**

This study investigates intra-industry trade (IIT) of Pakistan for 31 years with eleven selective major trading economies and country-specific determinants of IIT of Pakistan using gravity model. OLS technique is used on panel data of 341 observation and UN COMTRADE and World Development Indicator (WDI) as data source the result shows 24.93% of IIT of Pakistan with its selective trading partners and R-square is 88%. This study provides 31 years average levels of IIT of Pakistan, both one-digit SITC commodity wise and country wise. More specifically the average levels are of three decades, first 1982 to 1991, second 1992 to 2001 and third 2002 to 2012. Results are highly significant and are as expected. Commodity wise the highest IIT level was found to be in Crude materials, inedible, except fuels (SITC-code 2), within this Pakistan IIT with Kuwait reported to be 80%. While Country wise highest IIT level of Pakistan is with Singapore.  This study suggests specific strategy proposal for the encouragement of IIT of Pakistan.

**Keyword(s):** Intra Industry Trade (IIT), Standard International Trade Classification (SITC)

**Introduction**

It is impossible for a country to produce all the commodities. This originates the need for trade. Countries only produce those commodities in which they are efficient and posses' comparative advantage. Later, exchange a portion of these commodities for those commodities in which other countries are relatively more efficient. The basis of International trade has widened immensely due to relative difference in factor endowments, taste, technical knowledge (technology) etc. International Trade is classified into two major gears import and export. These two components sound to be one-way trade. The direction of trade of commodities being trade in and send abroad are referred to import and export. This is era of globalization; no country can fully produce any commodity by itself. A nation needs commodity from other country in order to provide finished goods to the consumer. To achieve this purpose trade between countries takes place within the same industry that is engaged in producing same kind of commodity. This trade among countries in exchange of same products is classified as Intra-industry trade (IIT). IIT would continue to generate even if overall ratio of capital-labor had been same in the countries, the differentiate products would be carried out to be bring into being by their firms. The leading urbanized countries import raw material from the 3rd world countries and export semi & finished goods to them, keeping developing nations at disadvantageous position. To eliminate this trade unfairness and disadvantage organizations like GATT and WTO encourage free trade and supervise tariffs and regional trade of their member countries but there are many factors which are responsible for the success of regional integration, pattern of comparative advantage , free trade etc. Member countries of these organizations are highly concerned with in the extent of trade complementarily with in a regional trading bloc, pattern of comparative advantage and tariff on their exports.

According to Verdoon (1960) post-World War-II witnessed trade patterns amongst European economies within intra industry. Since then trade pattern of intra industry become benchmark in international trade. Intra industry trade consists of about one-fourth of International trade[1].

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[1] For instance, in 2002, IIT was comprised of 68.5 % , 77.7%, and 72.0 % of entire manufacturing trade of United States,

Meanwhile the industry is more integrated today as compared to the older days. This grouping amongst regions proved to be very successful for nations. However, the global financial catastrophes[1] initiated the concept of low cost and trustworthy transportation along with communications and technologies. Recent studies findings showed IIT at 4-digit ISIC (or HS) level to raise high due to International fragmentation of production. Production is now considered to be more efficient outsourced to different countries effecting economical factors in terms of prices.

IIT among developed countries have been focused by many empirical studies. Usually trade between developing versus developed countries has been explained with Heckscher-Ohlin theorem. The empirical studies of Tharakan, 1986, Balassa and Bauwens, 1987 indicate of having some empirical evidence in terms of IIT between developed economies and developing economies. This landmark model for IIT are workings of Krugman (1979), Lancaster (1980) and Helpman (1981), Eaton and Kierzkowski (1984), and Helpman and Krugman (1985). These models highlighted the differentiation of commodities and also highlighted imperfect competition within the industrial market, concerning industrial concentration and the scale economies.

Commercial policy reforms were implemented by Pakistan in order to encourage regional trade. Pakistan initiated import-substitution policy similar to other developing economies that supported overvaluation of exchange rate, import quotas and high tariff rates by joining two regional-trading blocs i.e. South Asian Association for Regional Cooperation (SAARC) and Economic Cooperation Organization (ECO) (Kemal, 2004).

Hence, given the significance of intra-industry trade, IIT of Pakistan along with its eleven selective trading economies will be carried out in this paper. The trade will be studied in the light of intra industry. The input of this study may be judged on the roots of awareness that : (i) there is an absence of such investigation within the area of intra-industry trade of Pakistan which will present a three decade analysis of intra-industry trade along with its eleven major trading partners. (ii) There is a lack of empirical findings that may be helpful in making policy for intra industry trade of Pakistan.

Moreover, the paper will be divided into four sections. Firstly, literature review will be presented to provide an insight into the workings of intra-industry trade along with references. Secondly, methodology will be presented to achieve the objectives of this research paper. Thirdly, Empirical results will be discussed. Finally, in the last section conclusion will be summed up along with policy proposals for the intra-industry trade.

**Literature Review**

Heckscher-Ohlin (HO) model explains the traditional international trade, it predicts that countries with that produce similar products have little reasons to trade. Among countries the difference between factors of production is the foundation of international trade. According to their different factor endowments in the production of different products countries enjoys comparative cost advantage. Such international trade between countries that trade with each other on the basis of comparative cost advantage of is called inter industry trade. In the light of these traditional theories there is an absence in the trade of similar products amongst economies with the same competencies.

The era of post World War II opened the doors for the trade between countries of similar commodities that have been produced by similar factors of production. The countries with similar factors of production can also trade among and can gain from it. It has been observed that urbanized economies have experienced a noteworthy share of trade of commodities that are traded within the same industry rather than among them. IIT is a trade that is based on the economies of scale and differentiated goods.

The IIT literature began in earlier 1960's. This nature of trade was observed by Balassa (1966)[2] and Grubel (1967)[3] (1975)[4]. The ground-breaking workings on intra-industry trade by Krugman, (1979), (1980), (1981); Lancaster (1980); Helpman, (1981) eliminate the idea that traditional theories could enlighten intra-industry trade.

Krugman (1979)[5] is perhaps the pioneer to introduce IIT with a standard econometric model. Turkcan (2005) examine factors of IIT in final and intermediary goods[6].

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Czech Republic and Germany respectively

[1] Fragmentation occurs when the output of a final good requires multiple stages in production [Turckan (2005)].

[2] Balassa (1966) investigate Europe's trade within the industries of customs.

[3] Grubel and Lloyd (1966) introduced the index for calculating the IIT.

[4] Grubel and Lloyd (1975) presented an improved index for IIT. It is also known as G-L index

[5] Krugman (1979)[5] taking geographical proximity explains that identical economies have IIT between them.

[6] For Turkey and O.E.C.D (Organization for Economic Cooperation and Development) countries.

According to this writer's knowledge very few researches are conducted on the IIT of Pakistan. Kemal (2002 and 2004) calculated Grubel and Lloyd index to know the contribution of IIT in Pakistan's trade with the countries of SAARC and ECO. The investigation of determinants of intra industry trade between Pakistan and selective ten main trading economies was conducted by Shahbaz (2010). The recent study of Adnan (2013) contributes its share in finding share of IIT of Pakistan with India, Bangladesh and Sri Lanka, using country and industry specific characteristics for analysis of determinants of intra industry trade.

In the light of above discussed literature reviews it lead to the judgment that for both consumers and producers IIT is beneficial. It enables a producer to produce commodities at fewer varieties at low economic efficiency. As products are been produced at lower average cost and high productivity and on the other hand the consumers also enjoy the fruits of IIT as a large range of commodities are offered at cheaper prices. There is an absences of empirical study that analysis IIT for Pakistan of commodity codes ranging from 0 to 9 of SITC, with Canada, China , India, Iran, Japan, Kuwait, Malaysia, K.S.A, Singapore, U.A.E and U.S. The present study bridges this gap.

**Methodology**

*3.1. Introduction*

The sub-section 3.2 explains the calculating method of IIT and sub-section 3.3 discusses the empirical model used in this manuscript.

*3.2 Intra-industry Trade*

It is two-way export and import of commodity of an industry, a variety of methods of calculating IIT have been projected in empirical writings, inclusive of the Balassa Index, the Aquino index and (G-L) index .The method of calculating IIT is refined by Grubel and Lloyd (1971) and it is most extensively used. However, in the observed literature it is often cited that beside aggregation bias the Grubel-Lloyd Indices has one most important dilemma. The unadjusted Grubel-Lloyd index is inversely related with large overall trade imbalance. By means of national trade balances, intensity of intra-industry trade in an economy will be without a doubt underestimated. For evading this problem, another technique was proposed by Grubel and Lloyd (1975) to adjust the index[1].

Known the evils of unadjusted Grubel and Lloyed index, by incorporating the adjusted G-L index, this manuscript calculates the intensity of IIT between Pakistan and its major trading countries. Adjusted G-L index is defined as:

$$IIT = 1 - \frac{|X_i - M_i|}{(X_i + M_i)} \tag{1}$$

They interpret intra industry trade as gap in the trade flow of specific industry (*i*) and the total trade of this identical industry. The index is presented as a ratio in which the denominator is total trade. The data for import and export of Pakistan at one-digit SITC is extracted from UN COMTRADE.

| Index Value | Trade Type |
|---|---|
| IIT = 1 | *All trade is Intra Industry Trade* |
| IIT = 0 | All trade is Inter Industry Trade |

*3.3. Empirical Model*

For empirical analysis a gravity equation is applied with panel data to investigate the deciding factors of IIT in Pakistan bilateral trade with selective eleven major trading partners in time period of 1982-2012. The exogenous variables data is taken from World Development Indicators, The World Bank database.

3.3.1Gravity model

Gravity model is used in many social sciences because sometimes studies use aggregation of human behavior which involves migration and traffic flows, elements of mass and distance are used in bilateral trade; this model is based on an analogy with Newton's gravitational law that is described as:

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[1] The adjusted G-L index used the proportionate size of trade (exports and imports) of a specific commodity within an industry as weights.

$$F_{ij} = G \frac{M_i M_j}{D_{ij}^i}$$

Where, force between two bodies i and j is $F_{ij}$, the mass of two bodies i and j respectively is represented by $M_I$ $M_j$, the distance between the bodies i and j is $D_{ij}$ and G is the force of gravity.

Transforming this Newton's law for trade, where $Y_{ij}$ is the bilateral trade between countries, y is the economics size of trading partners and $D_{ij}$ is the distance taken in account as trade barriers.

$$Y_{ij} = \alpha \frac{y_i y_j}{D_{ij}} \qquad\qquad i=1, \ldots, n \text{ and } j=1, \ldots, n \quad i \neq j$$

3.3.2. Explanatory Variable

I has been observed that in many empirical investigations of IIT, country specific and industry specific variables are been considered as determinants of IIT. In this manuscript number of country specific characteristics are considered as feasible exogenous variables explaining the level of IIT, in the Pakistan bilateral trade with 11 major trading partners over the 1982-2012 periods. The hypotheses presented here are taken from the on hand empirical and theoretical literature. In the following lines hypotheses of this study is considered to look into the intra- industry trade determinants of Pakistan trade.

**Economic Size (AGDP$_{ft}$ ):** this is average of gross domestic product (GDP) of Pakistan and its trade partner. Helpman and Krugman (1985) finds that as the average economic size of both countries increases the level of intra-industry trade in manufactured goods trade also increases. This rise in level of IIT is because of the existence of economies of scale. Moreover, large demand for distant differentiated commodities and the possibility for IIT become high in larger markets. Therefore, the shares of intra industry trade among any two economies are predictable to have positively relation with the average economic size of partner countries. The average GDP levels of the Pakistan and each of its trading partners f (in current US dollar), denoted as (AGDP$_{ft}$), is used to test this hypothesis.

**Differences in Market Size ( DGDP$_{ft}$ ):** this is difference in GDP (in current US dollars) between Pakistan and its 11 major trading partners. Findings of Helpman and Krugman (1985) suggest that, differences of capability to produce differentiated commodities between any two countries is the difference in market size; as they become more alike in means of their factor endowments and market size. Hence, for IIT differences in market size is expected to be negative. Moreover Loertscher and Wolter (1980), Greenaway et al. (1994), Hummels and Levinshon (1995) and Turkan (2005) also found it to be inversely related but Ferto and Soós (2008), and Leitão and Faustino (2009) findings were reciprocal to the earlier findings. The value of the difference of market size (in current US dollar) between Pakistan and its eleven main trading partners, denoted as (DGDP$_{ft}$), is used to observe the control of differences in market size over IIT.

**Differences in Per Capita GDP (DPCI$_{ft}$ ):** (This is difference between Pakistan  GDP per capita and partnering country GDP per capita). The taste and preference shows the demand pattern. For such demand pattern difference in GDP per capita can be taken as its proxy. Linder (1961) explains that countries with same taste and preference for differentiated goods and similar per capita incomes will have more bilateral trade. There will be less trade with escalating difference in per capita GDP. Thus expected sign is negative. The absolute value of the difference in per capita GDP (in current US dollar) between the Pakistan and its trading partner (DPCI$_{kt}$ ) is used to test this hypothesis. Linder (1961), Helpman-Krugman (1985), Adnan Akbar (2013) found it negative sign but Feenstra  and  Hanson  (1997) found it to have positive relationship for intermediate goods.

**DIST:** this is the geographical distance in kilometers from Capital of Pakistan to the Capital of partner country. The observed signs in on hand literatures are negative such as Krugman (1980), Balassa (1986). As the more the trading partner is greater transportation, transaction and insurance costs. So, there is an inverse relationship between IIT and geographical distance. Hummels and Levinshon (1995), Zhan and Clark (2009), Shahbaz and Leitão (2010), Turkan(2010) and Adnan Akbar (2013) also found a negative sign. In addition Balassa and Bauwens (1987) define geographical distance for IIT as weighted distance between the trading partners:

$$WDIST = \frac{DIST_k * GDP_{kt}}{\sum_{k=1}^{11} GDP_{kt}}$$

**Exchange Rate (EX):** this is the bilateral exchange rate of Pakistan with its trading partner. EX is included in this model to observe the effect of bilateral exchange rate on IIT. In the on hand literatures there is no such clear identification regarding the signs coefficients of exchange rate on IIT. Thus no clear expectation is made about the sign.

3.3.3. Model Specification

$$IIT_{ft} = \alpha_0 + \beta_1 Ln(AGDP_{ft}) + \beta_2 Ln(DGPD_{ft}) + \beta_3 Ln(DPCI_{ft}) + \beta_4(DIST_{ft}) + \beta_5(EX_{ft}) + \mu_{ft}$$

Where: IIT stands for Intra industry trade of Pakistan and its trading countries at time t, AGDP represents the average economic size between the Pakistan and its trading countries at time t, DGDP is difference between the market size of the both trading countries at time t, DPCI indicates the absolute difference in the per capita GDP of Pakistan and its partnering Country at time t, while DIST is for geographical weighted distance between the two trading partners, Pakistan and its trade partner at time t, EX is specified for bilateral exchange rate between Pakistan and trading country, $\mu$ is the disturbance term and finally $k$ is the trading Partner.

**Results and estimation**

*4.1. Introduction*

In this section result and estimation will be discussed. In sub-section 4.2.evidence of IIT is presented, in this section a brief discussion will be made on the IIT of Pakistan with its selected main trading partners. 4.3 describe the descriptive statistics of exogenous variable. Moreover in sub-section 4.4 explains the empirical findings.

*4.2. Evidence of IIT*

This section provides an overview on IIT values calculated by the author using UN COMTRADE data as source. The interpretation on the calculation is done in four sections, firstly a general interpretation on overall result, followed by average values of IIT of Pakistan, both commodity wise and country wise. Secondly the total 31 years are divided into three decades (1982-1991, 1992-2001 and 2002-2012), this will help us to note the trend of IIT of Pakistan that, are the levels of IIT remains constant or varies. This analysis will play a vital role in understanding the reasons behind the fluctuations in IIT and will help in policy making.

4.2.1. Overview at IIT Levels

The G-L indices are calculated at One-digit aggregation level of SITC. IIT is calculated for thirty one years from 1982 to 2012. The commodities are divided in accordance to the SITC codes of one-digit. The purpose of calculating intra industry trade for one-digit SITC code is to investigate overall value for the categorized commodity rather than sub-categories, to know in general the impact of intra industry value of the categorized commodity on complete trade. Canada, China, India, Iran, Japan, Kuwait, Malaysia, Saudi Arab, Singapore, United Arab Emirates and United States are the major trading partners of Pakistan. The main objective of this paper is to calculate IIT of Pakistan with selective eleven trading countries from 1982 to 2012. The data source for collection of data is UN COMTRADE. In accordance to the method discussed in the section of methodology for calculating IIT. The evidence of IIT of Pakistan with selected eleven trading countries is shown in the following table.

**Table 4.1 G-L Indices of Trade between Pakistan and Trading Partners[1]**

| Country | Year | | | |
|---|---|---|---|---|
| | 1982-1991 | 1992-2001 | 2002-2012 | 1982-2012 |
| **Canada** | 16.64% | 13.49% | 24.47% | 18.51% |
| **China** | 19.12% | 28.23% | 30.92% | 26.28% |
| **India** | 22.80% | 37.47% | 42.10% | 34.14% |
| **Iran** | 11.54% | 18.29% | 29.20% | 19.72% |
| **Japan** | 25.77% | 24.92% | 26.14% | 25.66% |
| **Kuwait** | 18.58% | 15.19% | 18.85% | 17.20% |
| **Malaysia** | 29.58% | 24.45% | 30.17% | 28.18% |
| **Saudi Arabia** | 19.87% | 21.40% | 18.38% | 19.69% |
| **Singapore** | 41.73% | 36.07% | 40.16% | 39.52% |
| **United Arab Emirates** | 24.92% | 23.05% | 34.20% | 27.73% |
| **USA** | 26.47% | 13.64% | 14.14% | 18.01% |

Source: Authors own calculation, Data is taken from UN COMTRADE.

[1] The presented values in table 4.1 is the average of ten years of each group, expect group of 2002-2012, in this group the average values are of eleven years.

The presented values of IIT are an average value of 10, 10 and 11 years. The collected data that is used for calculating IIT of Pakistan with selective trading countries indicates that in first ten years (1982-1991) IIT is found to be lower as compare to IIT in (2002-2012) expect Saudi Arabia, Singapore and USA.  A big change is been notice in IIT of Pakistan with China, India and Iran. More than on average a positive change of 10% has been reported. In contrast a decline of 12% on an average is reported for IIT of Pakistan with USA.   The graphical presentation of the table 4.1 is presented below.



Source: Authors own calculation, Data is taken from UN COMTRADE.
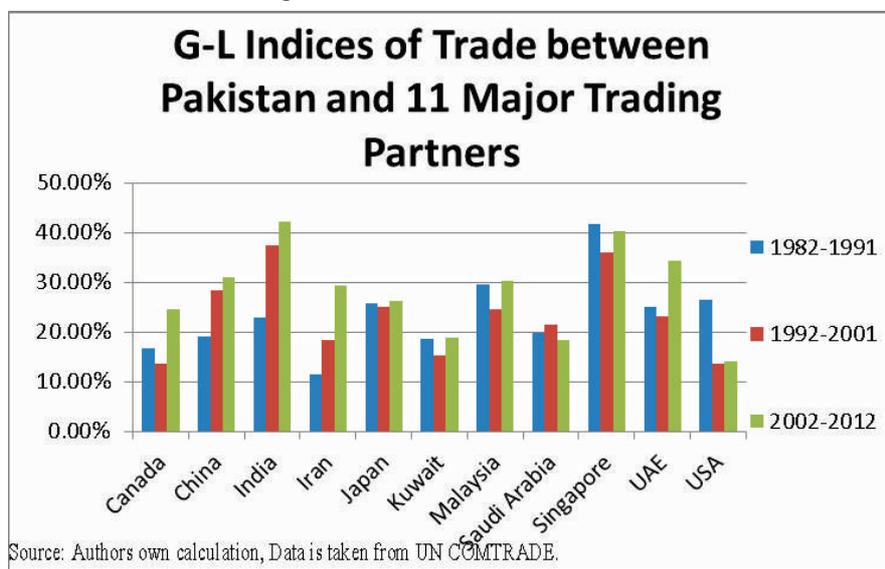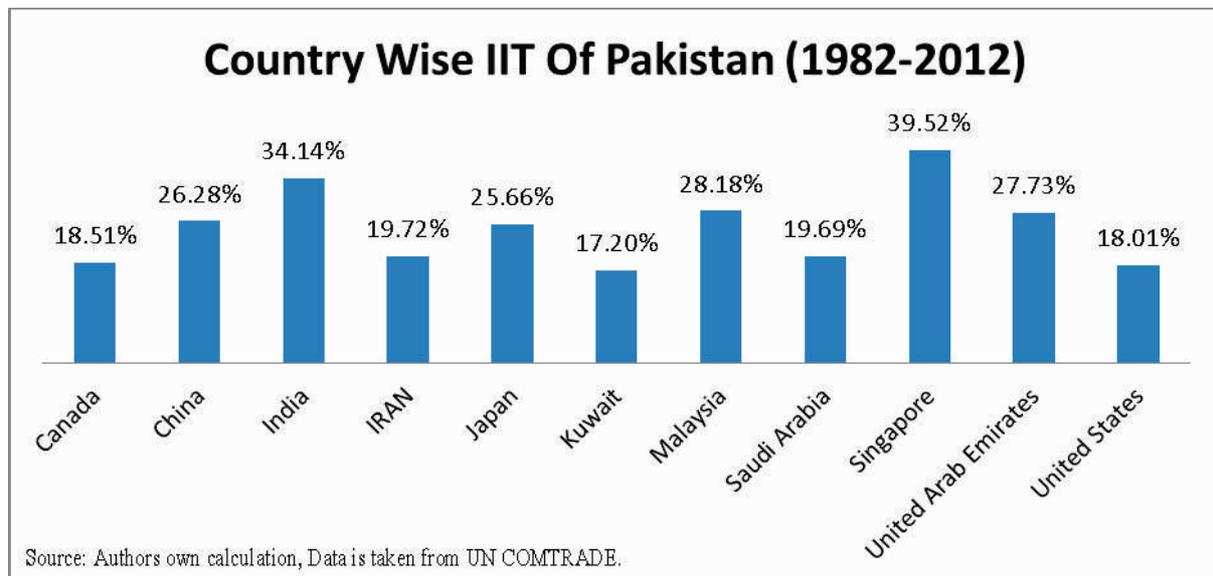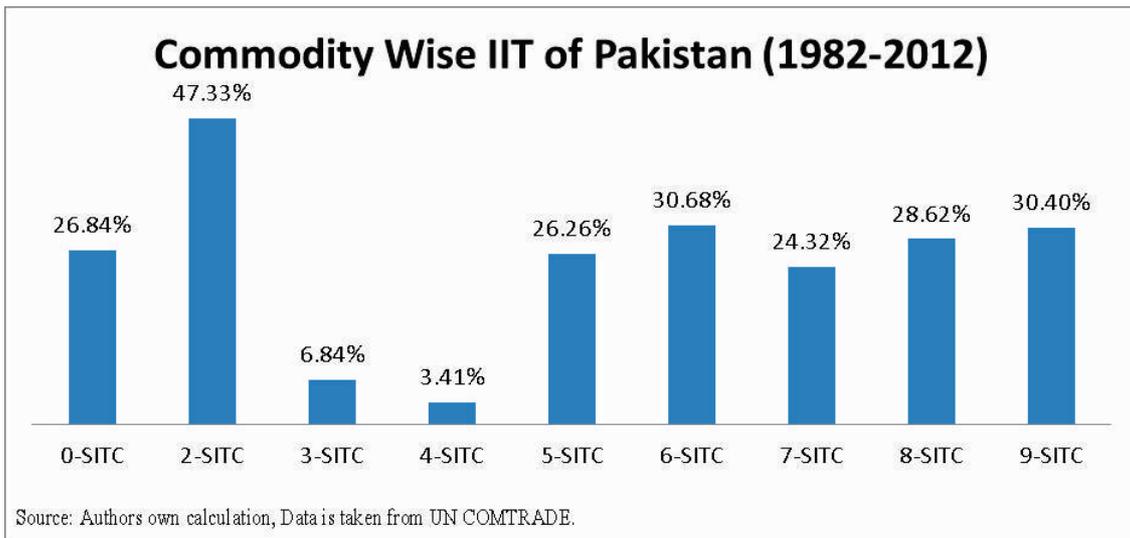
4.2.2. IIT Level of 1982-2012

In 31 years from 1982 to 2012 Pakistan IIT with selective countries is 24.93%. Commodity wise in the category of Crude materials, inedible, except fuels[1] Pakistan IIT for it is found to be 47.33%; Kuwait and Canada reported 80.80% and 7.36% country wise highest and lowest level of IIT respectively. Animal and vegetable oils and fats[2] reported lowest level of IIT. While country wise Pakistan IIT is found to be most with Singapore, India and Malaysia, with the IIT level of 39.52%, 33.76% and 28.18% respectively. These values are shown in the following table and graphs.

| Table 4.2 IIT Level of 1982-2012 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Commodity Country | 0-SITC | 2-SITC | 3-SITC | 4-SITC | 5-SITC | 6-SITC | 7-SITC | 8-SITC | 9-SITC | All Commodities |
| Canada | 38.86% | 7.64% | 0.12% | 4.58% | 22.48% | 39.18% | 8.86% | 6.86% | 37.98% | 18.51% |
| China | 42.46% | 21.59% | 13.93% | 3.13% | 28.67% | 52.07% | 11.95% | 24.49% | 38.24% | 26.28% |
| India | 63.61% | 53.56% | 7.34% | 0.28% | 29.10% | 43.38% | 26.40% | 50.24% | 33.31% | 34.14% |
| IRAN | 12.77% | 42.66% | 0.38% | 3.22% | 22.56% | 31.57% | 36.94% | 12.96% | 14.45% | 19.72% |
| Japan | 13.74% | 37.13% | 9.35% | 1.81% | 35.74% | 33.40% | 1.11% | 53.02% | 45.62% | 25.66% |
| Kuwait | 0.09% | 80.80% | 1.18% | 0.37% | 34.64% | 0.65% | 20.08% | 0.37% | 16.59% | 17.20% |
| Malaysia | 17.83% | 67.45% | 3.43% | 0.11% | 57.20% | 18.59% | 56.02% | 17.85% | 15.17% | 28.18% |
| Saudi Arabia | 3.05% | 70.93% | 0.12% | 21.48% | 15.88% | 6.58% | 42.41% | 1.29% | 15.46% | 19.69% |
| Singapore | 51.49% | 56.70% | 19.67% | 2.47% | 27.61% | 33.63% | 36.73% | 71.78% | 55.60% | 39.52% |
| United Arab Emirates | 10.10% | 49.90% | 19.63% | 0.00% | 11.19% | 52.06% | 22.42% | 63.11% | 21.18% | 27.73% |
| United States | 41.28% | 32.22% | 0.10% | 0.05% | 3.82% | 26.32% | 4.57% | 12.90% | 40.82% | 18.01% |
| 11 Countries | 26.84% | 47.33% | 6.84% | 3.41% | 26.26% | 30.68% | 24.32% | 28.62% | 30.40% | 24.97% |

Source: Authors own calculation, Data is taken from UN COMTRADE.

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[1]  Commodity code 2 in SITC Rev-1, source UN COMTRADE.
[2]  Commodity code 4 in SITC Rev-1, source UN COMTRADE.

## Commodity Wise IIT of Pakistan (1982-2012)



Source: Authors own calculation, Data is taken from UN COMTRADE.

## Country Wise IIT Of Pakistan (1982-2012)



Source: Authors own calculation, Data is taken from UN COMTRADE.

### 4.2.3. IIT Level of 1982-1991

In 10 years from 1982 to 2012 Pakistan IIT with selective countries is 22.92%. Commodity wise in the category of Crude materials, inedible, except fuels[1] Pakistan IIT for it is found to be 46.34%; Kuwait and China reported 80.52% and 12.25% country wise highest and lowest level of IIT respectively. Animal and vegetable oils and fats[2] reported lowest level of IIT. While country wise Pakistan IIT is found to be most with Singapore, Malaysia and United States, with the IIT level of 41.73%, 29.58%and 26.47%% respectively. These values are shown in the following table and graphs.

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[1]  Commodity code 2 in SITC Rev-1, source UN COMTRADE.

[2]  Commodity code 4 in SITC Rev-1, source UN COMTRADE.
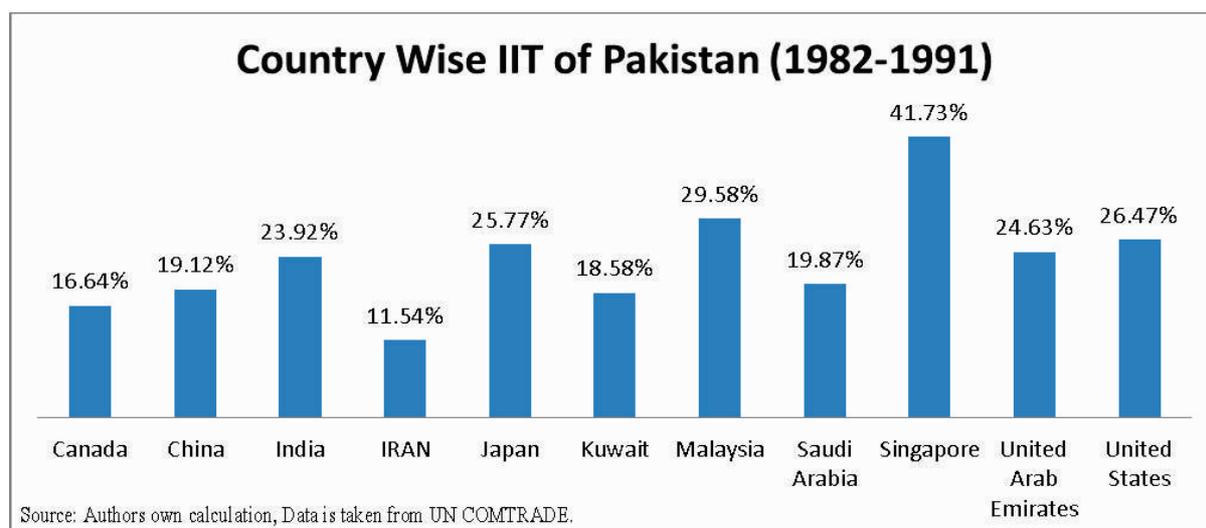
| Table 4.3 10 YEARS AVERAGE (1982-1991) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0-SITC | 2-SITC | 3-SITC | 4-SITC | 5-SITC | 6-SITC | 7-SITC | 8-SITC | 9-SITC | All COMMODITIES |
| Canada | 34.12% | 15.25% | 0.00% | 0.00% | 6.65% | 48.26% | 13.24% | 7.09% | 25.16% | 16.64% |
| China | 5.32% | 12.65% | 5.75% | 0.14% | 22.85% | 56.62% | 16.05% | 20.77% | 31.92% | 19.12% |
| India | 56.20% | 41.46% | 0.00% | 0.00% | 31.26% | 9.95% | 15.27% | 33.86% | 27.28% | 23.92% |
| IRAN | 3.70% | 55.20% | 0.01% | 0.00% | 3.10% | 10.99% | 16.34% | 12.68% | 1.87% | 11.54% |
| Japan | 23.35% | 33.88% | 9.55% | 5.28% | 14.21% | 43.40% | 0.90% | 55.43% | 45.90% | 25.77% |
| Kuwait | 0.25% | 80.52% | 2.25% | 0.00% | 32.22% | 0.20% | 41.73% | 0.21% | 9.85% | 18.58% |
| Malaysia | 37.49% | 64.41% | 0.00% | 0.02% | 60.28% | 14.86% | 69.76% | 10.94% | 8.45% | 29.58% |
| Saudi Arabia | 2.37% | 60.95% | 0.01% | 18.56% | 18.92% | 2.10% | 61.26% | 0.54% | 14.12% | 19.87% |
| Singapore | 86.55% | 58.67% | 32.56% | 7.37% | 5.66% | 25.42% | 42.01% | 79.16% | 38.17% | 41.73% |
| United Arab Emirates | 3.31% | 63.23% | 13.10% | 0.00% | 0.00% | 47.01% | 13.18% | 59.26% | 22.60% | 24.63% |
| United States | 69.73% | 66.05% | 0.00% | 0.00% | 0.41% | 22.67% | 9.28% | 10.84% | 59.28% | 26.47% |
| 11 Countries | 30.90% | 46.34% | 5.27% | 2.61% | 17.87% | 26.17% | 26.65% | 25.31% | 25.16% | 22.92% |

Source: Authors own calculation, Data is taken from UN COMTRADE.



Source: Authors own calculation, Data is taken from UN COMTRADE.

**Country Wise IIT of Pakistan (1982-1991)**
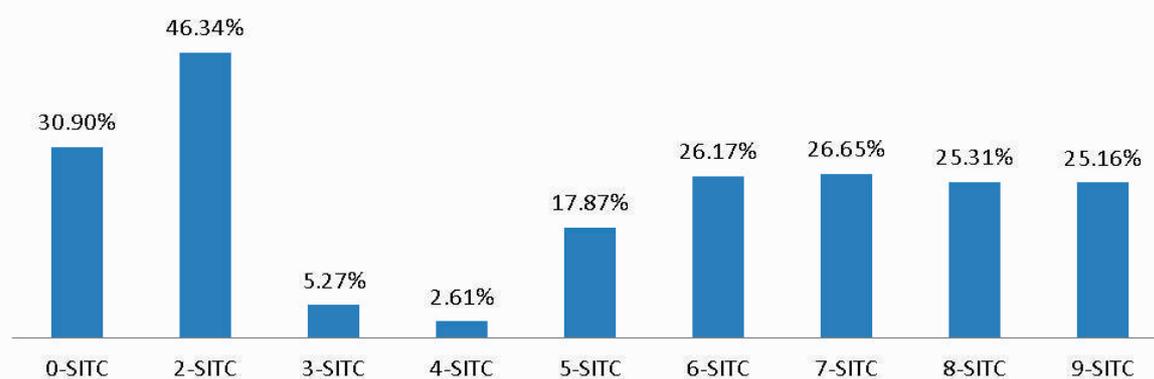
Source: Authors own calculation, Data is taken from UN COMTRADE.

### 4.2.4. IIT Level of 1992-2001

The 10 years average from 1992 to 2001 Pakistan IIT with selective countries is 24.08%.Commodity wise in the category of SITC 2 and SITC9 Pakistan IIT for it is found to be 44.25% and 33.34%, ITT of sitc4 and sitc3 are 2.11% and 6.55% respectively. Singapore and India has 36.89% and 36.39 country wise highest level of IIT respectively. Whereas, United States and Canada has lowest level of ITT 12.69% and 13.52% respectively.

| | 0-SITC | 2-SITC | 3-SITC | 4-SITC | 5-SITC | 6-SITC | 7-SITC | 8-SITC | 9-SITC | All COMMODITIES |
|---|---|---|---|---|---|---|---|---|---|---|
| Canada | 19.06% | 5.53% | 0.00% | 0.00% | 6.02% | 35.88% | 2.35% | 6.96% | 45.85% | 13.52% |
| China | 56.59% | 26.56% | 27.35% | 1.66% | 20.13% | 50.55% | 15.19% | 21.40% | 48.26% | 29.74% |
| India | 66.93% | 71.28% | 2.70% | 0.00% | 13.58% | 62.01% | 13.15% | 56.38% | 41.48% | 36.39% |
| IRAN | 18.20% | 27.39% | 0.00% | 2.63% | 39.61% | 27.66% | 34.84% | 7.06% | 8.47% | 18.43% |
| Japan | 7.95% | 45.77% | 12.78% | 0.15% | 23.26% | 26.65% | 0.52% | 70.17% | 38.35% | 25.06% |
| Kuwait | 0.01% | 80.15% | 0.06% | 0.00% | 30.12% | 0.42% | 15.00% | 0.29% | 6.11% | 14.68% |
| Malaysia | 9.79% | 66.70% | 0.00% | 0.28% | 52.81% | 10.57% | 41.44% | 19.68% | 12.36% | 23.74% |
| Saudi Arabia | 6.16% | 75.40% | 0.13% | 14.45% | 6.79% | 6.98% | 58.85% | 1.66% | 15.53% | 20.66% |
| Singapore | 39.46% | 51.18% | 12.19% | 0.00% | 19.79% | 29.25% | 20.88% | 84.00% | 75.24% | 36.89% |
| United Arab Emirates | 9.29% | 51.88% | 12.19% | 0.00% | 1.07% | 37.32% | 16.34% | 53.61% | 28.56% | 23.36% |
| United States | 18.81% | 24.53% | 0.17% | 0.00% | 0.81% | 26.81% | 1.70% | 9.90% | 31.46% | 12.69% |
| 11 Countries | 28.42% | 44.25% | 6.55% | 2.11% | 21.15% | 30.57% | 22.21% | 28.08% | 33.34% | 24.08% |

Table 4.4 10 YEARS AVERAGE OF IIT (1992-2001)

Source: Authors own calculation, Data is taken from UN COMTRADE.

Commodity Wise IIT of Pakistan (1992-2001

Source: Authors own calculation, Data is taken from UN COMTRADE.



Country Wise IIT of Pakistan (1992-2001)

Source: Authors own calculation, Data is taken from UN COMTRADE.
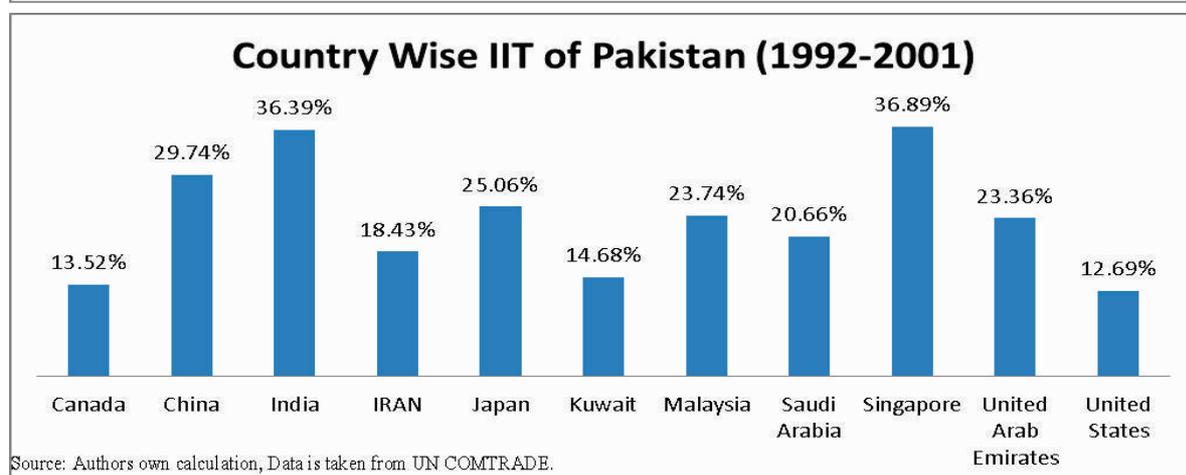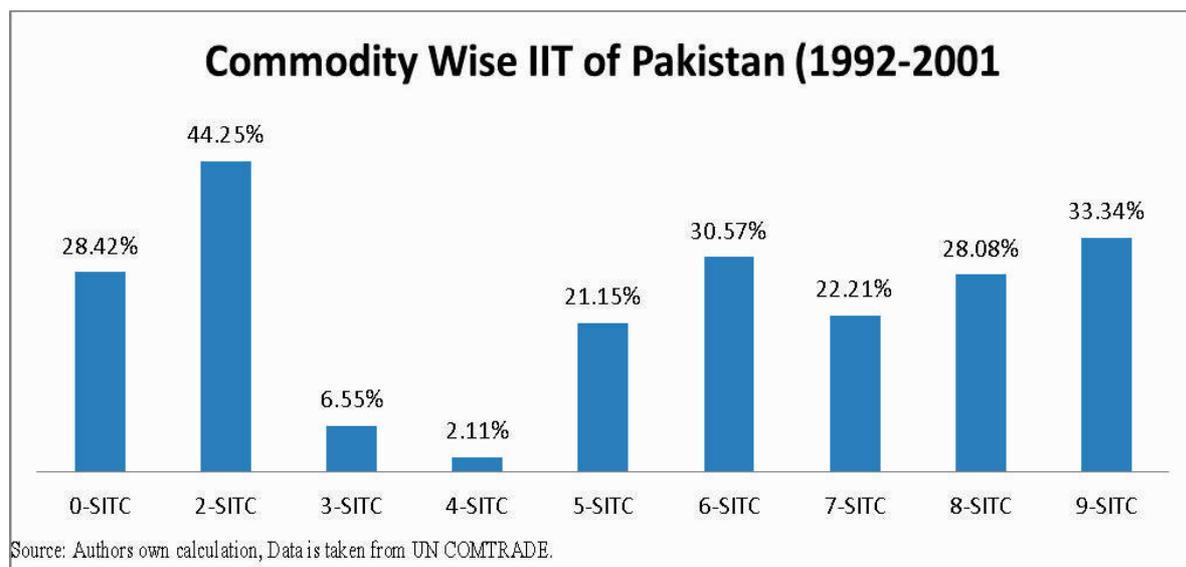
## 4.2.5. IIT Level of 2002-2012

The 10 years average from 2002 to 2012 Pakistan IIT with selective countries is 28.23%.Commodity wise in the category of SITC 2 and SITC5 Pakistan IIT for it is found to be 43.92% and 41.63%, ITT of sitc4 and sitc3 are 5.63% and 8.63% respectively. India and Singapore has 42.10% and 39.95% country wise highest level of IIT respectively. Whereas, United States and Kuwait has lowest level of ITT 14.87% and 18.32% respectively.

| Table 4.5 11 YEARS AVERAGE OF (2002-2012) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0-SITC | 2-SITC | 3-SITC | 4-SITC | 5-SITC | 6-SITC | 7-SITC | 8-SITC | 9-SITC | All COMMODITIES |
| Canada | 63.40% | 2.15% | 0.35% | 13.75% | 54.76% | 33.41% | 10.98% | 6.54% | 42.93% | 25.36% |
| China | 65.47% | 25.55% | 8.69% | 7.60% | 43.02% | 49.03% | 4.60% | 31.29% | 34.54% | 29.98% |
| India | 67.70% | 47.96% | 19.34% | 0.83% | 42.46% | 58.17% | 50.77% | 60.47% | 31.18% | 42.10% |
| IRAN | 16.40% | 45.41% | 1.12% | 7.02% | 24.98% | 56.08% | 59.64% | 19.15% | 33.02% | 29.20% |
| Japan | 9.92% | 31.74% | 5.72% | 0.00% | 69.77% | 30.14% | 1.91% | 33.45% | 52.61% | 26.14% |
| Kuwait | 0.02% | 81.72% | 1.23% | 1.10% | 41.57% | 1.33% | 3.51% | 0.60% | 33.80% | 18.32% |
| Malaysia | 6.20% | 71.24% | 10.29% | 0.04% | 58.50% | 30.35% | 56.87% | 22.92% | 24.71% | 31.23% |
| Saudi Arabia | 0.61% | 76.45% | 0.22% | 31.43% | 21.93% | 10.67% | 7.11% | 1.66% | 16.73% | 18.53% |
| Singapore | 28.48% | 60.25% | 14.26% | 0.05% | 57.39% | 46.22% | 47.31% | 52.18% | 53.37% | 39.95% |
| United Arab Emirates | 17.02% | 34.60% | 33.58% | 0.00% | 32.51% | 71.84% | 37.75% | 76.46% | 12.39% | 35.13% |
| United States | 35.30% | 6.07% | 0.13% | 0.15% | 10.26% | 29.48% | 2.74% | 17.97% | 31.72% | 14.87% |
| 11 Countries | 28.23% | 43.92% | 8.63% | 5.63% | 41.56% | 37.88% | 25.74% | 29.33% | 33.36% | 28.23% |

Source: Authors own calculation, Data is taken from UN COMTRADE.
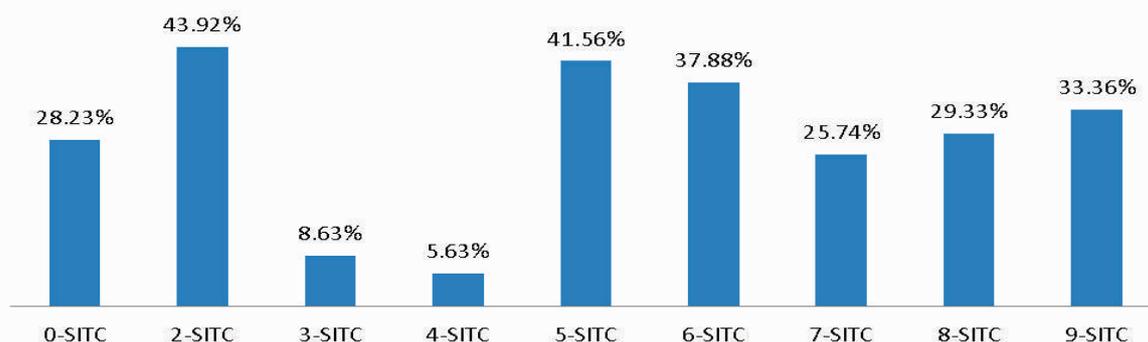


Source: Authors own calculation, Data is taken from UN COMTRADE.
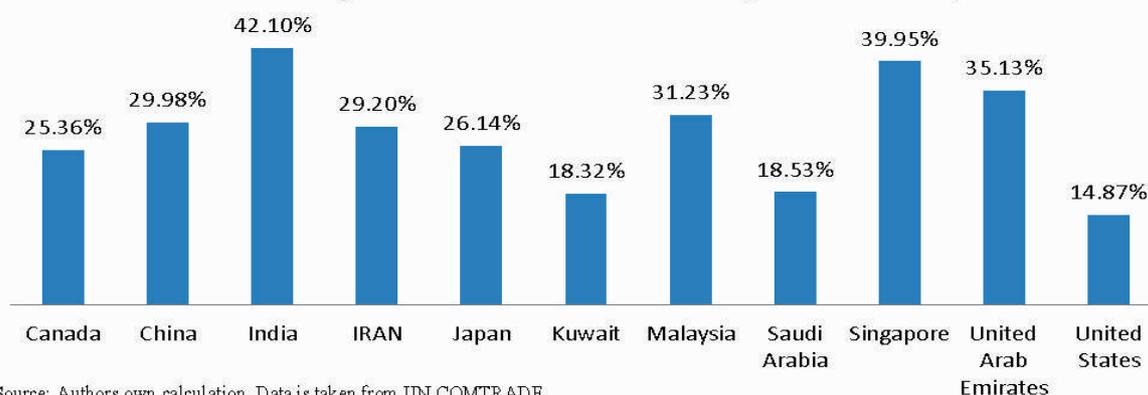


Source: Authors own calculation, Data is taken from UN COMTRADE.

*4.3. Descriptive Statistics*

The nature of data is represented by descriptive statistics. Mean and median is used as two measures of central tendency. All exogenous variables are positively skewed as it has been observed that the mean of all determinants is more than their median, expect DPCI. The maximum, minimum and standard deviation provides

the range of variation in the data. In light of the table 4.2 the minimum variation is noted to be of DPCI and DIST has the maximum variation.

Table 4.2

Descriptive Statistics

| Statistics | AGDP | DGDP | DPCI | DIST | REX |
|---|---|---|---|---|---|
| Mean | 26.19587 | 25.89768 | 8.604927 | 162.374 | 28.44059 |
| Median | 25.88 | 25.8 | 9.46 | 126.76 | 11.33 |
| Maximum | 29.71 | 30.37 | 10.89 | 754.15 | 341.38 |
| Minimum | 23.87 | 19.83 | 0.92 | 0 | 0.01 |
| Std. Dev. | 1.504225 | 2.333853 | 2.188953 | 155.993 | 51.67333 |

*4.4. Empirical Result*

Empirical findings are discussed in this section. There are eleven selective countries for calculating intra industry trade (IIT) of Pakistan. The time range is of 31 years (1982 to 2012). The values are reported from SITC- REV 1. The category of commodities is from 0 to 9. While collecting the data it was noticed by the author of this manuscript that Pakistan do not trade much in commodity code 1 of SITC REV-1, refers to ' Beverages and tobacco' in comparison to other remaining ten main categories of SITC Rev-1, therefore it is not included in the data. A panel data set is used for estimation of data; time and country are two dimensions of it. The model is estimated through panel data technique. The given model in methodology is been estimated by using E-views. Moreover the table 4.3 shows the result of regression model.

All the signs of variables of the model are as expected. Variables are statistically significant too expect DIST. The impact of variable AGDP is found to have positive significance on IIT. AGDP is used to measure the market size. This impact of market size is in accordance to the pervious findings of Helpman and Krugman (1985), Balassa (1986), Clark and Stanley (1999) and Adnan (2013) the opportunity of International trade makes the size of market larger. The size determines that how much a firm can produce. The increase in size of market makes firms enable to produce more and reap the benefits of economies of scales. The firms get opportunities for making profits by decreasing their average cost of production; it is due to the existence of economies of scales. Therefore the IIT also increases as the market size increases.

The sign of DGDP is negative, as expected and is statistically significant too. This is found to be true in accordance to the literature of Helpman and Krugman (1985) that enhanced overlapping demand for differentiated commodities has potential because of countries being similar in means of their market size and factors of endowment. Thus the difference in market size shows the ability of countries to produce differentiated products. The larger the difference of market size will be between Pakistan her trading country the lesser will be IIT between them. Moreover Loertscher and Wolter (1980), Greenaway et al. (1994), Hummels and Levinshon (1995) and Turkcan (2005) also found a negative sign.

The negative sign of DPCI shows that there is a negative and statistically significant impact on IIT level. Linder (1961), Helpman-Krugman (1985) and Adnan (2013) found it negative sign. The difference in the taste and preferences of the consumers are not alike due to this dissimilarity the consumers demand increases for different goods to consume. If the demanded commodity is not available in the region it declines the opportunity of bilateral IIT among the trading partners.

The table 4.3 shows that as expected there is negative relationship between distance and IIT. The effect of DIST is found to be negative for IIT of Pakistan with selected trading countries. It means that the countries near Pakistan trade more with it due the low cost of transportation and communication as compare to countries located at long distance. This finding is found to be in line with Krugman (1980), Balassa (1986) , Clark and Stanley (1999), Hummels and Levinshon (1995), Zhan and Clark (2009), Shahbaz and Leitão (2010), Turkcan(2010) and Adnan Akbar (2013).

| Table 4.3 | | |
|---|---|---|
| Results for Intra-industry Trade | | |
| Variable | Coefficient | t-Statistic |
| AGDP | 6.935407 | 5.997799 |

| DGDP | -4.63735 | -6.81428 |
|------|----------|----------|
| DPCI | -0.87853 | -3.15136 |
| DIST | -0.00698 | -1.39282 |
| REX  | -0.03392 | -3.22328 |

|              |          |
|--------------|----------|
| F-statistic | 14.22487 |
| Prob(F-statistic) | 0.000000 |

## 5. Conclusion

This manuscript has core objective to calculate IIT Pakistan with its selective major partners. The secondary objective has been to analysis the determinants of IIT of Pakistan. Moreover this study is limited to the subject to the availability of data. However IIT has been calculated for 31 years (1982-2012) for SITC one digit. The key concept was drawn from the Turkcan and Ates (2010) regarding country-specific independent variables of IIT. The panel data technique is been used for estimation of IIT. A simple regression model was taken and OLS method was applied by using E-views.

Based on the results it is found that all signs were as same as expected and are statistically significant, expect distance. The economic size is found to be positively related with IIT, rest are inversely related. Difference in market size, difference in per capita income (proxy for taste and preferences), distance and exchange rate have negative impact on IIT.

An increase in economic size (AGDP) will lead to increase in IIT as economic size shows the ability of firms to produce more and to attain benefits of economies of scale by reducing their average cost of production. Difference in market size (DGDP) has a negative effect on IIT. The difference in per capita income (DPCI) is found to have adverse effect on IIT due to dissimilarities in taste and preferences of consumers' causes demand for differentiated commodities. In addition the distance (DIST) decreases trade as it increases between two countries because of increase in transportation cost and other related costs. The variable bilateral exchange rate shows a negative sign in this analysis.

This study also finds that on an average in past three decades the IIT of Pakistan with its selected trading economies has increased. In 31 years from 1982 to 2012 Pakistan IIT with selective countries is 24.93%. Commodity wise in the category of Crude materials, inedible, except fuels[1] Pakistan IIT for it is found to be 47.33%; Kuwait and Canada reported 80.80% and 7.36% country wise highest and lowest level of IIT respectively. Animal and vegetable oils and fats[2] reported lowest level of IIT. While country wise Pakistan IIT is found to be most with Singapore, India and Malaysia, with the IIT level of 39.52%, 33.76% and 28.18% respectively.

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[1] Commodity code 2 in SITC Rev-1, source UN COMTRADE.
[2] Commodity code 4 in SITC Rev-1, source UN COMTRADE.

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