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Can Exchange Rate Depreciation Lead to Increase in Exports of Pakistan? A Time Series Analysis

ABSTRACT

In this analysis, it is argued that Pakistan had passed through different exchange rate regimes in the last two decades. This study empirically analyses the impact of exchange rate fluctuations on Pakistan's exports. A monthly time series data of Export Volume, Import Volume, Real Effective Exchange Rate, Average Applied Tariff Rates for Pakistan, and major trading partners gross domestic product (GDP) has been taken for 2003-04 to 2018-19. Data for the first six months of 2019-20 has also been included in the analysis, as it was the period that witnessed substantial exchange rate depreciation. Ordinary Least Square (OLS) technique has been applied to check the time-series impact between Export Volume and Real Effective Exchange Rate and weighted average exchange rate. On co-integrated series, the Error Correction Model (ECM) has been used to find out the long-run and short-run relationships among variables of the same period. The results show that there is a positive, but less significant, impact of currency variations on Pakistan's exports, however, there is an inverse nevertheless significant impact of applied average tariff rates on Pakistan's exports. Furthermore, there is a positive correlation between the increase in exports and the weighted GDP of its trading partners (which creates exportable surplus due to industrial growth).

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Author's contribution in the article: 1- Conceived and designed the analysis, 2- Reviewed and compiled the literature, 3- Collected the data, 4- Contributed data or analysis tools, 5- Performed the analysis, 6- Wrote the paper, 7- Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

The effect of exchange rate fluctuation on trade has been and continues to be an extremely debated topic in international trade. It is generally presumed that exchange rate fluctuation adversely impacts international trade, however, there are different findings of various research papers showing a significant effect on trade to an insignificant impact on trade, depending upon the industrial base and exportable surplus of a country. Further, the effects of exchange rate volatility on trade, vary depending upon the fact that whether the country is advance (developed) or developing. From an empirical point of view, the literature since 2000 has reinforced the evidence that there is an ambiguous linkage between exchange rate volatility and exports.

Sizable volatility in the exchange rate has often been viewed as detrimental, since a great uncertainty associated with to exchange rate may threaten international trade by increasing the risk of trading activity. The excessive fluctuations of the exchange rate may inevitably create uncertainty in preparing macroeconomic policies, investment decisions, and international trade flows.

The role of trade and particularly exports in a country's economy is increasing day by day, as it is the main source of foreign exchange earnings, besides remittances. The amount of remittances sent by overseas Pakistanis (which is export of services) has also been near to the value of merchandise exports. For countries like Pakistan, where the government's revenues from direct and indirect taxes are insufficient to meet the current expenditure (including debts, development expenditure), the successive governments have been borrowing from both local as well as foreign sources, to bridge the fiscal gap. If the local currency continues depreciating under floating or flexible exchange rate regimes, domestic goods prices become lower than the foreign products and importers have to pay more amounts for the same quantity of imported goods than before depreciation. So, exchange rate depreciation normally better off the country's current account balances, terms of trade and so financial balances. Since the early 1990s, Pakistan has been in the process of liberalization of trade and moving towards an export-led growth trade policy.

Pakistan has been following a more liberal trade regime, as compared to other South Asian countries since early 2000 (ADB, 2015)[1]. Over the year's tariffs have been brought down to the maximum level of 20% (except automobiles & some other items) and many, incentives have been provided to attract foreign investment and to promote exports. However, Pakistan's export performance from FY2003-04 to FY 2017-18 lags far behind even from its South Asian neighbors like India, Bangladesh, and Far East Asian countries like Malaysia, Thailand, and Vietnam. Pakistan has been facing a peculiar situation of slow growth in its exports, whereas, imports have increased manifold, thus badly affecting the balance of payments, although the Government of Pakistan has taken several measures to boost exports.

Among several trade policy tools applied to increase exports of a country, depreciation of the currency is also considered to increase exports, as in relative terms the Pakistani products become cheaper in the international market. However, there are positive as well as negative impacts of currency depreciation. On the positive side, depreciation may be good for economic growth and generation of economic activities resulting from an increase in exports and incomes of exporters. This increases incomes and stimulates higher consumption of the people associated with the production of export products. Depreciation helps in increasing merchandise exports, discourages imports, which relatively becomes expensive, and improves trade balance. Furthermore, it increases revenue collection as the rupee value of imports would become higher. The negative impacts of depreciation may include an increase in foreign debt liability, as a more local currency would be required to pay one dollar of loans, a rise in industrial costs due to an increase in the value of imported inputs of products made for the domestic market or exports. In Pakistan for the

[1] Impact of trade and FDI policies on industrial development in South Asia by Asian Development Bank (ADB), "https://www.adb.org/publications/trade-and-fdi-policies-industrial-development-south-asia"

production of export items some imported inputs are used like Egyptian cotton, textile machinery/parts, chemicals in the textile sector that account for 60 percent of total exports.

According to WTO trade statistics the exports of developing countries grew by 12 percent annually since 2000, as compared to 5.6 percent for Pakistan and 10 percent for the world as a whole. Exports of some other developing countries in Asia, e.g. China, India, Malaysia, Thailand, and Vietnam have grown at a much faster pace than that of Pakistan, during the past 20 years. The main reasons are economic and political stability, high GDP growth, higher foreign/local investments, no threat of terrorism[2], fewer across border conflicts, better infrastructure and favorable economic policies followed consistently, in those countries. Table 1 shows the export performance of Pakistan and that of some selected countries from 1997 to 2017.

The Table 1 shows that Bangladesh's exports were less than Pakistan's exports in 1997, while that of Vietnam was almost at the same level. The exports volume of Turkey and India was three to four times higher than that of Pakistan, as Turkey's witnessed high GDP growth rates during 2002 to 2007, an average of 7.14 percent (5.03 percent to 9.64 percent) and from 2010 to 2017 the average was 6.24 percent (3.18 to 11.11 percent). In the case of India, the GDP growth rate from 2003 to 2007 was on average 7.20 percent (7.66 percent to 8.06 percent) and from 2009 to 2017 the average was 7.13 percent (5.24 percent to 8.50 percent).[3] However, after 20 years exports of Bangladesh are almost double those of Pakistan, as it has market access at zero rates of duties in US and EU markets being the least developed country. There is no comparison of Pakistan's exports with that of India, Turkey, and Vietnam. There are several reasons due to which Pakistan is left far behind in export performance, mainly war on terrorism, poor infrastructure, shortage of electricity, political instability, low GDP growth rate, low saving/investment, low labor productivity due to mainly unskilled labor, etc.

Table 1: Exports Comparison of Selected Countries over Past 20 Years (US$ billions)

Country	1997	2002	2007	2012	2017	2019
Bangladesh	4.02	5.42	13.14	24.31	38.79	47.20
China	182.88	325.6	1,220.06	2,048.78	2,263.37	2,498.56
India	35.01	50.1	145.9	289.56	295.85	322.78
Indonesia	53.44	57.16	114.1	190.03	168.81	167.49
Malaysia	78.74	94.06	175.96	227.45	216.43	238.16
Pakistan	8.77	11.93	17.84	24.61	21.88	23.81
Thailand	57.38	68.11	153.57	229.54	236.01	245.38
Vietnam	9.18	16.71	48.56	114.53	213.93	264.61
Turkey	26.24	35.76	107.27	152.46	156.99	171.53

Source: Trade Map

Several measures are taken by the countries to increase their exports, which *inter-alia* includes: (i) Low inflation and interest rates, (ii) Liberal trade regime and lower tariffs, (iii) Providing facilities to Small and Medium enterprises, (iv) Compliance of quality and standards as per the provisions of agreements on Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT), (v) Better Infrastructure and transportation facilities to reduce the cost of freight, (vi) Technological advancement and research, (vii) Higher rate of Foreign Direct Investment, (viii) Higher saving/investment rate, Integration with the world economy through production value chains, (ix) Zero-rating tax regime for export-oriented sectors. Pakistan's export performance and weighted average exchange rates for the period from FY 2003-04 to 2018-19 (fifteen years) are given in Table 2.

[2] Daily and Monthly Costs of Terrorism on Pakistani Exports (May 2011) by Mamoon, Dawood; Akhtar, Sajjad and Hissam, Saadia, Pakistan Institute of Trade and Development.

[3] https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations

Table 2: Comparison of Pakistan Export Growth to PKR Depreciation

Year	Exports (US$ Billion)	Imports (US$ Billion)	Exports Growth (%)	Imports Growth (%)	Weighted Average Exchange Rate (Pak-Rs. to Dollar)	Depreciation (%)
2003-04	12.4	13.6	--	---	58.4	--
2004-05	14.5	19.0	17%	40%	59.6	2%
2005-06	16.6	24.9	14%	31%	60.3	1%
2006-07	17.3	26.9	4%	8%	60.7	1%
2007-08	20.4	35.3	18%	31%	64.2	6%
2008-09	19.1	31.7	-6%	-10%	79.5	24%
2009-10	19.7	31.1	3%	-2%	84.1	6%
2010-11	25.4	35.8	29%	15%	85.6	2%
2011-12	24.7	40.4	-3%	13%	90.3	5%
2012-13	24.8	40.2	0%	0%	97.4	8%
2013-14	25.1	41.7	1%	4%	102.8	6%
2014-15	24.1	41.4	-4%	-1%	101.4	-1%
2015-16	22.1	43.9	-8%	6%	104.2	3%
2016-17	20.5	46.9	-7%	7%	104.7	0%
2017-18	21.9	57.5	7%	23%	109.8	5%
2018-19	23.7	60.3	8%	5%	136.1	24%

Source: Authors' calculations based on SBP data

The above Table shows that Pakistan's exports have increased from US$12.40 billion in 2003-04 to US$24.82 billion in 2012-13, at an annual growth rate of 5.6 percent, while during the same period the currency depreciated at an annual rate of 4.4 percent. It is better to analyze the relationship in FY2011-12 when the currency was depreciated almost 6% and export volume decreased -2.57 and import volume increased 12%, but in the following year currency further depreciated almost 8%, while export increased marginally and imports remained above US$40 billion.

Pakistan's export base is extremely narrow as about 63% of its exports are comprised of textiles. The other export items are namely rice, leather, and synthetically made-ups that constitute around 15% of total exports. Unfortunately, the above four items are relatively low value-added products and fetch less foreign exchange. Pakistan has not made much effort to diversify its export products, even within textiles, the major exports remain cotton yarn, cloth, bed sheets, etc., and fewer efforts were made to increase exports of high value-added garments. Similarly, Pakistan's export destinations are also concentrated as 26 percent exports are to EU, 25 percent to the USA, 11 percent to China, UAE 9 percent. New markets for Pakistan's goods are also to be explored in African countries, East Asian Countries, South America, Russia, Eastern Europe, etc. Pakistan is also yet to enter into hi-tech exports. In short, Pakistan is lacking diversification of export products as well as export destinations, increasing export of high value-added and hi-tech products, which face fierce global competition is need of the hour. Pakistan can explore the emerging markets in Africa, ASEAN member countries where per capita income and consumption patterns are growing. For the diversification of the products, Pakistan can export halal meat, dairy products, processed food, electrical and mechanical goods, ladies and men garments and footwear, etc.

Briefly, the objective of the present study is to analyze the impact of exchange rate volatility on the export performance of Pakistan. Another objective is to empirically test the long-run relationship between these variables. So, based on the detailed introduction and objectives, the research question of the study is, "whether currency depreciation has a significant impact on Pakistan export performance as indicated by the title of the study.

2. LITERATURE REVIEW

In this section brief extracts from the previous research papers /studies conducted by different authors on the hypothesis that whether there is a significant positive relationship between the depreciation of currency and increase in exports. A systematic literature review methodology has been adopted in this paper. By using the Autoregressive-Distributed-Lag (ARDL) technique, the sectoral export trend is examined under different exchange rate regimes, findings of the study, however, suggest an insignificant and negative relationship between the variables (Aftab et al., 2012). When the standard deviation of the exchange rate is measured by its moving averages as an indicator of exchange rate volatility, results suggest that these fluctuations have a negative effect but significant impact on exports in Cyprus and Croatia (Serenis & Tsounis, 2013). Similarly, Alam et al. (2018) comprehensive review concluded that exchange rate volatility has adverse effects on the bilateral export of Pakistan with the USA and the United Kingdom while in the case of UAE and Saudi Arabia findings are insignificant but there is found positive results for Germany and Japan.

Zamir et al. (2017) found that exchange rate volatility has a significant but negative impact on major macroeconomic variables including export of Pakistan. The study suggested that instead of focusing on currency depreciation for increasing the export volume, the government should encourage import substitution. The issue of exchange rate volatility and industrial trade between Pakistan and the USA from 1980 to 2014 has been examined by Bahmani-Oskooee et al. (2017). The results of the study suggest that 50% of industrial units are affected by exchange rate volatility. Large industrial units are positively affected by ER in the long run. Similar results have been reported by Bahmani-Oskooee et al. (2016) for turkey and the USA under commodity trade analysis.

Ahmed et al. (2017) have analyzed the impact of the exchange rate on exports using data taken from1970-2015 and employing the ARDL approach. Finding suggests that there is an insignificant and negative relationship between export volume in Pakistan and exchange rate. In another study, Ahmed et al. (2017) also employed the ARDL technique and found an inverse but insignificant relationship between exchange rate volatility and exports. Their study corroborates that higher exchange rate volatility is associated with lower export growth in Pakistan. Kearns and Patel (2016) explain two different types of exchange rate for analysis; (i) trade-weighted exchange rates and (ii) debt-weighted exchange rates that are constructed by the Bank for International Settlements (BIS) and they find out their impact on a country's trade. The study indicates that both exchange rates have been differently affected by the trade of emerging economies and advanced economies. Responsiveness exchange rate variations on trade have a weaker effect on advanced economies than the emerging economies due to a strong financial system, as their financial system absorbs all exchange rate movements and uncertainties.

Hooy et al. (2015) find a positive relationship between Real Effective Exchange Rate (REER) depreciation and exports, especially exports high and medium-tech intermediates and final products in regional trade partners-ASEAN. And Li et al. (2015) provide evidence that high productive product exporters show little response to fluctuations in RMB currency movements in China. Ollivaud et al. (2015), present that a large number of fluctuations in the exchange rate have little effect on international trade and responsiveness is very low but it deepens the financial crises in the economy, especially taking the case of Japan and the United Kingdom. Baek (2014) studies product-level trade responses to exchange rate taking the data of Korea and the United States and concludes that both import and export of specific 71 products are affected by currency fluctuations. Exchange rate volatility hurts industrial production, Jamil et al. (2012). As they explained that after the introduction of the common currency in Europe, the magnitude of the negative impact of exchange rate volatility has reduced but overall it remains negative.

Manufacturers and producers of the domestic country also react differently against foreign and local currency movements. If domestic traders are risk lovers, countries' real exports may increase due to exchange rate volatility (Doğanlar, 2002). There is a negative and significant relationship between these two variables only in the long run not in the short run for Pakistan and India (Mustafa et al., 2004).

In the case of Pakistan, nominal exchange rate fluctuations have more impacts on trade balances than real effective exchange rate fluctuations. Sencicek and Upadhyaya (2010) have analyzed that there are positive but insignificant results on exports in case of a real effective exchange rate as it adjusts the inflation phenomenon.

Egert and Zumaquero (2008) checked the direct effect of exchange rate volatility on exports of different countries. It was examined whether there is an indirect effect on exports in different exchange rate regimes. The effect was checked at sectoral, bilateral, and aggregate levels. It results showed that there is a different impact on exports, depending upon size, direction, and the regime of exchange rate on different sectors and countries at different time-periods. The relationship between exchange rate and trade for developing countries Khan *et al.* (2012) found that when Pakistan uses the US-dollar as vehicle currency the exports and imports of Pakistan decline whereas when it brings into play domestic currency for trade, the imports and exports of host country become unaffected. They take monthly data from 1971:01 to 2009:12 and use GARCH and least square dummy variable techniques to surmise the results.

3. DATA

For estimation purposes, monthly time series data is taken from 2003/7 to 2019/12. It significantly captures the minimum number of observations for the degree of freedom in estimations purposes and regression analysis. To measure the exchange rate volatility impact on Pakistan's export performance, data has been obtained from different secondary sources. The monthly data of export value, real effective exchange rate, the weighted average exchange rate have been taken from the State Bank of Pakistan (SBP). Applied average tariff rates data has been taken from World Integrated Trade Solutions (WITS) and Trade Analysis Information System (TRAINS). While major trading partner's gross domestic product data is taken from World Development Indicators (WDI) and then weights are assigned according to their trade volumes.

4. METHODOLOGY

Dynamics of trade theories like neo-classical, traditional, modern trade and growth theories are widely taught in the world. The evolution of international trade theories started in the 16th century from mercantilist, who were in favors of holding assets in form of gold, precious stones, and metals to Adam smith's absolute advantage theory and David Ricardo's comparative advantage theory, who were representatives of commodities specialization in exchanging and trading of goods. Later on, Heckscher Ohlin presented the idea of factor abundance and commodity intensity for exporting the product and explained, "A country should export the commodity that is produced by its cheap and abundant factor of production.

Sequentially, the trade cycle theory was described by John Maynard Keynes. Keynes expressed six decades ago, how trade-cycle occurs in any economy. It depends completely on the marginal efficiency of investment instead of the marginal efficiency of capital. This theory explains the concept of trade and investment multipliers effects. Multiplier effects lead to an increase in income multiple times, which attracts demand for goods and services in the economy. So resultantly production of goods and services surges and thus domestically and internationally goods are started trading and trade balances become better off in the country.

When there is depreciation in the exchange rate, it will lead to weakening the current account balances in the short run. Initially, there is inelastic demand in the economy, sooner demand $\in_{Pm}^{Px}$ [4] improves and approximately becomes greater than one, current account balances also recover. So, time gaps and lags have a much important role in any macroeconomic policy. In the short run, consumers and producers have commodity contracts that aren't affected by the policy change. This phenomenon was described by Ian Bremmer in their book "*The J Curve: A new way to understand why nations rise and fall"* and later on it was known as the J-Curve theory.

If we may observe Pakistan export to exchange rate relationship, J-Curve theory holds. Pakistan's major imports have inelastic demand and exports commodities have little flexibility to change in the short run. But fear of exchange rate volatility normally distorts the trade balances that's why some nations prefer dirty or managed floating exchange rates over pegged or fully flexible exchange rates. One cannot ignore that exchange rate volatility plays an important role in resource allocation, export performance, and economic growth in Pakistan., But anticipations about the fluctuation in exchange rate policies have different impacts on investors' perceptions between two countries and hence on their export basket as explained by Siegel's paradox. In short-run consumers trade their preferred products over non-preferred commodities due to price uncertainty.

The country's exports demand depends on the number of factors that are already mentioned. Normally in literature export demand is taken as a function of real effective exchange rate or relative prices of goods and foreign consumers' income. As a result of depreciation, the relative price of domestic goods in terms of foreign currency becomes cheaper which induces foreigners to increase the demand for these products. On the other hand, the relative price of imports for the domestic consumer now becomes expensive, hence discouraging the demand for imports. So, exchange rate depreciation normally better off the country's current account balances and terms of trade both.

It has been observed from literature and existing data, currency appreciation or depreciation leads to fewer effects on large economies' trade baskets than small economies because several other factors hinder the relationship.

Mathematically, the export demand function can be written as:

$$X = f(E\frac{P_f}{P_d}, Y_f) \quad (1)$$

Here in this model, X is denoted for domestic country export that is dependent on or function of the real effective exchange rate and foreign income. The econometric analysis of the exchange rate volatility and export performance is examined in this section. In this part of the analysis, the econometric methodology has been discussed to explain the impact between these two variables and some other variables that are applied average tariff rate and weighted GDP of Pakistan's major trading partners.

To dichotomize the nexus between exchange rate volatility and export performance of Pakistan, the following model has been selected:

$$EXP_t = f(ER_t, X_t) \quad (2)$$

Where EXP is the export volume at t time-period for a specific country normally it is taken as net exports. Whereas ER is referred to as exchange rate of specific at t time-period and Xt is a vector of control variables

[4] Price elasticity of demand for export relative to import elasticity of price.

including foreign income, size of the economy, the average applied tariff rates or trade restrictions, ease of doing business, interest rate, trade remedies law, inflation, import intensity of raw materials, domestic firms' productivity. All the variables have their importance but here, average applied tariff rates and trading partners' GDP are being taken for analysis.

$$Exp_t = \alpha + \beta\ REER_t + \delta TR_t + \theta FGDP_t + \varepsilon_t \quad (3)$$

In the above linear equation, export volume has been regressed on by real effective exchange rate, average applied tariff rate, and weighted GDP. Where α is constant in the equation which explains the averages of all unincorporated variables. To check the responsiveness of all variables on export elasticity, a log-log equation is modified.

$$LnExp_t = \alpha + \beta\ ln\ REER_t + \theta lnFGDP_t + \delta lnTR_t + \varepsilon_t \quad (4)$$

In the given equation, β is the elasticity of exports with respect to the real effective exchange rate, while $\theta\ and\ \delta$ represent the elasticity of exports with respect to weighted GDP and tariffs respectively. ε_t is the error terms and is subject to the assumption of minimum variance, zero-time correlation, and normality?

$$LnExp_t = \alpha + \beta\ ln\ WAER_t + \theta lnFGDP_t + \delta lnTR_t + \varepsilon_t \quad (5)$$

While is this equation $WAER$ explains the weighted average exchange rate and its β shows its sensitiveness to export volume.

5. RESULTS AND DISCUSSION

In this section, results have been explained based on the estimated models discussed earlier. Results based on equation 4 are presented in Table 3.

Table 3: Real effective Exchange rate-based Regression results

Variables	Coefficients	Probability
$REER_t$	0.278***	0.000
$\boldsymbol{FGDP_t}$	0.914***	0.000
Avg. Applied Tariff Rate	-0.725**	0.047
N	187	
$\boldsymbol{R^2}$	0.938	
$\boldsymbol{\bar{R}^2}$	0.929	
F-Statistics	1599.1	
P-Value	0.0000	

Source: Authors' calculations. ***, **, * indicates level of significance at 1%, 5% & 10%, respectively.

According to the table based on Ordinary Least Square (OLS) estimations, the overall model is significant based on p-values. Results given in the above table indicate that real effective exchange rates and major trading partners' GDP has a positive and significant impact on the volume of exports in Pakistan. Findings also suggest that the elasticity of exports with respect to weighted GDP is estimated to be 0.91, implying that for a 1% increase in the GDP of Pakistan's major trading partners, export volume increases by 0.91%. On the same token, if point one percentage change occurs in $REER$ it will lead to a 0.27 percent increase in exports. Average applied tariff rates have a negative but significant impact on Pakistan's export volume.

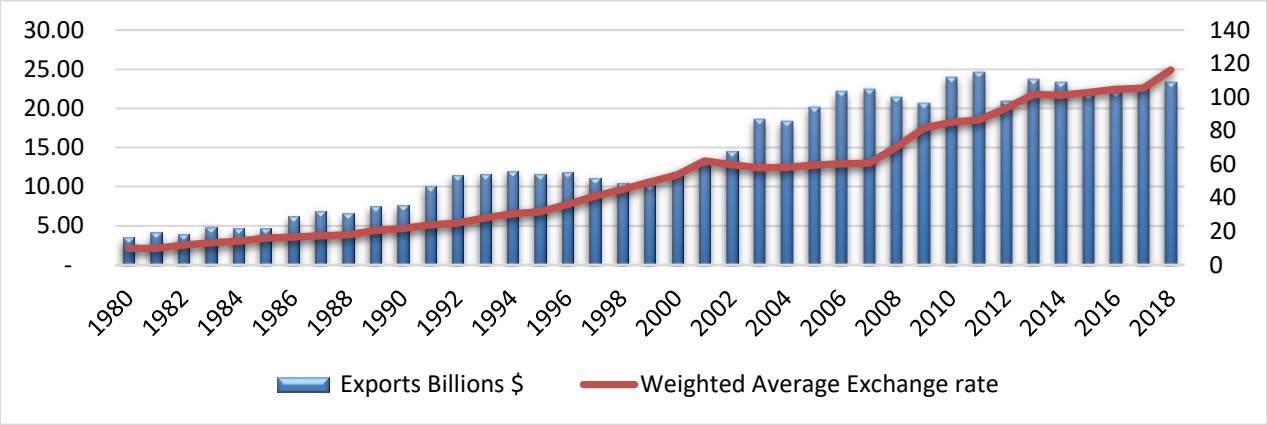

Figure 1: Relationship between Export volumes and Weighted Average Exchange Rate

Regression-based results are consistent with the displayed graph as it is clearly explaining that both have an increasing trend. The results for the weighted average exchange rate are presented in Table 4.

Table 4: Weighted Average Exchange rate-based Regression results

Variables	Coefficients	Probability
$WAER_t$	0.234***	0.000
$\boldsymbol{FGDP_t}$	1.241**	0.003
Avg. Applied Tariff Rate	-0.453***	0.011
N	187	
$\boldsymbol{R^2}$	0.927	
$\boldsymbol{\bar{R}^2}$	0.919	
F-Statistics	1511.0	
P-Value	0.0000	

Source: Authors' calculations. ***, **, * indicates level of significance at 1%, 5% & 10%, respectively.

According to the table based on OLS estimations, the overall model is significant based on P-values. Results given in the above table indicate that real effective exchange rates and major trading partners' GDP has a positive and significant impact on the volume of exports in Pakistan. Findings also suggest that the elasticity of exports with respect to weighted GDP is estimated to be 1.241 implying that for a 1% increase in the GDP of Pakistan's major trading partners, export volume increases by 1.241 %. Similarly, if point one percentage change occurs in $WAER$ it will lead to a 0.23 percent increase in exports. Average applied tariff rates have a negative but significant impact on Pakistan's export volume. Results based on Fully Modified Least Squares (FMOLS) are presented in Table 5.

The results in Table 6 indicate that both series are integrated (1) and results suggest that there is a significant impact of REER on the export volume of Pakistan. The core objective of the cointegration test is to check whether a long-run relationship between the variables exists or not, so for the requirement for the estimation, variables series must be cointegrated. All variables are integrated 1 and the stochastic term is I(0). Engle-Granger Tau- Statistics and Engle-Granger Z - statistic demonstrate that series are cointegrated as their values (-7.56, -168.97) are statistically significant against their MacKinnon probability values$(0.00, 0.00)$.

Table 5: REER based Engle-Granger Co-integration Regression

Variables	Coefficients	Probability
$REER_t$	0.417***	0.000
$\boldsymbol{FGDP_t}$	1.217***	0.000
Avg Applied Tariff Rate	-0.788***	0.005
N	187	
$\boldsymbol{R^2}$	0.798	
$\boldsymbol{\bar{R}^2}$	0.780	
Rho – 1	-1.49	
P-Value	0.0000	

Source: Authors' calculations. ***, **, * indicates level of significance at 1%, 5% & 10%, respectively.

Error Correction Model (ECM) explains both series are co-integrated and there is a long-run relationship, while the negative value in the results is in favor of the short-run relationship. Based on the Schwarz information criterion (SIC), there are 2 lags taken. Overall models' goodness is significant that is examined by the value of τ. τ explains all results are consistent with the OLS results. $REER$, weighted GDP, and Average applied tariff rates have a significant impact on Pakistan's export volume. Findings also suggest that the elasticity of exports with respect to weighted GDP is estimated to be 1.21 implying that for a 1 percent increase in the GDP of Pakistan's major trading partners, export volume increases by 1.21 percent. Average applied tariff rates have a negative but significant impact on Pakistan's export volume. Point one percentage increase in REER will lead to a 0.41 percent increase in export volume. Weighted Average Exchange Rate (WAER) results are consistent with the previous model (REER model) results.

Table 6: WAER based Engle-Granger Co-integration Regression

Variables	Coefficients	Probability
$WAER_t$	0.311***	0.000
$\boldsymbol{FGDP_t}$	1.401***	0.000
Avg Applied Tariff Rate	-0.0252**	0.003
N	187	
$\boldsymbol{R^2}$	0.791	
$\boldsymbol{\bar{R}^2}$	0.780	
Rho – 1	-1.45	
P-Value	0.000	

Source: Authors' calculations. ***, **, * indicates level of significance at 1%, 5% & 10%, respectively.

6. CONCLUSION

The objective of the present study is to analyze the impact of exchange rate volatility/fluctuation on Pakistan's exports, as it is argued that depreciation would positively affect the exports. Another objective is to empirically test the long-run relationship between these variables. For this purpose, monthly data of export values, real effective exchange rate, weighted average exchange rate, and weighted GDP has been taken for the period from 2003/7 to 2018/12. The findings of the study suggest that there would be a significant positive impact on the exchange rate on exports of Pakistan. The increase in exports depends upon several other factors such as low cost of doing business, comparable cost of energy concerning regional countries, high labor productivity, high savings & investment ratio, diversified export products, use of latest technology in export sectors, etc. Furthermore, there is a positive correlation between the increase in exports and the weighted GDP of its trading partners (which creates exportable surplus due to industrial growth).

Historically in the case of Pakistan, when the currency was artificially pegged by the government, export volume remains stagnant and when the currency was allowed to depreciate, Pakistan's export performance started getting better and export volume increased. Other than the real or weighted average exchange rate, lower applied average tariff rates also have a positive impact on country's export performance. In the period when Pakistan liberalized its trade regime and as average tariff rates decrease, the export volume increased.

Despite positive results, the depreciation of currency discourages imports and helps in improving the balance of payments; however, depreciation also makes imported inputs of export industries expensive. This increases the cost of production of export products.

Due to the depreciation of the currency, the prices of imported products increase, which results in higher inflation. In a country like Pakistan, which is mainly dependent on imported edible oils and crude oil, the depreciation of currency will result in higher prices of edible oils and petroleum products in the domestic market. This put further pressure on domestic prices and prices of most of the products start increasing due to an increase in transportation cost.

The policy recommendations from this paper are:

i) In this study depreciation of the exchange rate shows a positive and significant impact on the export growth of Pakistan. Exchange rate depreciation may have a larger impact on exports when the industrial policy is export-led (giving maximum incentives to export sectors) rather than import substitution driven industry policy.
ii) In addition to this, in developing country like Pakistan where the industrial base is quite narrow and the number of export products and export destinations are also very few, depreciation of the Rupee shows a positive correlation with exports, however, there should be an increase in competitiveness of exported products with respect to regional blocs as Pakistan has very nominal/marginal competitive to Bangladesh, India, Malaysia, and Thailand.
iii) Pro-growth and stabilization policies in the country may provide certainty to exporters to export and give a boost to investors.

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Investors' Imitation Behaviour: A Comparison of Islamic and Conventional Banks Stocks

ABSTRACT

This study aim is to investigate the existence of herding behavior in the banking sector; conventional banking and Islamic banking sectors. By using daily data, Cross-sectional Standard deviation (CSSD) and Cross-sectional Absolute Deviation (CSAD) based methods are employed to estimate herding behavior in the aforesaid market. The study finds no evidence of herding behavior for investors in conventional banks as well as for investors in Islamic banks. The study also highlights the non-existence of herding behavior in extreme market conditions for both types of banks.

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Author's contribution in the article: 1-Conceived and designed the analysis, 2-Reviewed and compiled the literature, 3-Collected the data, 4-Contributed data or analysis tools, 5-Performed the analysis, 6-Wrote the paper, 7-Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

Many factors can influence the decision-making power of people, the choices made by other persons have a significant impact on their decisions of them De-Bondt (2008). The herding behaviour is explained as following the individuals who have experienced the same efforts in the past. People do herd not only in the daily routine of life but also in financial markets as stated by Devenow (1996). In stock markets, people do herd the financial expertise while making their investment decisions (Bikhchandani et al., 1992).

Fama (1970) advocates the traditional view of investment behavior and explains that the efficient market hypothesis of rationality holds if the information is perfect with fully confirmed prices. On the other hand, Barberis (2003) is in favor of the psychological impacts of investors on behavioral finance. There is widespread empirical evidence on the significant impacts of investor psychology on financial markets.

Both economists and specialists in stock markets have been analyzing the herding behavior for some years. In the stock markets of South Korea and Taiwan, Chang et al. (2000) and the Athens stock market, Tessaromatis and Thomas (2009) reported the presence of herding behavior. Researchers also reported the same in the Chinese stock market (Chang et al. 2000; Tan et al. 2008). Similarly, there is positive evidence of herding behavior in the developed economies of the European Union (Khan, 2011; Chiang & Zheng, 2010). Saastamoinen (2008) and Ohlson (2010) reported herding behavior exists in investors in the stock markets of Finland and Sweden. The findings of Christie and Huang (1995) also show the herding behavior presence in major sectors of NYSE.

Herding in stocks would mean that investors copy the behavior of others instead of relying on their information. In the present study, we tried to examine the existence of herding behavior in stocks of conventional banks and Islamic banks. Several studies tried to analyze the presence of herding behavior in the financial markets of various countries. There exist only a few studies related to the Karachi Stock Market (KSE)1 which analyzed the existence or non-existence of herding behavior. None of the studies try to investigate the difference in the behavior of the investors in Islamic banking and conventional banking. This is important to analyze as investors in both banking systems may differ from each other in terms of their investment behavior.

The main objective of the research is to investigate the existence of the herding behavior in the stocks of the banking sector; Islamic banking sector and conventional banking sector.

Following the introduction, section 2 presents a detailed review of empirical studies conducted in the field. Section 3 elaborated on the methods used, and section 4 contains the description of the data. Results and their discussion are presented in section 5. In the end, the conclusion of the study is presented in section 6.

2. LITERATURE REVIEW

There are two main approaches to investing in the stock market. First are the rational expectations, according to which investment decisions are made on the analysis of individual investors as stated by Falkenstein (1996). The second approach is the adaptive expectations in which investors mimic others Bikhchandani et al. (1992). In the stock market, investment managers mimic others for the sake of keeping their reputation in the market and to lessen the risk (Trueman, 1994; Scharfstein & Stein, 1990).

[1] On January 9, 2016 Karachi Stock Exchange (KSE) along with Islamabad Stock Exchange (ISE) and Lahore Stock Exchange (LSE) are incorporated in the Pakistan Stock Exchange (PSX).

Herding can be of three types; reputational earning, information cascade, and characteristic herding. In reputational earning, the individual investor follows the peer group. An information cascade can also encourage investors to mimic others mainly due to differences in information among investors. The last type of herding is characteristic herding. Under characteristic herding, there are different proffered stocks of common characteristics and because of this, the investors in their investigation regarding the optimal stocks reach the same conclusion. Other than these, investigative herding can be considered as another type of herding. The investigation of characteristics of some particular stock by the investors leads them to reach the same conclusion. So, a preference of investors for that particular stock can be seen based on their decision made by their judgment and it shows that they herd around the stock market (Froot et al., 1992; Hirshleifer & Teoh, 2003).

The behavior of investment in herding can be considered rational or irrational. The behavior of investors is considered irrational when they blindly follow others instead of their own beliefs. Managers who want to maintain a reputation in the market follow their peer group. This is rational behavior under the principal-agent model (Froot et al., 1992). The investors take into account the informational flow of leading investors, which leads them to follow the flow (Bikhchandani et al., 1992).

Chang et al. (2000) examine individual investor's herding behavior by introducing the cross-sectional standard deviation (CSSD) and using dummies for each extreme to deal with both extreme market conditions. They propose herding behavior exists in extreme market conditions, as investors copy the behavior of others by ignoring their instincts and asset pricing realities in panic situations. This method has some problems like the selection of lower and upper limits of the markets due to time-variant features of the markets and less efficiency because of the small sample size.

Chang et al. (2000) also used the CSAD method to analyze herding behavior in the normal condition of the markets. By using the CSAD method, Chang et al. (2000) found no significant evidence of herding for developed equity markets. However, they found some evidence of herding behavior in developing markets e.g. South Korea and Taiwan. Another study by Demirer and Kutan (2006) use data of daily stock returns from 1999 to 2002 and investigate the herding behavior in the Chinese stock markets. They employed the CSAD method and analysis is carried out for 375 Chinese stocks. They report no evidence of herding.

During the periods of market stress herding behavior may become more important. So, Christie and Huang (1995) used 5% and 1% values as the cut-off point to identify the lower and upper tails of the return distribution and only during the periods of extreme returns capture herding. Chiang and Zheng (2010) analyzed Shanghai and Shenzhen stock markets using the quantile regression equation for aggregate and sector level. They employed data from 1996 to 2007. The authors concluded that there is more tendency of herding at lower quantiles as compared to higher quantiles.

The herding behavior may exist due to the type of data set employed in the analysis. Tan et al. (2008), for both local and international investors, investigate herding behavior in the Chinese stock markets with the application of CSSD and CSAD. They reported the presence of herding behavior in case of daily data but no herding behavior at the weekly and monthly time horizon.

Sias (2004) finds mutual funds not to follow the actions of other mutual funds normally, but to follow their trade patterns. Significant evidence for this type of herding behavior in the trading of mutual funds is reported. Similarly, Hung et al. (2010), investigating the mutual funds in the Taiwan stock market, reported that institutional funds have herding behavior trends.

Investigating stock exchanges of four countries (Italy, Spain, Greece, and Portugal), by using CSSD and CSAD Economou et al. (2011) concluded the existence of herding in all four markets and also reported that herding is most likely observed in upper or lower market conditions.

The impact of extreme market conditions on herding might vary in different regions. Lao and Singh (2011) analyze Chinese and Indian markets by using CSSD and CSAD methods. For the Chinese market, the authors report that herding is more likely in bad market conditions. On the other hand, for the Indian market, the authors revealed that herding is more likely in good market conditions. The difference in rules and regulations along with dissimilarities in the characteristics of the markets can be counted as possible reasons. Gebka and Wohar (2013), using sector wise data with CSSD and CSAD, report no significant evidence of international herding. By contrast, the authors reported evidence of herding for some sectors: consumer services, basic materials, and oil and gas stocks worldwide. Using data of Spanish mutual funds and portfolios, Gavriilidis et al. (2013) find institutional herding at the national and the industry level. They also report that sectors with high information flow will have a high level of herding and vice versa.

Klein (2013) using CSSD and CSAD methods concludes that the United States and Euro-area markets have significant herding behavior. The existence of herding might be because the beliefs of investors affect the expectations of other shareholders. According to Rangvid et al. (2013), shareholders' expectations are formed in line with market harmony. Using quantitative data, the authors also report that young investors are more likely to be influenced by the market consensus. Lin and Lin (2014) investigate information-related and event-based herding for Taiwan's stock exchange. Strong evidence of both types is found in the analysis.

Pochea et al. (2017) found the presence of herding behavior in seven European countries. Chauhan et al. (2019) said during periods of turbulent uncertainty, people tend to follow others' decisions. According to Economou et al. (2018), market sentiments are an important part of herding behavior. The sentiment of the investors is linked to different external signals coming from different sources (Philippas et al., 2020). The overall market movements are affected significantly by the herding behavior. (Ph & Uchil, 2019; Jaiyeoba et al., 2018)

For Pakistan, there is one major study by Ilyas (2015) that investigates the herding behavior in KSE. The author also tries to find the existence of herding in extreme market conditions using CSSD and CSAD. The author reports that herding is subject to the sector as well period of analysis. Jamil et al. (2019) reported that there is some evidence of herding in KSE in bearish market conditions.

From the above-reviewed literature, it can be seen that none of the studies finds the presence of herding behavior in the conventional banking system and Islamic banking system. The present study aims to fill this gap and also to check the existence of herding in extreme market conditions for the banking sector.

3. METHODOLOGY

The study employs the methods introduced by Christie and Huang (1995) and Chang et al. (2000) to capture the presence of herding behavior in the banking sector. Both techniques are alike in spirit but sometimes they do not give the same conclusion. The method developed by Christie and Huang (1995) is based on the cross-sectional standard deviation (CSSD) while the method proposed by Chang et al. (2000) is based on a cross-sectional absolute deviation (CSAD).

3.1 Cross-Sectional Standard Deviation

Christie and Huang (1995) estimated the relation of the deviation in the average returns of the market and the cross-sectional deviation in the individual returns to estimate the presence of herding behavior in the equity market of the US. The general Capital Asset Pricing Models (CAPM) claims that there is a linear relationship between the spreading in an individual firm's returns and the spreading of average market returns. Treynor and Mazuy (1966) and Black (1972) report that individual returns increase nearly the same

as the increase in average market returns. They also report that this relation is affected by the market condition. In lower and higher extremes of the market, there is high stress, and investors are more likely to follow the market trend rather than their own beliefs.

Christie and Huang (1995) suggest the use of the CSSD of returns to identify herd behavior in a market setting. The underlying principle behind this measure is that the asset returns of an individual firm will move along with the returns of the overall market in the presence of herd behavior. This is because, in this situation, investors will make the decisions based only upon the communal market actions rather than on their own private opinion (information). As a result, cross-sectional dispersion would be lower than the natural dispersion. Hence, this would be symptomatic of the existence of herding behavior. The measure estimates the average closeness of the returns to the realized average. The authors argue that, since the individual assets vary in their sensitivity to market returns, the asset pricing models foresee the increase in the dispersion with the increase in market returns.

So, in the presence of herding behavior, individuals make their decisions only based on the communal market actions rather than on their private information, the return of the security will be closer to the return on the overall market. As a result, in the absence of herd behavior, there will be an increase in dispersion, and in case of severe herding, this behavior may lead to a decrease in dispersion. Christie and Huang (1995) define the CSSD as:

$$CSSD_t = \sqrt{\sum_{i=1} \frac{(R_{it} - R_{mt})^2}{N-1}} \quad (1)$$

here, R_{it} is the return for bank i at time t, R_{mt} is the cross-sectional average of the N returns in the portfolio of the banking sector (average return of all the banks) at time t, N is the total number of banks. According to the Capital Asset Pricing Theory (CAPM), portfolio returns are linearly associated with average market returns. Further, a non-linear association between them is an indicator of the existence of herding behavior. On the other hand, returns of the individual bank may decrease with the increased average return of the market. This indicates a negative relation between individual bank's return and market return dispersion. This is also an indication of herding behavior.

Christie and Huang (1995) treat extreme market conditions differently. According to them, in stressful situations, investors avoid following their own beliefs. Hence in this situation, herding is more probable. For analysis, they constructed dummy variables for both lower and higher extremes. These purely depend upon the market structure. There is no consensus among researchers on the definition of extreme market conditions. Different researchers used different percentages for up and bottom extreme market conditions. Studies like Chang et al. (2000), and Khan et al. (2013) use five percent values from top and five percent values from the bottom as the upper and lower extremes. Further, Christie and Huang (1995), Hwang and Salmon (2001), and Vieira and Pereira (2015) use one percent from upper and lower values along with five percent as the extreme market conditions.

In our data, there are more cases of positive returns and fewer cases of negative returns. Due to the difference in the number of days having positive and negative returns, in the present study, we employed one percent from lower and five percent from the bottom as extreme market conditions. Therefore, the regression equation after the incorporation of dummy variables can be written as follows:

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t \quad (2)$$

where D_t^L is a dummy variable having value 1 at time t if the return of the market is in the bottom one percent of its distribution, and 0, otherwise. Likewise, D_t^U is a dummy variable having value 1 at a time if

the return of the market lies in the top five percent of its distribution and 0, otherwise. Here, negative and significant values of the coefficients of these dummy variables indicate the presence of herding behaviour, whereas insignificant values of coefficients of these dummy variables indicate evidence of no herding behaviour in extreme conditions.

3.2. Cross-Sectional Absolute Deviation (CSAD)

The CSAD model is an extension of the CSSD model, it also follows the same spirit. Both of these models estimate the market-wide herding. Christie and Huang (1995) focused on extreme market conditions and cover both lower and upper tails by the introduction of dummy variables. Chang et al. (2000) argue that other than stress conditions herding can also exist in normal market conditions. They proved that the rational asset pricing model predicts equity return dispersions as a linearly increasing function of the market returns. Instead, if the market participants during periods of high price movements ignore their own beliefs and try to follow aggregate market behaviour, then this increasing effect and linear relation among the market return and dispersion will no longer hold. The non-linearly increasing relation may even become decreasing. This intuition is the basis of our empirical model.

Herding behaviour can be defined as a non-linear increasing function or decreasing function. Here in the particular market, the non-linear increasing function will exhibit less severe herding and the decreasing function indicate the severe type of herding. To capture the non-linearity in the market, Chang et al. (2000) introduce the square of market returns as an independent variable along with the absolute value of the market return. At the first stage following formula is used to calculate the $CSAD$ at time$t$:

$$CSAD_t = \frac{1}{N}\sum_{i=1}|R_{it} - R_{mt}| \quad (3)$$

This equation is similar to the CSSD except it uses absolute deviation. To analyze the non-linear relationship of the market returns and the individual return generally, we use the following equation:

$$CSAD_t = \gamma_0 + \gamma_1|R_{mt}| + \gamma_2|R_{mt}|^2 + \varepsilon_t \quad (4)$$

From the above equation, the coefficient of $|R_{mt}|^2$ must be negative and significant as proof of the existence of a nonlinear relationship between individual stock returns and average market returns. Correspondingly, equations (5) and (6) are used to identify the asymmetry and herding behaviour in both extremes, separately. Equation 5 is used to analyze herding behaviour in the upper extreme and equation 6 is for the lower extremity.

$$CSAD_t^{UP} = \alpha + \gamma_1^{UP}\left|R_{mt}^{UP}\right| + \gamma_2^{UP}(R_{mt}^{UP})^2 + \varepsilon_t \quad (5)$$
$$CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN}\left|R_{mt}^{DOWN}\right| + \gamma_2^{DOWN}(R_{mt}^{DOWN})^2 + \varepsilon_t \quad (6)$$

In equation (5), a negative and significant value of γ_2^{UP} indicates the presence of herding activity in the superior extreme. Similarly, in equation 6, a negative and significant value of γ_2^{DOWN} is evidence of herding behavior in the lower extremity. This approach is also used by Demirer and Kutan (2006), Tan et al. (2008), Javed et al. (2013), and Ilyas (2015) to estimate the existence of herding behavior.

Both CSAD and CSSD can be used to find the existence of herding behavior in extreme market conditions. The difference between both is that Chang et al. (2000) have associated the positive return values with higher extreme and negative return values with lower extreme. On the other hand, Christie and Huang (1995) consider top and bottom 5% values as extreme values. In our study, we used the bottom 5% as lower extreme while the top 5% as upper extreme.

4. DATA AND SUMMARY STATISTICS

The data of two Islamic banks and eighteen conventional banks are collected from Karachi Stock Exchange[2] and Business Recorder[3]. The daily data of opening and closing prices are accumulated from May-2006 to May-2016. Allied Bank Limited (ABL), Askari Commercial Bank (ASK), Bank Alfalah, *Standard Chartered Bank,* Bank Al-Habib, Habib Metropolitan, Bank of Punjab, Faysal Bank, Habib Bank, Jahangir Siddiqui (JS) bank, Muslim Commercial Bank, National Bank, Nordic Investment Bank (NIB), Samba Bank, Soneri Bank, Silk Bank, Summit Bank, The Bank of Khyber, United Bank are taken as conventional banks whereas Bank Islami and Meezan Bank are chosen as Islamic banks for the analysis. Among the conventional banks, MCB bank has the highest market capitalization while Silk bank has the lowest market capitalization in the stock market. On the other side, among the Islamic banks, Meezan Bank has a higher market capitalization as compared to Bank Islami.

The average market return is a key indicator of trade in that particular market. Likewise, the average return of the specific stock also attracts its selling and purchasing. The CSSD and CSAD of banks are calculated based on their average return. In this study, returns are calculated by the differences in daily log prices.

Table 1 shows a brief explanation of the average returns of selected banks. In the first row, the maximum and minimum average return of the banking sector is given: the average return of overall banks is negative with 1.3 units standard deviation. The Islamic banks have the maximum amount of average return is equal to 7.40 with a negative (-0.0003) mean. A maximum average return of 7.72 is given for the conventional banks, with a standard deviation of 1.32.

Table 1 depicts the CSSD of both categories of banks. As mentioned above, the CSSD is used to measure the dispersion of individual returns from the average market return to analyze the existence of herding behavior in upper and lower extremes. CSSD is calculated using equation 1. The conventional banks have higher returns than the Islamic banks under the maximum value of CSSD, and in mean value, conventional banks are superior too.

Table 1: Summary Statistics of Average Returns, CSSD, and CSAD

	Minimum	Maximum	Mean	Std. Deviation	Obs.
Average Returns					
Banking sector	-8.2021	7.4511	-0.0394	1.2925	2488
Islamic banks	-12.6390	7.4050	-0.0003	1.6615	2488
Conventional banks	-8.5183	7.7247	-0.0432	1.3208	2488
Cross-Sectional Standard Deviation (CSSD)					
Banking sector	0.0000	26.7278	1.6456	1.2841	2488
Islamic banks	0.0000	20.9446	1.2784	1.3452	2488
Conventional banks	0.0000	28.1031	1.6297	1.3414	2488
Cross-Sectional Absolute Deviation (CSAD)					
Banking sector	0.0000	11.1032	1.1527	0.7031	2488
Islamic banks	0.0000	14.8101	0.9040	0.9512	2488
Conventional banks	0.0000	12.2095	1.1430	0.7416	2488

Source: Author's calculations.

[2] Following the merger of Islamabad Stock Exchange, and Lahore Stock Exchange in Karachi Stock Exchange, the new name of the exchange is Pakistan Stock Exchange.

[3] Business Recorder is the first financial Newspaper of Pakistan, for detail see www.brecorder.com.

5. RESULTS

The present study employs the methodology developed by Christie and Huang (1995) and Chiang and Zheng (2010) to check the existence of herding behavior in banking sectors. In subsection 5.1, results based on methodology by Christie and Huang (1995) are presented. It checks the existence of herding behavior in lower and upper extreme market conditions. They use dummy variables for lower and upper extremes, and statistically significant negative values of the parameters of these dummies will be evidence for herding behavior in that particular banking sector. Results based on the methodology presented by Chang et al. (2000) are presented in subsection 5.2. To check herding behavior in a bull market, it uses data for which returns are positive. On the other hand, to check herding behavior in the bear market, it uses data for which returns are negative.

5.1. Results of Herding Behaviour based on CSSD

In the economy, the stock market is considered a volatile market. Good and bad news affect investors' decisions differently in the market. The results of equation 2 are used to check the existence of herding behavior in extreme conditions, presented in Table 2. Christie and Huang (1995) report that good news has a relatively smaller effect than bad news. This implies that chances of herding in the lower extreme of the market are higher than the chances of herding in normal conditions and upper extreme.

In Table 2, β^U measures herding in the upper extreme of the particular banking sector and β^L measures the herding in the lower extreme. The negative and significant values of these coefficients demonstrate that the particular extreme has herding activities and investors use to follow others. On the other hand, a positive and significant coefficient represents the existence of no herding activity. Overall, results reveal that there is no herding in any of the banking sectors with any of the market conditions. It means that in a given sample, both Islamic banks and conventional banks do not herd in extraordinary situations.

Table 2: Herding Behavior in Extreme Conditions

Variables	Conventional Banks	Islamic Banks	Overall All Banks
Constant	1.5292	1.1541	1.5380
	(58.69)***	(45.08)***	(60.89)***
β^L	3.8821	3.8164	2.3546
	(14.70)***	(14.71)***	(13.15)***
β^U	1.2850	1.7724	1.2562
	(11.11)***	(15.59)***	(11.26)***
N	2488	2488	2488
Adj-R^2	0.1173	0.1525	0.1039
F-Statistics	166.17	224.69	145.19
P-Value	0.0000	0.0000	0.0000

Source: Author's estimations. *, **, and *** indicate significance at 10%, 5%, and 1% level of significance, respectively.

5.2. Results of Herding Behavior based on CSAD

In contrast to the CSSD, which is used only for extreme conditions, the CSAD method can also be used for normal conditions. Similarly, equation 4 is used to capture the non-linear relationship between individual investors and the banking sector. Table 3 shows the result of this equation for herding behavior in the normal market environment. The negative and significant values of γ_2 provide evidence for the existence of herding activities in a particular banking sector. Our analysis would be inconclusive if we find the value of γ_2 is insignificant, however, we find the positive and significant value of γ_2, so we concluded based on this data set there is no evidence of herding for Islamic as well as conventional banking stocks.

Table 3: Results of Herding Behavior in Normal Market Conditions

Variables	Conventional Banks	Islamic Banks	Overall All Banks
Constant	0.8412	0.5920	0.8458
	(39.72)***	(21.71)***	(41.71)***
γ_1	0.2925	0.14377	0.3235
	(10.27)***	(4.98)***	(11.47)***
γ_2	0.0240	0.0526	0.0149
	(4.21)***	(10.24)***	(2.53)**
N	2488	2488	2488
Adj-R^2	0.2822	0.2851	0.2783
F-Statistics	489.76	496.98	480.56
P-Value	0.0000	0.0000	0.0000

Source: Author's estimations. *, **, and *** indicate significance at 10%, 5%, and 1% level of significance, respectively.

To identify the asymmetry in the market, the equation 5 and 6 are used. The results of this equation are presented in Tables 4 and 5. To check the herding activity in the bullish market, only daily data for which returns are positive is utilized. As mentioned above, the value of γ_2^{UP} is used as a piece of evidence for herding behavior in a bullish market. Results presented in Table 4 show that there is no negative and significant value of the corresponding coefficient, which indicates that there is no evidence of herding activity in the given sample. The finding is true for both types of banking sectors.

Table 4: Results of Herding Behavior in Bull-Market

Variables	Conventional Banks	Islamic Banks	All Banks
Constant	0.9209	0.5311	0.9185
	(32.87)***	(11.71)***	(33.93)***
γ_1^{UP}	0.2329	0.3493	0.2824
	(5.85)***	(6.62)***	(7.18)***
γ_2^{UP}	0.0401	0.0056	0.0254
	(4.51)***	(0.53)	(2.82)***
N	1208	1182	1206
Adj-R^2	0.2972	0.2179	0.2897
F-Statistics	256.22	165.51	246.77
P-Value	0.0000	0.0000	0.0000

Source: Author's estimations. *, **, and *** indicate significance at 10%, 5%, and 1% level of significance, respectively.

Similar to the bullish market, we investigate the presence of herding behavior in the bearish market as well by using equation 6. For the existence of herding behavior, we must have a negative and significant value of the coefficient γ_2^{DOWN}. The results of possible herding behavior in the bearish market are presented in Table 5. Results indicate that, in any of the cases, there is no negative value of the parameter, which means that there is no evidence of herding behavior. The findings are similar for the banking sector comprising of conventional banks and Islamic banks.

Table 5: Results of Herding Behavior in Bear-Market

Variables	Conventional Banks	Islamic Banks	All Banks
Constant	0.8533	0.6558	0.8473
	(26.05)***	(18.46)***	(27.52)***
γ_1^{DOWN}	0.2447	0.0096	0.2786
	(5.82)***	(0.27)	(6.76)***
γ_2^{DOWN}	0.0288	0.0760	0.0208
	(3.69)***	(13.31)***	(2.58)**
N	1236	1258	1246
Adj-R^2	0.2642	0.3652	0.2628
F-Statistics	222.77	362.51	222.89
P-Value	0.0000	0.0000	0.0000

Source: Author's estimations. *, **, and *** indicate significance at 10%, 5%, and 1% level of significance, respectively.

6. SUMMARY AND CONCLUSION

The behavior of investors in stocks of conventional banks and Islamic banks might be different from each other. In the present study, we tested the existence of herding behavior in the banking sector by bifurcating it into conventional banks and Islamic banks. We also tested the existence of herding behavior in these sectors with extreme market conditions. For the analysis, the study used daily data of closing prices of eighteen conventional and two Islamic banks from May 2006 to May 2016.

The estimation is carried out for three different market conditions: normal market conditions, bearish and bullish market conditions, and extreme lower and extremely higher market condition. For normal market conditions, CSAD is employed to capture the asymmetric behavior of the investors during different market conditions as used by Chang et al. (2000). Likewise, CSSD is used to measure herding behavior in extreme market conditions as used by Christie and Huang (1995).

The estimated results based on the CSSD show that for both types of banks; conventional and Islamic banks, there is no evidence of herding behavior found in the upper and lower extremes of the market. Similarly, in the case of CSAD, no evidence of herding behavior in any of the banking sectors can be observed in bull-market, bear-market, or normal market conditions. If there exists some herding in the stock market then maybe due to lack of data our model is not able to capture it. This indicates that, while trading stocks for these banks, investors make decisions by their own beliefs rather than following the decisions of other investors. Here, results are not in line with the results of Chang et al. (2000), Christie and Huang (1995), and Ilyas (2015) who report that, during more volatile and stressful market conditions, investors by suppressing their own believes have higher tendency to mimic each other.

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International Stock Markets Integration: A Case Study of Selected OIC Countries

ABSTRACT

This study examines the integration in eight selected emerging stock markets from the OIC countries namely Pakistan, Bangladesh, Egypt, Indonesia, Iran, Saudi Arabia, Turkey, and Malaysia for the period of March 1998 to March 2016. The study adopts a combination approach by considering the combination of two countries, then a combination of three countries, and so on up to the n^{th} combination of the stock markets using the Autoregressive distributive lag approach. The results show that there is a systematic pattern of long-run equilibrium relationship among the stock markets of selected OIC countries. Malaysia, Indonesia, and Turkey are found to be leading stock markets in the selected group. The results of this study will provide a pattern of beneficial portfolio diversification to investors.

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Author's contribution in the article: 1-Conceived and designed the analysis, 2-Reviewed and compiled the literature, 3-Collected the data, 4-Contributed data or analysis tools, 5-Performed the analysis, 6-Wrote the paper, 7-Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

Studies on International stock market integration have become very important in the recent past for investors as well as academicians. Many researchers have investigated the integration of stock markets from different aspects (Wang et al., 2003; Mukherjee & Mishra, 2010; Horvath & Petrovski, 2013; Narayan et al., 2014; Rizvi & Arshad, 2017). The stock market integration theory states that assets have the same level of risk if there is no transaction cost, legal restrictions, taxes, and tariffs on the free mobility of equities (Levine, 1997; Kose et al., 2009). During the last three decades, stock market integration has gained considerable attention from researchers due to an increasing trend of equity flow from developed countries to developing countries.

A vast literature is available on stock market integration both in developed and developing countries (Buckberg, 1995; Marashdeh, 2005; Narayan et al., 2014; Teulon et al., 2014; Al Nasser & Hajilee, 2016). However, there is little work in this area about the OIC nation-states. There are 57 OIC member countries and they are geographically distributed in 6 regions. OIC countries constitute a big part of the world which is mostly neglected in respect of stock markets' integration. Of 57 OIC countries, 38 have functioning stock exchanges, and 16 out of 38 countries are members of the Federation of Euro-Asian Stock Exchanges (FEAS). OIC member stock exchanges have increased their share within the total world market during the last decades and gained considerable attention as new emerging markets.

There are relatively very few studies that focused on the stock market integration of OIC countries (Hassan, 2003; Ceylan and Dogan, 2004; Majid et al., 2007; Majid & Kassim, 2010; Nurrachmi, 2018). Most of the previous studies on the topic under consideration are explanatory and found evidence of stock market integration. However, due to the emerging importance of OIC stock markets in the global world more comprehensive studies are required that can provide more information about the nature of the integration of OIC countries stock markets especially for the investors who want to diversify their portfolio through investing in different combination of OIC countries stock exchange. Thus, this study aims to fulfill this gap and attempts to provide a comprehensive analysis of the stock market integration of OIC countries.

This study is distinguished from others in the following respects; first, this study adopts a combination approach, it considers the combination of two countries (28 combinations)[1], the combination of three countries (56 combinations), and so on up to the n^{th} combination of the stock markets. Which provides the opportunities to the investors, they can make portfolio according to their desire combination of Muslims countries to strengthen the Muslims platform. Second, this study uses the Autoregressive distributive lag approach, which is not used earlier by any researcher evaluating OIC stock markets' integration.

The key objective of this study is to observe the financial integration among the stock markets of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Pakistan, Saudi Arabia, and Turkey[2]. More specifically, we focus on

- Whether there has been any integration among selected OIC stock markets?
- Can investors diversify the risk by investing in selected OIC stock markets?

This study proceeds in the following way. Section two exhibits the relevant literature review of our study. Section three describes data and methodology. Section four explains the results of estimation, significance,

[1] $c_2^8 = \frac{8!}{2!(8-2)!} = 28$ where n=8 (selected eight OIC countries) and r=2 (combinations of two countries)

[2] Other countries' stock exchanges are not included mainly due to the data availability problem. However, the selected eight stock exchanges are the major stock exchanges of OIC countries.

and interpretation. Section five concludes the study with some recommendations and future research suggestions.

2. LITERATURE REVIEW

Many studies are conducted to find out cointegration among different countries. However, few studies focused on OIC country's stock markets and none of the previous studies has used the ARDL approach for estimation of the stock markets of OIC countries. The studies have used different methodologies and models for finding stock market cointegration, some of the main methodologies and models that are used in literature are CAMP, APT, VAR, Johansen maximum likelihood approach, and Engle-Granger cointegration approach, etc.

Sharpe (1964), Lintner (1965), and Mosin (1966) independently developed one of the most famous financial equilibrium model called the capital asset pricing model (CAPM). CAPM helped establish the foundation of the modern portfolio theory. CAPM explains the relationship between the expected return and the risk of an asset. Buckberg (1995) studied the emerging markets and their cointegration with global financial markets by using international CAPM. The study used monthly data from 1977 to 1991, for twenty emerging economies. During the period 1977 to 1984, six markets out of twenty rejected market integration but from 1984 to 1991 eighteen markets were found to be integrated. This may be due to the capital flow from developed countries to emerging economies during the 1980s. Najmudin et al. (2007) examined the international stock market integration for eight stock markets over the period January 2003 to December 2016. The results of the study suggested that China and Philliphens stock markets are integrated. Whereas, herding behavior is also found in these two markets. Moreover in other markets like Japan, Indonesia, Malaysia, Uk, Singapore, and Thailand herding behavior was observed in the period of market crisis only.

Arbitrage Pricing Theory (APT) is a general theory of asset pricing, proposed by an economist Stephen Ross in 1976 (Ross, 1976). APT explains that expected returns on an asset can be predicted as a linear function of various macro-economic factors. Cho et al. (1986) used “Inter battery factor analysis” to estimate the cointegration of eleven countries (US, Canada, France, Germany, Netherlands, Switzerland, U K, Australia, Hong Kong, Singapore & Japan) using APT for the monthly period 1973- 1983. Their findings showed the absence of any integration among the markets. The cause of rejection of their joint hypothesis was not determined. Siahaan (2018) used APT to check the integration of Southeast Asian countries. The results of the study suggest that the Indonesian stock market is mostly dominated and highly integrated with other markets under consideration.

A VAR model is a set of k explanatory variables over a specific period as a linear combination of only their past values, VAR model is developed by Chris Sims in 1980. Wang et al. (2003), studied the effects of the Asian financial crisis on the African markets. They examined both the global and the regional integration of African stock markets. They used data of daily stock indices closing prices from January 1996 to May 2002. The generalized impulse response function was used by them to estimate the dynamic linkages across the markets of the US, South Africa, Morocco, Egypt, Nigeria, and Zimbabwe. Their findings showed that short and long-run interdependence among African markets was limited and the regional integration between these markets was weakened after the crisis.

According to the Engle-Granger approach developed in 1987, if two series are co-integrated then the linear combination of two series must be stationary. Engle-Granger is a two-step method. Neaime (2002) used the Engle-Granger approach to determine the integration of the MENA region and three developed stock markets in the UK, USA, and France using weekly data up to December 2000. He found that there is strong cointegration between the MENA region and the developed countries' markets but weak integration among the MENA region countries (Turkey, Egypt, Morocco, Jordan). Saha and Bhunia (2012) investigated the

cointegration of the Indian stock market with leading South Asian countries stock exchanges. The results of the study suggested that the Indian stock market is integrated with all other stock markets under consideration for both the short and long term.

Johansen's maximum likelihood approach (1991) named after Soren Johansen provided comprehensive testing in the presence of multiple cointegration relations. Choudhry (1997) examined the long-run relationship between six Latin American stock markets and the US. The weekly stock indices from January 1989 to December 1993 were used to study the relationship between these emerging markets and also with the US stock markets. Unit root tests, cointegration tests, and error correction models were used to examine the empirical investigation. The findings of the study revealed that due to globalization of the emerging markets in the 1980s and 1990s there existed a long-run stationary relationship within these emerging markets and with the US stock markets.

ARDL procedure to cointegration is first introduced by Pesaran in 1997. ARDL is a model for time series data in which a regression equation is used to predict the current value of a dependent variable say "Y_t" based on both current and lagged values of an independent variable and lagged (past values) of the dependent variable. By using the ARDL method of cointegration Marashdeh (2005) studied the relationship among four stock markets of the MENA region namely Turkey, Jordan, Egypt, and Morocco, and stock markets in three developed countries, Germany, USA, and the UK. The study showed the integration among four MENA markets but no cointegration among the markets of the MENA region and those developed countries.

Ceylan and Dogan (2004) investigated the integration of selected eight OIC countries stock exchanges namely Egypt, Turkey, Jordan, Morocco, Kuwait, Lebanon, Pakistan, and Oman. Their study used Engle-Granger and Dynamic OLS method for estimation and perform pair-wise analysis. The result of the study shows that among a total of 28 pair-wise combinations only two pairs are found to be cointegrated. Moreover, Majid et al. (2007) also included eight countries for their analysis. These countries are Malaysia, Indonesia, Bangladesh, Pakistan, Turkey, Egypt, Oman, and Kuwait. Their study found that only the stock market of the Asian region is integrated. Ergun and Hassan (2009) examined four OIC countries Turkey, Indonesia, Malaysia, and Pakistan, and using the Vector Error Correction Model provided evidence of the long-run relationship.

3. METHODOLOGY

Monthly price indices of stock markets of countries namely Bangladesh, Egypt, Indonesia, Iran, Malaysia, Pakistan, Saudi Arabia, and Turkey were used in the proposed study. All stock indices were taken from international financial statistics from March 1998 to March 2016. Monthly data is chosen in this study firstly to avoid false correlation problems commonly found in quarterly and annual data, and secondly to avoid compromising on the available degrees of freedom required in selecting appropriate lag structures. Whereas daily data was also deemed to contain too much noise and is affected by the day of the week effect. The monthly observations provide a clear picture.

This study uses ARDL models to find the cointegration of selected OIC countries stock markets and Augmented Dickey-Fuller (ADF) models for unit root test to check and make sure that the dependent variable is of I(1) in level and none of the variables is of I(2) or higher order. The study begins with a unit root test to check that while finding the cointegration between or among the countries' stock market, the dependent country stock index should be I(1) & none of the independent countries stock markets is of I(2) or higher order. Following Augmented Dickey-Fuller (ADF) models are used to check the unit root hypothesis:

$$\Delta \ln S_t^y = \alpha_1 + \beta \ln S_{t-1}^y + \delta \sum_{i=1}^{m} \Delta \ln S_{t-i}^y + \varepsilon_t \quad (1)$$

$$\Delta \ln S_t^y = \alpha_1 + \alpha_2 t + \beta \ln S_{t-1}^y + \delta \sum_{i=1}^{m} \Delta \ln S_{t-i}^y + \varepsilon_t \quad (2)$$

Where $\ln S_t^y$ represents the stock market index (in natural logs), α_1 represents the constant term, t represents the trend term $\delta \sum_{i=1}^{m \sum_{t-i}^{y}} \Delta ln$ represents the autoregressive term included in models to ensure the residual (ε_t) is serially correlated. The hypothesis is:

$H_0: \beta = 0$ non-stationary (unit root)
$H_1: \beta \neq 0$ Stationary (not unit root)

If a stock index had a unit root (null hypothesis cannot be rejected).

Appendix A shows the result of unit root, all the stock indices become stationary at the first difference in both models (Intercept only, with Intercept & Trend). From the unit root test, it becomes clear, any stock index can be taken as the dependent variable while finding cointegration through the ARDL approach because all stock series are I(1). None of the stock series are I(2) and higher therefore any series can be taken as the independent variable.

This study uses ARDL models to find the cointegration of selected OIC countries' stock. To examine the nth order cointegration relationship among the selected OIC countries stock markets, we use a systematic pattern in which (n-6) to nth order estimations are done through the ARDL method by taking one country dependent, and its integration is checked against all other countries.[3]

First of all, the study sees the cointegration relationship taking the combinations of pairs of the selected OIC countries stock markets. In pairwise cointegration testing total of twenty-eight combinations are examined in two steps.[4] In the first step, F-statistics is computed from the following model which tells stock markets taken are co-integrated or not by comparing computed F-statistic with the Two sets of asymptotic critical values are provided by Pesaran and Pesaran for two polar cases. One set assumes that all regressors are I(1), and the other set assumes that all are I(0). These two sets of critical bounds provide a method of distributing regressors into I(1) and I(0). If the computed F-statistics is greater than the upper bound critical value, then we reject the null hypothesis of no cointegration and conclude that there exists a steady-state equilibrium between the variables. If the computed F-statistics is less than the lower bound critical value, then we cannot reject the null of no cointegration. If the computed F-statistics falls within the lower and upper bound critical values, then the result will be considered inconclusive.

$$\Delta \ln S_t^y = \beta_0 + \beta_1 \ln S_{t-1}^y + \beta_2 \ln S_{t-1}^x + \sum_{i=1}^{m1} \beta_{3i} \Delta \ln S_{t-i}^y + \sum_{i=0}^{m2} \beta_{4i} \Delta \ln S_{t-i}^x + \varepsilon_t \quad (3)$$

Where $\ln S_t^y$ represents the stock index of Y country with natural log, $\ln S_t^x$ represents the stock index of X country with a natural log. The hypothesis is:

$H_0: \beta_1 = \beta_2 = 0$ (No cointegration)
$H_1: \beta_1 \neq \beta_2 \neq 0$ (Cointegration)

[3] Where n is the number of selected stock markets of OIC countries (Eight countries have been taken by this study). First, see pair-wise integration (n-6), then among three countries (n-5), and so on up to n.

[4] $c_r^n = \frac{8!}{2!(8-2)!} = 28$ Where n=8 (selected eight OIC countries) and r=2

In the second step, we estimate the long-run coefficients of the same equation by applying the ARDL error correction models for those pairs of stock markets that show cointegration. From the following equation, we get the residuals that we use in the unrestricted error correction model.

$$ln\, S_t^y = \alpha_0 + \alpha_1\, ln\, S_t^x \; + \varepsilon_t \tag{4}$$

Unrestricted Error correction Model:

$$\Delta\, ln\, S_t^y = \beta_0 + \sum_{i=1}^{m1} \beta_{1i} \Delta\, ln\, S_{t-i}^y + \sum_{i=0}^{m2} \beta_{2i} \Delta\, ln\, S_{t-i}^x + \lambda EC_{t-1} + \eta_t \tag{5}$$

Where λ represents the speed of adjustment, EC represents the residuals obtained from equation (4)

After testing pairwise, the study test cointegration of selected OIC countries stock markets using combinations of three countries. A total of fifty-six combinations[5] run to test cointegration among selected OIC countries stock markets. Moreover, combinations of four countries are then taken into account and in this case total, possible combinations are seventy which are checked by the model mentioned above. Whereas, the same model is also applied to test the cointegration of the combinations of five countries stock markets with possible combinations of fifty-six. According to the sequence, the combination of six countries' stock markets with a total of twenty-eight combinations is tested for cointegration. Finally, considering the last model in the chain, the study takes the combinations of seven countries at a time and possible combinations are eight.

4. DATA AND SUMMARY STATISTICS

The Schwartz Bayesian criterion (SBC) is used to select lags in the models. According to Pesaran and Shin (1998), SBC is preferable to the Akaike Information Criteria (AIC). We use a maximum of twelve lags when pair-wise models are estimated to find cointegration, but as the number of regressors increases, the number of lags decreases. Two levels of significance are used to check cointegration (1% and 5%). Only those combinations are reported in the Appendix A that shows cointegration.

The results are given in the appendix B. whereas cointegration tests show that there is a systematic pattern of long-run equilibrium relationship among the stock markets of selected OIC countries. The nth-order co-integration test was performed and a total of 939 ARDL models were estimated. Results show that Malaysia, Indonesia, and Turkey are the most important stock markets in the selected group. All the models were found to be cointegrated with Malaysia, Indonesia, or Turkey stock markets. The results of this study provide a pattern of beneficial portfolio diversification to investors. This study has tested different combinations of stock markets in the selected OIC countries and the results are summarized in the following figures.

The basic structure of these figures is simple. Each figure has eight rows, the first row of the figures contains a dependent variable and the remaining seven rows of the figures contain the independent variables. Row one and two explain the pairwise (n-6) cointegration testing results. Here n is several countries that are 8. As in figure 1 MA and TR stock market in the pair-wise testing are found to be cointegrated. These results of pair are helpful for those who want to invest in only two OIC countries' stock markets. The investors can get long run benefit by investing in any other pair of selected OIC countries expect TR and MA stock markets but can get short-run arbitrage profit in this combination due to timing difference of opening and closing of the stock markets.

[5] $c_3^8 = \frac{8!}{3!(8-3)!}$ = 56, selected 8 OIC countries stock markets and 3 countries combinations.

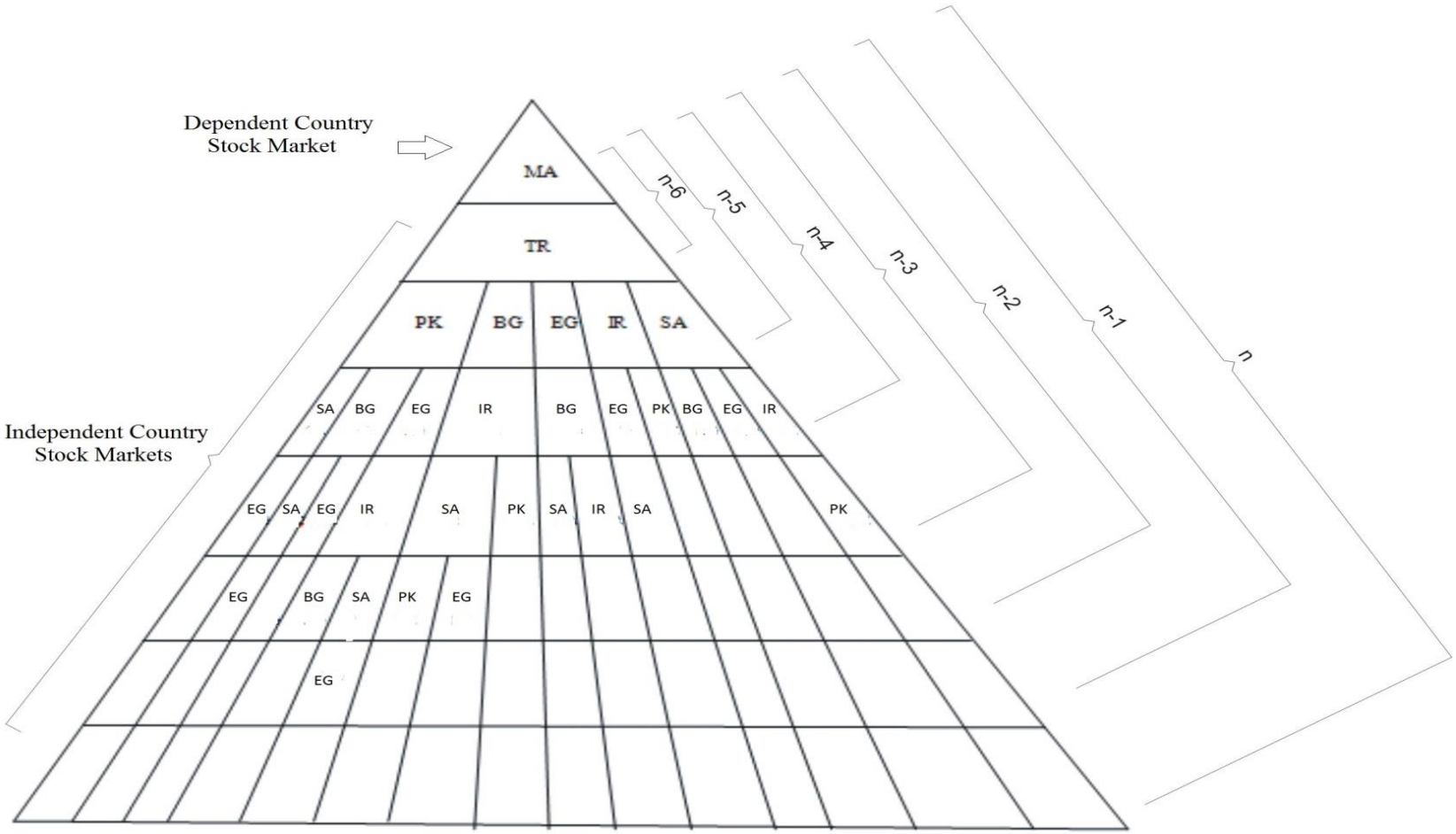

Figure 1: Summarized results where dependent Malaysian stock exchange is pair-wise cointegrated with Turkey stock exchange

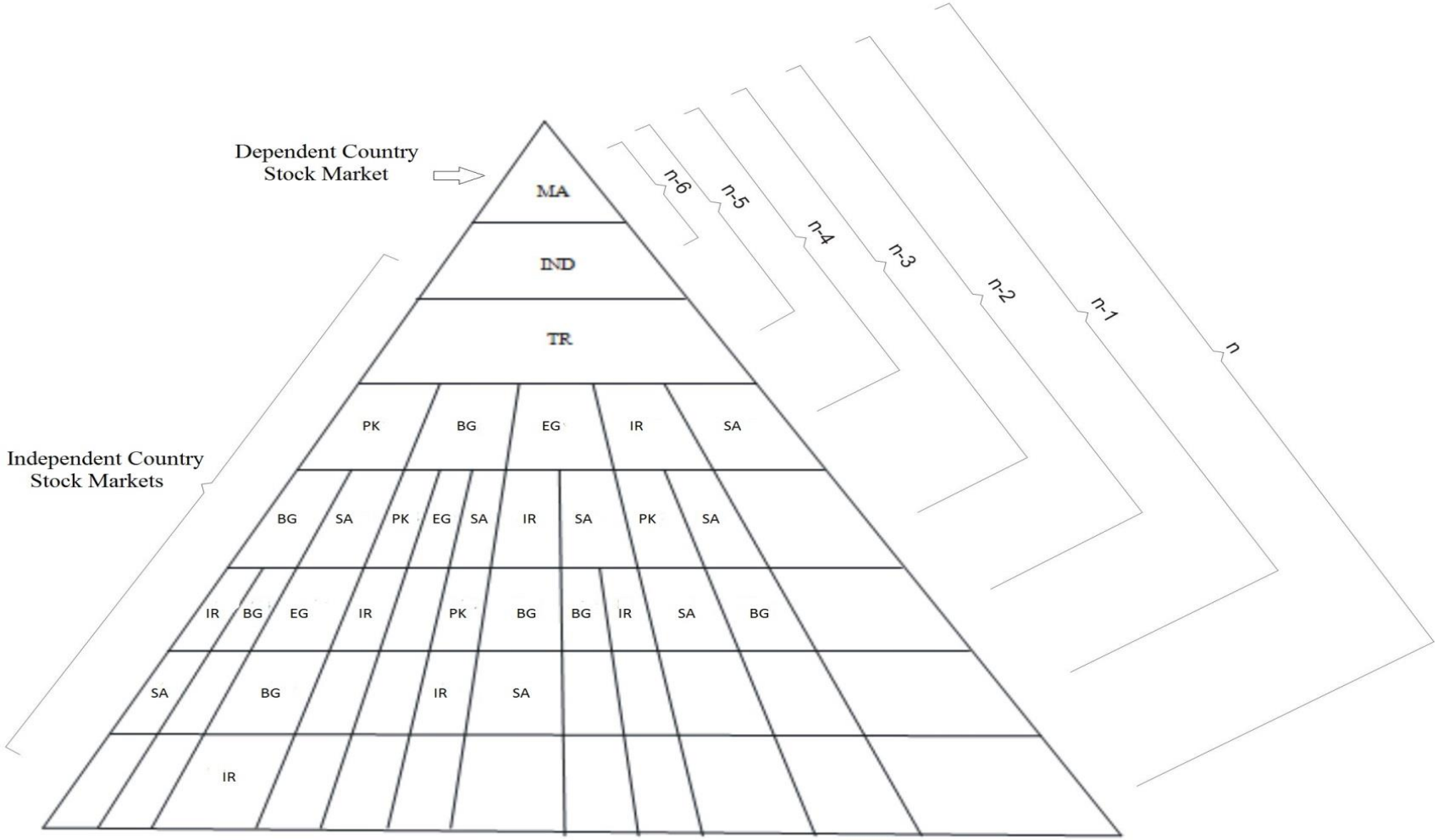

Figure 2: Summarized results where dependent Malaysian stock exchange is pair-wise cointegrated with Indonesian stock exchange

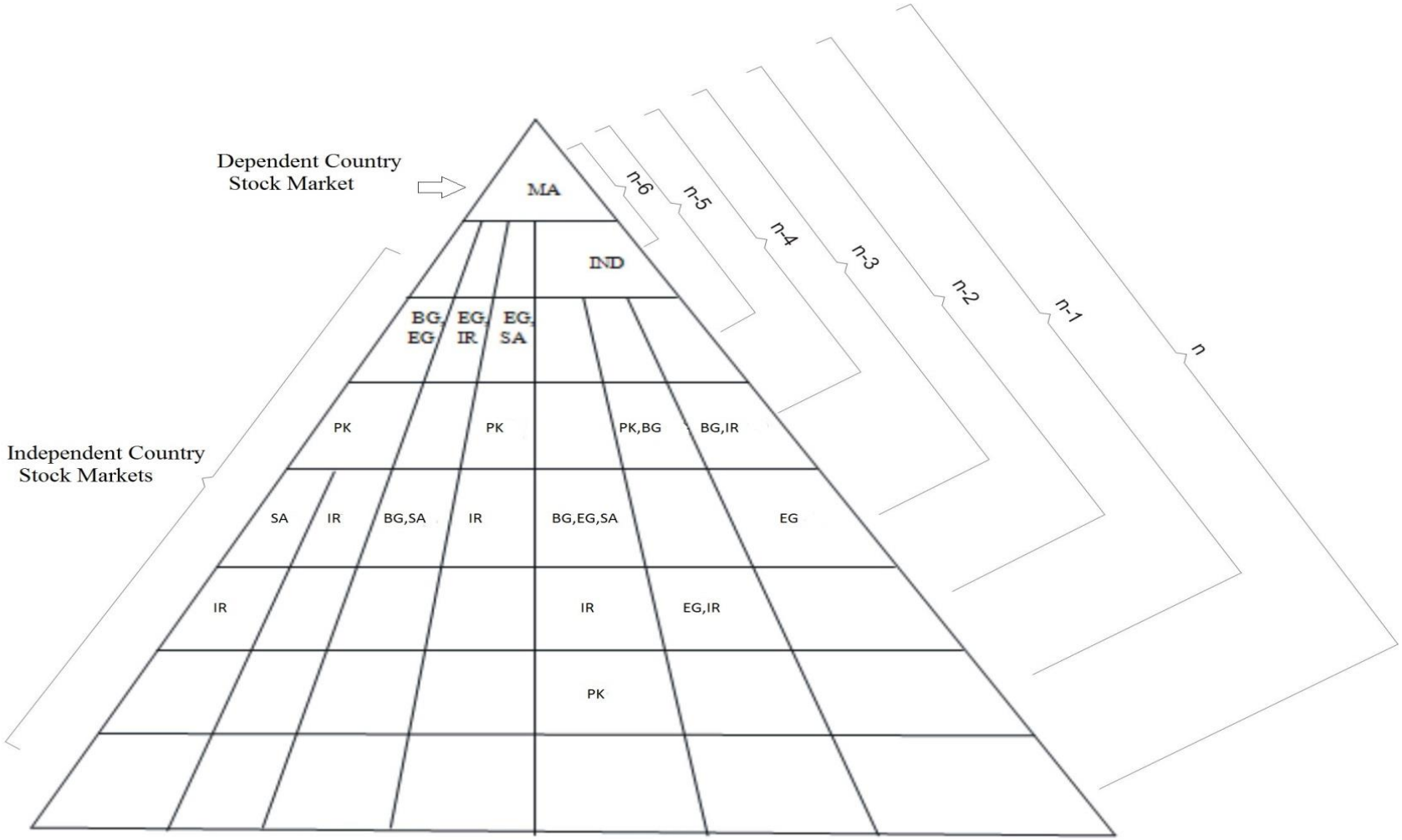

Figure 3: Summarized results where dependent Malaysian stock exchange is pair-wise cointegrated with Indonesian stock exchange without Turkey stock exchange

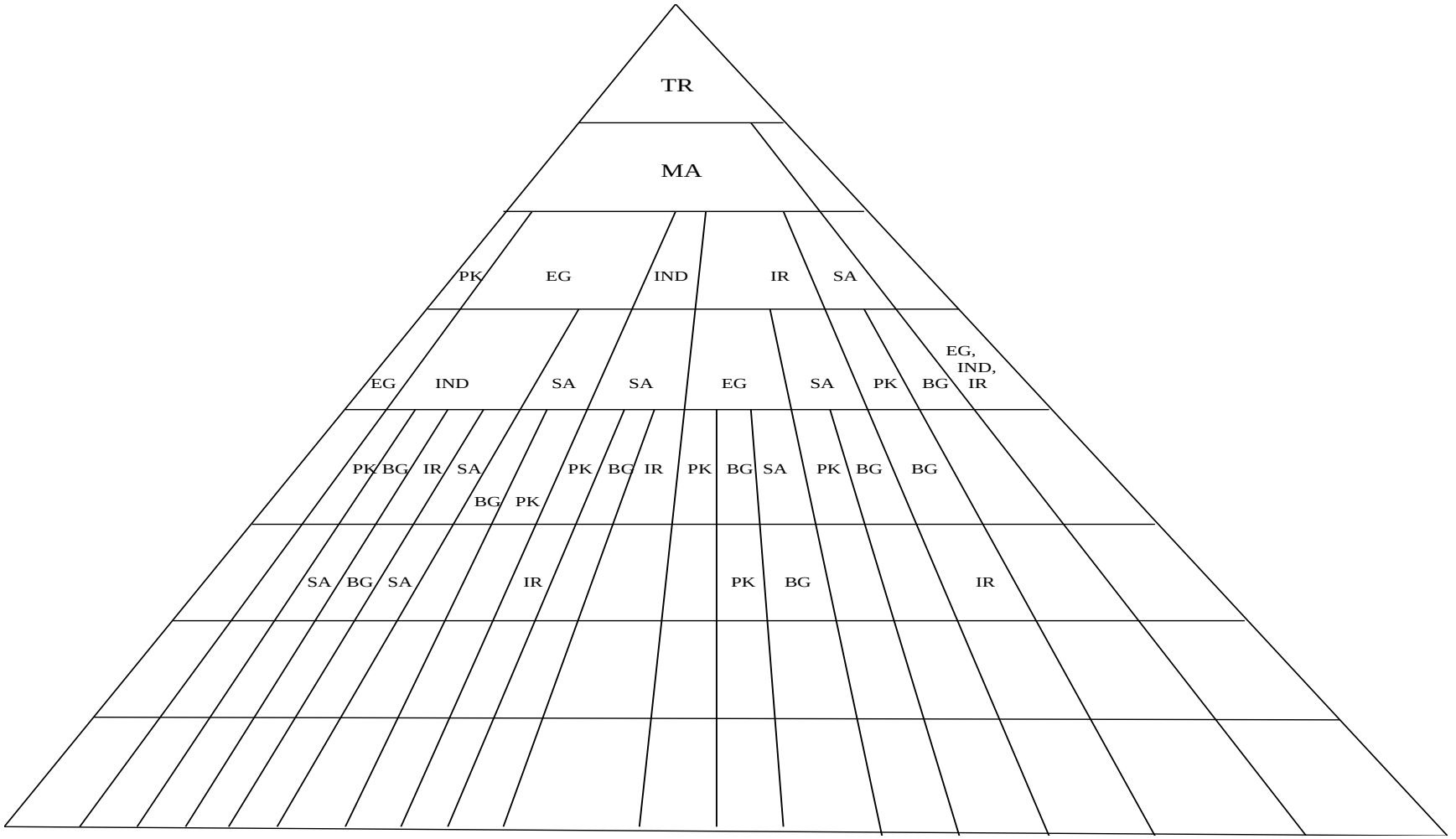

Figure 4: Summarized results with Turkey as dependent stock exchange

The first three rows of the figures show the cointegration testing results with three countries (n-5) order. Small boxes in the third rows show the number of combinations of three countries that are found to be cointegrated. As in Figure 1, five combinations of the three countries are found to be cointegrated. So, the investors that want to invest in only three OIC stock markets among selected OIC stock markets can obtain higher profit in long run by managing their portfolio in such a way that at one point in time none of the above combinations of three countries stock markets will be present in his portfolio.

The (n-4) order cointegration testing results are summarized in the first four rows of the figures. The sub boxes followed by one box in the previous row, show the combinations of countries remain cointegrated with the addition of one extra country. As in Figure 1 in (n-5) order MA, TR, and PK stock markets are found to be cointegrated while in (n-4) order with four countries MA, TR, and PK stock markets remain cointegrated with one extra stock market of SA. However, a unique combination in any order that doesn't follow the countries cointegration in the previous order is also possible. As in figure 4, in (n-4) order cointegration testing, the TR stock market is cointegrated with EG, IND, and IR and followed any previous combination.

Results of (n-3) cointegration testing are summarized in the first five rows of the figures. The blank boxes in the rows represent the fact that the previous combination of co-integrated countries is not followed in the next order. As in Figure 1 in (n-4) order MA, TR, SA, and EG are found to be cointegrated but in (n-3) order with the combination of MA, TR, SA, and EG, no other countries stock market is found to be cointegrated so the proceeding box with this combination in row five is blank. Order (n-2) cointegration testing results are written in the first six rows of the figures. As in Figure 1, four combinations of 6 countries are found to be cointegrated in (n-2) order cointegration testing.

The first seven rows of the figure show the (n-1) order's cointegration testing results. These results help those investors who want to have a share of seven countries stock markets among selected OIC countries at one point in time in their portfolio. Figure 1 shows that an investor can get arbitrage profit while having any combination of shares of a combination of MA, TR, PK, EG, IR, SA, and BG.

All eight rows of the figures show the nth order cointegration testing results. In all figures, only one combination of eight countries is found to be cointegrated that is shown in Figure 2, where the MA stock market is dependent. Therefore, in all four figures total of 117 combinations of selected OIC countries are found to be cointegrated among tested 939 combinations. So, 822 combinations from selected OIC countries provide the opportunity to earn long-run portfolio diversification.

In comparison with other few studies on the topic under consideration, our findings are consistent and some contradictions with Ugur and Hassan (2009). Their study used 4 OIC countries stock markets for integration analysis namely Indonesia, Malaysia, Turkey, and Pakistan. The study shows that all stock markets are cointegrated with each other. Our findings are in contrast with this study in the sense that Turkey stock market affects all other stock markets and that it is most exogenous in the model. Despite the different methods and sample sizes used in Ugru et al study, it is found that Turkey stock market has a dominant role in the selected group of OIC countries as found in our study.

Another study on OIC stock market integration is by Majid et al. (2007). Some results of this study are also consistent with our study with some conflict as well. The study used 8 OIC stock markets for analysis and found that stock markets of the Asian region are generally cointegrated but no integration is found between Bangladesh and Pakistan. These results are consistent with our results. However this study found no cointegration between Mena regions stock markets but found cointegration between Turkey and Egypt, these results contradict our findings. Study results show that the Malaysian stock market responded more to shocks in the Indonesian stock market and this behavior of the Malaysian stock market is also observed in our study. The results have contradictions with our findings where Bangladesh responded more to the

Malaysian market. The study, in general, found no evidence of integration among the OIC countries but our findings reveal integration among the selected markets when Malaysia is taken as dependent in "n" order cointegration analysis. This inconsistency is possibly due to the difference in sample period and techniques used in the analysis.

5. IMPLICATIONS AND SUGGESTIONS

The empirical findings of this study have some important implications in terms of portfolio diversification. Investors can use the information of this study while investing in selected OIC countries' stock markets. The investor can also earn arbitrage profits in the short run even in combinations when cointegration exists, depending on the speed of adjustment of the error correction term. On the other hand, they can earn profit in the long run, in the combinations that are not cointegrated by managing portfolio diversification.

The findings of this study are not only helpful for investors but also for policymakers who are supposed to develop good and efficient economic relationships with OIC countries' stock markets. Like the Stock Exchange Forum of the OIC Members States.[1] This forum is established to strengthen the stock markets of the OIC countries. This study is helpful for the policymakers of the forum in terms of building the interest of investors to realize the vast opportunities of arbitrage profits in the OIC countries' stock markets.

However, despite the opportunity of high profit in the stock markets concerned, the OIC countries have failed to attract international investors. This situation is mainly due to political and economic insatiability in most of the OIC member countries, due to which the stock markets are still underdeveloped and market capitalization in these markets is still very low as compared to developed countries' stock markets.

Several steps need to be taken to increase cooperation and integration among the OIC countries' stock markets. These may include adopting new technology, increasing market capitalization, and liberalization, etc. Also, various associations and common trading platforms, mergers, unions, and federations can play a vital role. The OIC members also need to make serious efforts to promote cooperation among their stock markets (one way for this will be to take part in the Stock Exchange Forum of the OIC member states). Moreover, economic policies should be formulated so as they strengthen the national economies. A stable economy and political environment are however a pre-requisite to provide a healthy atmosphere for investors.

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[1] Stock Exchange Forum of the OIC members States was established in March 2005. Up to 2012, six conferences were conducted by this forum. However, the member's list of stock exchange in this forum was decreased after the 2nd conference held in October 2008 due to many reasons mainly weak proposal, decision level and low level of attraction for investors.

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Appendix A: Unit root Results

ADF Test Statistics at Levels					ADF Test Statistics at First difference				
Stock Index	Intercept		Intercept & Trend		Stock Index	Intercept		Intercept & Trend	
	Estimated Value	Lag Order	Estimated Value	Lag Order		Estimated Value	Lag Order	Estimated Value	Lag Order
LPK	-0.0082	3	-1.941	3	ΔLPK	-6.688**	2	-9.214**	0
LBG	0.5249	0	-2.455	0	ΔLBG	-10.20**	0	-10.35**	0
LEG	-0.0329	1	-2.043	1	ΔLEG	-8.275**	0	-5.693**	3
LIND	0.6933	2	-1.304	2	ΔLIND	-8.397**	1	-8.620**	1
LIR	-1.204	1	-0.788	1	ΔLIR	-6.346**	0	-6.419**	0
LMA	-0.8215	0	-3.134	1	ΔLMA	-7.091**	0	-7.057**	0
LSA	-0.8582	3	-1.901	3	ΔLSA	-4.379**	2	-4.362**	2
LTR	-1.047	1	-2.668	1	ΔLTR	-7.846**	0	-7.810**	0

Source: Authors' calculations. C.V of Intercept at 5%=-2.89 &1%=-3.49. C.V of Intercept &Trend at 5%=-3.45 & 1%=-4.04

Appendix B1: Estimated Models with One Independent Country (n-6)

Model No.	ARDL Selected Based on SBC	Dependent Country	Coefficient of constant term	Coefficient & Independent Country	F-Statistics	ECM
M 1-1	(2,3)	MA	2.985**	0.300**TR	5.976*	-0.134**
M 1-2	(1,0)	MA	2.623**	0.369**IND	6.119*	-0.240**

Source: Authors' calculations. Note: Critical value bounds for F-statistic with intercept are 6.84 – 7.84 at 1% and 4.94 – 5.73 at a 5% level of significance. **, * denotes 1% and 5% significant levels based on P-values.

Appendix B2: Estimated Models with Two Independent Countries (n-5)

Model No.	ARDL Selected Based on SBC	Dependent Country	Coefficient of constant term	Coefficient/ Independent Country(1)	Coefficient/ Independent Country(2)	F-statistics	ECM
M 2-1	(1,0,0)	MA	2.87 **	0.14 TR	0.21 PK	7.60**	-0.11*
M 2-2	(2,1,0)	MA	2.93 **	0.30** TR	0.015 BG	6.70**	-0.05**
M 2-3	(2,1,0)	MA	2.86 **	0.27**TR	0.06 EG	6.10*	-0.19**
M 2-4	(1,0,0)	MA	3.22 **	0.29* TR	-0.02 IR	8.21**	-0.11*
M 2-5	(1,0,0)	MA	3.29 **	0.35** TR	-0.09 SA	8.81**	-0.12*
M 2-6	(1,1,0)	MA	2.45 **	0.40* IND	0.02 TR	5.88*	-0.13*
M 2-7	(1,0,1)	MA	2.62 **	0.43 BG	0.83* EG	5.99*	-0.08*
M 2-8	(1,1,1)	MA	1.98 **	0.68* EG	-0.69*IR	5.43*	-0.10*
M 2-9	(2,0,0)	MA	1.84 **	0.86** EG	0.30* SA	4.99*	-0.15**

Source: Authors' calculations. Note: Critical value bounds for F-statistic with intercept are 5.15 – 6.63 at 1% and 3.79 - 4.85 at a 5% level of significance. **, * denotes 1% and 5% significant levels based on P-values

Appendix B3: Estimated models with Three Independent Countries (n-4)

Model No.	ARDL Selected Based on SBC	Dependent Country	Coefficient of constant term	Coefficient/ Independent Country(1)	Coefficient/ Independent Country(2)	Coefficient/ Independent Country(3)	F-statistics	ECM
M_{3-1}	(2,1,0,0)	MA	2.945**	0.335** TR	0.232**PK	-0.246** SA	7.339**	-0.288**
M_{3-2}	(1,0,0,0)	MA	3.422**	0.179 TR	0.375 PK	-0.316 BG	6.201**	-0.124*
M_{3-3}	(1,0,0,1)	MA	2.714**	0.155 TR	0.161 PK	0.049 EG	4.837*	-0.101*
M_{3-4}	(2,1,0,1)	MA	2.828**	0.326** TR	0.132 BG	-0.121 IR	5.463*	-0.227**
M_{3-5}	(1,0,0,1)	MA	3.166**	0.118 TR	0.596 EG	-0.434 BG	5.262*	-0.109*
M_{3-6}	(2,1,1,0)	MA	2.815**	0.272** TR	-0.097 IR	0.165 EG	5.225*	-0.216**
M_{3-7}	(2,1,0,1)	MA	2.980**	0.302** TR	-0.108 IR	0.115 PK	5.496*	-0.231**
M_{3-8}	(1,0,0,0)	MA	3.009**	0.339** TR	0.129 BG	-0.154 SA	5.687**	-0.127*
M_{3-9}	(2,1,0,0)	MA	2.711**	0.291** TR	-0.216** SA	0.291* EG	6.240**	-0.248**
M_{3-10}	(2,1,0,0)	MA	3.167**	0.381** TR	-0.112 SA	0.0014 IR	5.228*	-0.237**
M_{3-11}	(1,0,0,1)	MA	2.521**	0.552** IND	0.109 TR	-0.250 PK	5.675**	-0.160**
M_{3-12}	(1,1,0,0)	MA	3.118**	0.516** IND	0.140 TR	-0.359* BG	6.354**	-0.183**
M_{3-13}	(2,1,0,0)	MA	3.143**	0.319** IND	0.313** TR	-0.355** EG	5.942**	-0.274**
M_{3-14}	(2,1,0,1)	MA	2.727**	0.224** IND	0.237** TR	-0.099* IR	5.534*	-0.245**
M_{3-15}	(2,1,0,0)	MA	2.749**	0.265** IND	0.294** TR	-0.196** SA	8.754**	-0.323**
M_{3-16}	(1,1,0,0)	MA	2.903**	0.688** IND	0.004 PK	-0.347 BG	6.354**	-0.133**
M_{3-17}	(1,1,0,0)	MA	3.205**	0.705** IND	-0.615* BG	0.187 IR	4.815*	-0.158**
M_{3-18}	(1,0,1,0)	MA	3.244**	-0.626 BG	0.5696 EG	0.329 PK	4.615*	-0.105*
M_{3-19}	(1,1,0,0)	MA	1.818**	0.668* EG	-0.55** SA	0.453* PK	4.433*	-0.138**
M_{3-20}	(2,0,1,2)	TR	-1.427	0.784 EG	0.443 IND	0.0918 IR	5.527*	-0.098**

Source: Authors' calculations. Note: Critical value bounds for F-statistic with intercept are 4.29 – 5.61 at 1% and 3.23 - 4.35 at a 5% level of significance. **, * denotes 1% and 5% significant levels based on P-values.

Appendix B4: Estimated models with Four Independent Countries (n-3)

Model No.	ARDL Selected Based on SBC	Dependent Country	Coefficient of constant term	Coefficient/ Independent Country(1)	Coefficient/ Independent Country(2)	Coefficient/ Independent Country(3)	Coefficient/ Independent Country(4)	F-statistics	ECM
M_{4-1}	(1,0,1,0,0)	MA	2.472**	0.235*TR	0.380*PK	-0.457**SA	0.268 EG	8.129**	-0.202**
M_{4-2}	(1,0,0,0,1)	MA	3.388**	0.116 TR	0.129 PK	-0.521 BG	0.353 EG	5.552**	-0.121*
M_{4-3}	(1,0,0,0,0)	MA	2.877**	0.274**TR	0.472*PK	-0.044 BG	-0.350*SA	7.383**	-0.187**
M_{4-4}	(1,0,1,0,1)	MA	2.567**	0.172 TR	0.239 PK	0.185 EG	-0.199 IR	5.634**	-0.132*
M_{4-5}	(1,0,0,0,0)	MA	3.023**	0.336*TR	0.117 BG	0.019 IR	-0.162 SA	5.751**	-0.125*
M_{4-6}	(1,0,0,0,0)	MA	3.353**	0.195 TR	-0.261 BG	-0.049 IR	0.369 PK	5.850**	-0.130*
M_{4-7}	(1,0,0,1,0)	MA	2.538**	0.190 TR	0.695 EG	-0.147 BG	-0.326 SA	7.202**	-0.143**
M_{4-8}	(1,0,1,0,0)	MA	3.177**	0.112 TR	0.606 EG	-0.449 BG	0.010 IR	5.860**	-0.108*
M_{4-9}	(1,0,0,1,0)	MA	2.355**	0.201 TR	0.035 IR	0.953 EG	-0.385 SA	6.293**	-0.146**
M_{4-10}	(1,0,0,0,0)	MA	2.799**	0.274**TR	-0.361*SA	-0.005 IR	0.457**PK	6.729**	-0.189**
M_{4-11}	(1,0,0,0,1)	MA	2.920**	0.571**IND	0.235*TR	-0.139 PK	-0.339 EG	5.937**	-0.201**
M_{4-12}	(1,1,0,0,0)	MA	2.556**	0.407**IND	0.207**TR	0.035 PK	-0.240*SA	7.303**	-0.223**
M_{4-13}	(1,1,0,0,0)	MA	3.05**	0.549**IND	0.154 TR	-0.315 BG	-0.079 PK	6.391**	-0.189**
M_{4-14}	(1,1,0,0,0)	MA	3.179**	0.533**IND	0.196 TR	-0.275 BG	-0.171 EG	6.691**	-0.199**
M_{4-15}	(1,1,0,0,0)	MA	2.851**	0.474**IND	0.205**TR	-0.177 BG	-0.151 SA	7.853**	-0.224**
M_{4-16}	(1,1,0,0,0)	MA	2.995**	0.504**IND	0.232*TR	-0.411 EG	-0.011 IR	6.077**	-0.190**
M_{4-17}	(1,1,0,1,0)	MA	2.735**	0.448**IND	0.269**TR	-0.147 EG	-0.203* SA	6.380**	-0.260**
M_{4-18}	(1,0,0,1,0)	MA	2.518**	0.554*IND	0.107 TR	0.002 IR	-0.253 PK	5.694**	-0.160**
M_{4-19}	(1,1,0,0,0)	MA	2.464**	0.449**IND	0.185* TR	0.0708 IR	-0.280* SA	7.124**	-0.228**
M_{4-20}	(1,1,0,0,0)	MA	2.624**	0.579**IND	-0.334 BG	0.290 EG	-0.131 SA	4.813*	-0.147**
M_{4-21}	(1,1,0,0,0)	MA	3.209**	0.7133**IND	-0.612*BG	0.191 IR	-0.017 EG	4.554*	-0.158**
M_{4-22}	(1,0,0,1,0)	MA	2.290**	0.503* PK	-0.338 BG	0.794**EG	-0.483* SA	5.044*	-0.143**
M_{4-23}	(1,0,0,1,0)	MA	3.260**	0.327 PK	-0.635 BG	0.568 EG	0.008 IR	4.221*	-0.105*
M_{4-24}	(1,0,1,0,0)	MA	2.309**	-0.398 BG	1.133**EG	0.164 IR	-0.442 SA	4.296*	-0.112**
M_{4-25}	(1,0,1,0,0)	MA	1.803**	0.659*EG	0.053 IR	0.445 PK	-0.591*SA	4.106*	-0.138**

Source: Authors' calculations. Note: Critical value bounds for F-statistic with intercept are 3.74 - 5.06 at 1% and 2.86 - 4.01 at 5% level of significance. **, * denotes 1% and 5% significant levels based on P-values.

Appendix B5: Estimated models with Five Independent Countries (n-2)

Model No.	ARDL Selected Based on SBC	Dependent Country	Coefficient of constant term	Coefficient/ Independent Country(1)	Coefficient/ Independent Country(2)	Coefficient/ Independent Country(3)	Coefficient/ Independent Country(4)	Coefficient/ Independent Country(5)	F-statistics	ECM
M_{5-1}	(1,0,0,0,0,1)	MA	2.656**	0.21 TR	0.414* PK	-0.182 BG	-0.428**SA	0.379 EG	6.807**	-0.198**
M_{5-2}	(1,0,0,1,0,0)	MA	3.351**	0.138 TR	0.292 PK	0.318 EG	-0.036 IR	-0.464 BG	4.979**	-0.125*
M_{5-3}	(1,0,0,1,0,0)	MA	2.479**	0.237* TR	0.380* PK	0.266 EG	-0.006 IR	-0.452**SA	6.282**	-0.203**
M_{5-4}	(1,0,0,0,0,0)	MA	2.880**	0.273** TR	-0.048 BG	0.004 IR	-0.353*SA	0.473*PK	5.734**	-0.186**
M_{5-5}	(1,1,0,0,0,0)	MA	2.897**	0.618** IND	0.224* TR	-0.185 PK	-0.372 EG	-0.045 IR	5.546**	-0.202**
M_{5-6}	(1,1,0,0,0,0)	MA	3.021**	0.559** IND	0.202* TR	-0.066 PK	-0.157 EG	-0.245 BG	5.814**	-0.204**
M_{5-7}	(1,1,0,0,1,0)	MA	2.732**	0.435** IND	0.269** TR	0.023 PK	-0.214*SA	-0.145 EG	6.154**	-0.260**
M_{5-8}	(1,1,0,0,0,0)	MA	3.116**	0.735** IND	0.085 TR	-0.501* BG	-0.217 PK	0.188 IR	5.642**	-0.196**
M_{5-9}	(1,1,0,0,0,0)	MA	2.853**	0.446** IND	0.205** TR	-0.18 BG	-0.173 SA	0.052 PK	6.388**	-0.225**
M_{5-10}	(1,1,0,0,0,0)	MA	3.293**	0.617** IND	0.143 TR	-0.190 EG	0.122 IR	-0.435 BG	5.752**	-0.197**
M_{5-11}	(1,1,0,1,0,0)	MA	2.907**	0.473** IND	0.248** TR	-0.064 EG	-0.162 SA	-0.160 BG	6.577**	-0.256**
M_{5-12}	(1,1,0,0,0,0)	MA	2.461**	0.459** IND	0.184* TR	0.073 IR	-0.016 PK	-0.275*SA	5.839**	-0.227**
M_{5-13}	(1,1,0,0,0,0)	MA	2.881**	0.569** IND	0.152* TR	0.166 IR	-0.217*SA	-0.330 BG	6.363**	-0.241**
M_{5-14}	(1,0,0,1,0,0)	MA	2.636**	0.697** IND	-0.527** BG	0.223 EG	-0.284**SA	0.279**IR	4.750**	-0.232**
M_{5-15}	(1,1,0,0,0,0)	MA	3.075**	0.849** IND	-0235 PK	-0.585* BG	0.015 EG	0.254*IR	4.192*	-0.169**
M_{5-16}	(1,0,1,0,0,0)	MA	2.380**	-0.430 BG	0.807** EG	0.497* PK	-0.549*SA	0.128 IR	3.994*	-0.145**
M_{5-17}	(1,1,0,0,0,0)	MA	2.609**	-0.176 EG	0.488** IND	0.085 IR	-0.260 SA	0.252**TR	7.404**	-0.323**
M_{5-18}	(1,0,1,0,0,0)	MA	2.527**	-0.247 BG	-0.800 EG	0.096 IR	-0.384 SA	0.146 TR	5.251**	-0.135*

Source: Authors' calculations. Note: Critical value bounds for F-statistic with intercept are 3.41 - 4.68 at 1% and 2.62 – 3.79 at 5% level of significance. **,* denotes 1% and 5% significant levels based on P-values.

Appendix B6: Estimated models with Five Independent Countries (n-1)

Model No.	ARDL Selected Based on SBC	Dependent Country	Coefficient of constant term	Coefficient/ Independent Country(1)	Coefficient/ Independent Country(2)	Coefficient/ Independent Country(3)	Coefficient/ Independent Country(4)	Coefficient/ Independent Country(5)	Coefficient/ Independent Country(6)	F-statistics	ECM
M 6-1	(1,1,0,0,1,0,0)	MA	2.658**	0.190 TR	0.421*PK	0.424 EG	0.045 IR	0.457**SA	-0.23 BG	5.372**	-0.192**
M 6-2	(1,0,1,0,0,0,0)	MA	2.609**	0.524**IND	0.251**TR	-0.057 PK	-0.184 EG	-0.095 IR	-0.240** SA	4.241*	-0.321**
M 6-3	(1,1,0,1,0,0,0)	MA	2.905**	0.449**IND	0.247**TR	0.043 PK	-0.180 SA	-0.058 EG	-0.165 BG	5.530**	-0.257**
M 6-4	(1,1,0,0,0,0,0)	MA	3.152**	0.762**IND	0.170*TR	-0.411**BG	-0.238 PK	0.189*IR	-0.195 EG	5.970**	-0.276**
M 6-5	(1,0,0,0,1,0,1)	MA	2.880**	0.608**IND	0.147 TR	-0.338 BG	-0.198 SA	-0.058 PK	0.179 IR	5.401**	-0.241**
M 6-6	(1,0,0,1,0,0,0)	MA	2.862**	0.567**IND	0.192**TR	-0.044 EG	0.168*IR	-0.305*BG	-0.237**SA	6.784**	-0.318**
M 6-7	(1,0,1,0,0,0,0)	MA	2.657**	0.784**IND	-0.534**BG	0.201 EG	-0.234 SA	0.304**IR	-0.139 PK	4.485**	-0.33**

Source: Authors' calculations. Note: Critical value bounds for F-statistic with intercept are 2.45 – 3.61 at 5% and 3.15 - 4.43 at 1% level of significance. **,* denotes 1% and 5% significant levels based on P-values

Appendix B7: Estimated models with Seven Independent Countries (n)

Model No.	ARDL Selected Based on SBC	Dependent Country	Coefficient of constant term	Coefficient/ Independent Country							F-statistics	ECM
				(1)	(2)	(3)	(4)	(5)	(6)	(7)		
M 7-1	(1,0,1,0,0,0, 0,0)	MA	2.869**	0.621** IND	0.188** TR	-0.081 PK	-0.209* SA	-0.051 EG	-0.314 BG	0.185 IR	6.382**	-0.316**

Source: Authors' calculations. Note: Critical value bounds for F-statistic with intercept are 2.96 – 4.26 at 1% and 2.32 - 3.50 at a 5% level of significance. **, * denotes 1% and 5% significant levels based on P-values.

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Disentangling Horizontal and Vertical Intra industry Trade: Case of Pakistan

ABSTRACT

This study systematically examines and decomposes Intra Industry trade (IIT) of Pakistan into horizontal Intra industry trade (HIIT), low-quality vertical Intra industry trade (LQVIIT), and high-quality vertical Intra industry trade HQVIIT components using unit value indices. The study also investigates decade wise IIT of Pakistan using GL indices, and the country-specific determinants of Pakistan's IIT at the 1-digit industry level of SITC. Decomposition and measurement of Pakistan's IIT show that in the last forty-three years HIIT dominates VIIT, while LQVIIT dominates HQVIIT industries. The empirical analysis of the last decade shows that LQVIIT dominates HIIT as well as HQVIIT, and in the last three decades HIIT, LQVIIT, and HQVIIT show constant, increasing, and decreasing trend, respectively. The empirical analysis of the last two decades shows that IIT of Pakistan is sharply increasing, IIT of Pakistan with major developing trading partners is more than with major developed trading partners. Distance and differences in human capital variables show an insignificant impact on IIT of Pakistan.

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Author's contribution in the article: 1-Conceived and designed the analysis, 2-Reviewed and compiled the literature, 3-Collected the data, 4-Contributed data or analysis tools, 5-Performed the analysis, 6-Wrote the paper, 7-Financial support for the conduct of the study, 8-Other

1. INTRODUCTION

World trade has taken a unique chromaticity with the swift development of International Economic Relations (IER), and the plethora of rapid growth in interaction and interdependence of domestic economies (globalization and liberalization). Traditional trade theories of Heckscher-Ohlin-Samuelson[1] and Ricardo[2] which assume a constant return to scale (CRS) in production and perfect competition in markets could not explicate the changing patterns, and trends of international trade. In other words, these theories explain inter-industry trade[3]and predict that trade is the result of supply-side differences (difference in factor endowments).

However, in the sixth decade of the twentieth century, various trade economists and theorists (Linder, 1961; Michaely, 1962) examined that a large percentage of international trade between developed economies is due to product differentiation and takes place between similar commodities (commodities produced with similar factor endowments) and within the same industry. This phenomenon of bilateral exchange of similar commodities between the same industry groups has been defined as "Intra-industry trade". Besides, "intra-industry trade" (IIT) theorists predict that IIT is the reason for diversification of consumer preferences (taste), as more identical the per capita income levels of two trading economies are, the larger the extent of IIT will be (Linder, 1961; Lancaster, 1980).

After the recognition of the fact that IIT is an essential portion of global trade, IIT is further decomposed into "horizontal intra-industry trade[4]" (HIIT), and "vertical intra-industry trade[5]" (VIIT), and VIIT is further disentangled into "high quality vertical intra-industry trade[6]" (HQVIIT), and "low quality vertical intra-industry trade[7]" (LQVIIT). HIIT appears between the economies with EOS in production, and similar factor endowments, moreover, HIIT deals with products of the same class (industry) but having different characteristics (product differentiation), while VIIT appears between economies having differences in factor endowments, and constant return to scale (CRS) in production, besides, VIIT deals with goods of the same class (industry) but having a different level of quality (quality differences).

A plethora of HIIT and VIIT models have been constructed so far to deeply explain horizontal and vertical IIT. HIIT models state that the IIT trade between developed economies (north-north IIT) is most likely to be HIIT, because, HIIT models explicate that horizontally differentiated products (similar goods with different characteristics, and within same price range), increasing returns to scale, the same level of economic development, same factor endowments, smaller per-capita income differences, and monopolistic competition are the main sources of HIIT. However, VIIT models explain that IIT between developing and

[1] The Hecksher-Ohlin-Samuelson theory (factors proportion theory) describes that a nation will produce and export the product whose production process uses countries abundant (cheaper) factor intensively and import the product whose production process uses scarce (expensive) factor intensively.

[2] The Recardian theory states that all countries will get the benefits of trade if each country produces, specializes, and exports the commodity in which country has a relative cost benefit.

[3] Inter-Industry trade is the two-way exchange of dissimilar goods (goods of different industries) with in different categories, based on differences in factor endowment.

[4] HIIT is the two-way exchange of similar quality goods of same category (industry), within the same price range, and goods are perfect substitutes of each other. For example, trade between Samsung and Huawei mobile phone with same specifications and almost same price range.

[5] VIIT is the two-way exchange of goods of same category (industry), but differ in quality (different price range), such products are not the perfect substitutes. For example, trade between US and Japan importing Suzuki Alto and exporting Tesla car with different specifications and price range

[6] HQVIIT is the bilateral vertical IIT in high quality (capital intensive) vertically differentiated goods. For example, trade between Suzuki Mehran and BMW cars.

[7] LQVIIT is the bilateral vertical IIT in low quality (labor intensive) vertically differentiated goods. For example, Pakistan exports of low-quality textile articles to the US and imports of high-quality articles from the US.

developed economies (south-north IIT) is most likely to be VIIT, because, according to VIIT models vertical product differentiation (similar goods with different qualities, and with huge price differences), constant return to scale, differences in per capita income, dissimilar factor endowments, and perfect competition are the most important factors that determine VIIT.

Various research studies have been carried out to measure and understand the contributing factor of Pakistan's intra-industry trade. However, no study has been found that is disentangling IIT of Pakistan into its horizontal and vertical components. Therefore, this study will disentangle the total IIT of Pakistan into HIIT, LQVIIT, and HQVIIT components, and examines various patterns (measurement, share, decade wise trends, and dominance). This research work also analyzes decade wise trends and country-specific determinants of Pakistan's IIT in all 1-digit industries of SITC with developed and developing major trading partners. The empirical findings of this research work will be essential and helpful for intra-industry trade policy recommendations and understanding IIT of Pakistan in depth.

This research paper is structured as follows: Section II will present the literature review. Section III will be describing the methodology developed to disentangle the HIIT and VIIT and finding the determinants of IIT. Section IV contains the analysis and results of the estimations. Section V will be giving conclusions of the research study.

2. LITERATURE REVIEW

Balassa (1966), and Grubel & Lloyd (1975), has begun the empirical work on the measurement of IIT. Balassa (1966) analyses the European economies trade within industries of customs and introduced the Balassa index, and Grubel and Lloyd formulated an index of IIT measurement and later presented an improved form of an index known as GL index. Moreover, the innovative work on the IIT by (Krugman, 1979; Lancaster 1980; Helpman, 1981) leads to the elimination of the idea that classical theories of trade could explain IIT.

Krugman (1979) is considered as the pioneer study in introducing IIT with the standard econometric model (regression analysis), which analyzed that similar countries trade in differentiated goods (IIT). Different international empirical studies in the field of IIT have classified IIT into HIIT (two-way exchange of goods which are differentiated horizontally), and VIIT (two-way exchange of vertically differentiated goods). However, various other international studies (Balassa, 1966; Grubel & Lloyd, 1975; Greenaway et al., 1995; Abd-el-Rahman, 1991) have been conducted to measure total IIT, HIIT, VIIT, high-quality VIIT (HQVIIT), and low-quality VIIT (LQVIIT), and to analyze the country-specific and industry-specific determinants of IIT.

Abd-el Rahman (1991), and Greenaway and Milnner (1994), made a very important contribution in IIT theory by introducing unit value indices to decompose IIT into, HIIT, LQVIIT, and HQVIIT. HIIT arises when the trade takes place between horizontally differentiated goods (products having the same quality, but with different attributes). Lancaster (1980), Krugman (1981), and Bergstrand (1990) developed the theoretical basis for horizontal IIT. However, vertical IIT is the trade-in vertically differentiated goods (goods having different qualities/significant unit value gaps). Falvey (1981) and Falvey and Kierzkowski (1987) developed the theoretical bases for vertical IIT.

Various research studies (Balassa, 1979; Krugman, 1981; Helpman, 1981; Kemal, 2004; Zhang et al., 2005; Turkcan, 2005; Shahbaz & Leitao, 2010; Akram & Mahomood, 2013; Rosen, 2016) argue that country-specific and industry-specific variables such as economies of scale, consumer preferences (taste), dissimilarities in per capita income, country size, distance, dissimilarities in factor endowments (capital-

labour ratio), technology, level of education (skills), and market size are the main determinants of IIT using a Gravity model.

The gravity model did not have the theoretical foundation that often questioned the correctness of estimated coefficients through regression, however, now the gravity model is strengthened by the theoretical justifications for using the gravity model to analyze the two-way trade flows. The strong theoretical foundation of a Gravity model was provided by the work of Helpman, (1987), and Feenstra (1997).

In the case of Pakistan few research studies have been conducted to measure the IIT and its determinants, for example, Kemal (2004) computes the Grubel Lloyd indices (GL indices) to find the share of IIT in Pakistan's total trade with the countries of SAARC and ECO. Shahbaz and Leitao (2010) investigate the deciding factors of IIT between Pakistan and ten major trading partners. Akram and Mahmood (2013) find the share of IIT of Pakistan with India, Sri Lanka, and Bangladesh, and examines the determinants of Pakistan's IIT using country and industry-specific variables. Zaheer et al. (2013), analyze IIT of Pakistan with selective eleven major trading partners and examine the country-specific deciding factors of IIT.

However, no such study has been found that has disentangled the IIT of Pakistan into its horizontal and vertical components. No paper has analyzed that which type of horizontal or vertical trade is good for Pakistan considering a trade-in 1-digit industries of SITC. This research study is addressing this gap and the empirical findings of this research work will be essential and helpful for intra-industry trade policy recommendations at the micro-level.

3. METHODOLOGY

One of the most used measures was introduced by Abd-el-Rahman (1991). This specific method is based upon the unit values, which measures the quality differences by taking the ratio of unit values of exports to unit values of imports to decompose IIT into horizontal and vertical Intra industry trade. The Abd-el-Rahman's method of taking UVs of export and imports has been used by Greenaway et al. (1994) to find the extant of Horizontal IIT and vertical IIT. Equation of computing UVs is Unit Value Index = $\sum P_n Q_n / \sum P_o Q_o \times 100$. In this index, P_n is UV of the given commodity in the present time, P_o is the UV of the given commodity in the base time, Q_n is the quantity of the given commodity in the present time, and Q_o is the quantity of the given commodity in the base period.

Unit values (UVs) are used as an indicator of quality. The unit value index measures the average price of a bundle of specific commodity groups. It is supposed that an expensive product type will certainly be of high-quality, while a cheaper product type will be of low-quality (Stiglitz, 1987). UVs could be calculated in different scenarios, i.e., UV per ton, UV per square-meter, or UV per-item. This study has used UVs per item. UVs per item has been used successfully to analyze the patterns of the Swedish VIIT (Torstensson, 1991). UVs per ton was used in the research work of the UK and France trade (Oulton, 1991; Abd-el-Rahman, 1991).

Interestingly some issues are using UVs. Unit prices of commodities can be a function of quality, size, durability, and dependability. Apart from this, prices could be negatively associated with the size. Hence, a vehicle that is expensive, huge in size, and poorly finished could be considered as of lower quality as compared to a vehicle, which is cheaper, smaller in size, and well finished. However, these issues are not considered that important, so to stop the use of the UV index.

Method of decomposing IIT into HIIT & VIIT (HQ & LQ) is described by the following formulae:

$$1- \alpha \leq \frac{UV^X}{UV^M} \leq 1+ \alpha; \text{ where } \alpha = 0.15 \quad (1)$$

$$\frac{UV^X}{UV^M} < 1- \alpha \quad (2)$$

$$\frac{UV^X}{UV^M} > 1+\alpha \quad (3)$$

In the above formulae, UV^X and UV^M are unit-values of exported and imported commodities respectively in the given industry and given year between domestic and international countries. However, α is the arbitrarily fixed dispersion factor which is taken to be 0.15 in many research studies (Abd-el-Rahman, 1991). If the equation (1) holds or the ratio of UVs of export to import falls within the range of equation (1), then the products in the given industry are classified under the horizontal Intra industry trade (HIIT). As the above formulae rely on the assumption that the prices of products in a given industry reflect the quality, therefore, products in any given industry having high prices are considered as high-quality, whereas, low price products are of low-quality. Hence, if equation (2) holds then the products in the given industry shall be classified under the low-quality VIIT (LQVIIT), and if equation (3) holds then the products in the given industry are considered under high-quality VIIT (HQVIIT).

Grubel and Lloyd (1975) analyzed the G-L indices at the elementary industry level, i.e., (GLi), and the G-L index for all industries. However, the new index is given below:

$$GL_i = (1- B_t) \quad (4)$$

$$GLi = \left[1 - \frac{|X_i - M_i|}{(X_i + M_i)}\right] \quad (5)$$

$$GLi = \left[\frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)}\right] \quad (6)$$

In equation (6) GLi simply measures the IIT, the numerator of the index represents the percentage quantity of a given product in countries' trade. The value of the GL index ranges from zero to one. If either 'Xi (exports in i industry)' or the 'Mi (imports in i industry)' approaches 0, that means there is no IIT in the given product (no trade overlap), while one represents pure IIT (Trade overlap, $X_i = M_i$, then all the trade-in given product will be IIT).

In this study, we have used the one-digit aggregation level of SITC. However, this class of index is criticized for issues regarding categorical or subgroup (a higher level of SITC / 3- or 5-digit industry) aggregation issues. In this situation, for a given industry x_i and m_i (exports and imports) for the higher disaggregated level of SITC are represented as x_{ij} and m_{ij}. In this case, the percentage of IIT is computed by taking the sums of the total exported and imported commodities at a given higher SITC level '$\sum_j x_{ij}$' and '$\sum_j m_{ij}$'.

The gravity model is simply based on Newton's gravitation law that is described in the following equation.

$$F_{ij} = G \frac{M_i M_j}{D_{ij}^2} \quad (7)$$

Where the M_i and M_j are the masses of two bodies i and j respectively and the force of attraction between two bodies is F_{ij}. The distance between the bodies is D_{ij}. To transform Newton's law for trade, the gravity model is written in the following form.

$$Y_{ij} = \alpha \frac{y_i y_j}{D_{ij}} \quad (8)$$

Where i and j represent two countries (i = 1, 2, … , N; j =1, 2, …, N; $i \neq j$). Y_{ij} represents the bilateral trade flow between the two countries. D_{ij} denotes trade barricades between two countries i.e., distance, language, etc. And y embodies countries' economic size (measured in terms of GDP or population) and α stands for a constant of proportionality.

$$Y_{ij} = \alpha + \beta_1 \log y_i + \beta_2 \log y_j - \beta_3 \log D_{ij} \quad (9)$$

Equation (9) is the logarithmic representation of the gravity equation. This equation is considered as the main gravity equation. This equation implies that bilateral trade is directly proportional to the volume of the economies of two trading countries in terms of their population or gross domestic product (GDP), and inversely related (negatively related) to the capital to capital distance between them. Hence, the more will be the trade between the countries the more similar the countries are in their relative economic size and the lesser will be the trade the farther the countries from each other (as the distance is one of the trade barriers). Core Gravity model shown in equation (9) is augmented by the inclusion of various additional variables by Greenaway et al. (1999), and Turkcan (2005). In this study, the core Gravity model is also augmented by various additional variables for analyzing the bilateral IIT of Pakistan with its twelve major developed and developing trading countries. The augmented gravity model and the variables are described below:

$$\ln Y_{hf,t} = \alpha_0 + \beta_1 \ln AGDP_{hf,t} - \beta_2 \ln DPCGDP_{hf,t} - \beta_3 \ln DHCAP_{hf,t} - \beta_4 \ln DGDP_{hf,t} - \beta_3 \ln WDIST_{hf} + u_{hf,t} \quad (10)$$

$Y_{hf,t}$, $AGDP_{hf,t}$, $DPCGDP_{hf,t}$, $DHCAP_{hf,t}$, $DGDP_{hf,t}$, and $WDIST_{hf}$ represents the trade flow between domestic h, and the international country f in time period t, average GDP between the domestic & international country in time t, the difference in per capita GDP between the domestic & international country in time t, difference in human capital between the domestic & international country in time t, the difference in GDP between the domestic and international country in time t. and the capital distance between domestic and international country respectively.

The panel data approach will be used to estimate the equation (10). FE (Fixed effects) and the RE (random effects) models are the most used panel models, which encompasses legal, cultural, and institutional effects that much likely affect the two-way trade flows. However, initially to choose between models the Breusch-Pagan (BP) will be used. The BP test (Null: Pooled OLS model is appropriate, alt: RE model is appropriate) The BP test will confirm the appropriateness of the RE model over pooled OLS. After the BP test, FE and RE models will be estimated.

To choose the most appropriate model from FE and RE model in both the regressions regarding developing and developed countries Hausman specification test (Null: RE model is appropriate, alt: FE model is appropriate) will be used. Hausman test indicates that the RE model must be preferred over the FE model. Finally, it has been concluded that the RE model is the most appropriate. Some of the results like the results of the distance variable are against the theory. Therefore, the Pesaran CD test (Null: there is no serial correlation, alt: there is a serial correlation) will check either the model has a serial correlation or not. However, cross-sectional dependence is an issue that is mostly found in large or macro panels having long time series like over 20-30 years. Hence, this is not considered as much of an issue in small panels like less than 20 years.

4. DATA

Data on unit value indices for the 1-digit aggregation level of SITC (Standard International Trade Classification) has been taken from the Pakistan Bureau of Statistics (PBS) and the State bank of Pakistan (SBP). Data on exports and imports for Pakistan and its major trading partners are taken from UN

COMTRADE. Data on GDP in million dollars, higher education, and per-capita gross domestic product are collected by exploring the World Development Indicators (WDI), and the data on the distances between the capital of the domestic country and the capital of the foreign trading country has been collected from web. In our knowledge Unit value indices data are not available for higher disaggregated SITC levels.

As far as the values of standard deviation are concerned, the least variation is shown by lnIIT and maximum variation by lnDPCGDP. All the values of variables are in natural logarithmic form. These values are reported in the following Table 1.

Table 1: Descriptive Statistics

Statistic	*LNIIT*	*LNAGDP*	*LNDGDP*	*LNDHCAP*	*LNDPCGDP*	*LNWDIST*
Mean	4.9	27.9	28.2	2.6	11.3	9.1
Median	4.1	27.4	27.8	2.2	10	6.2
Maximum	4.6	29.8	30.5	3.2	11	8.8
Minimum	1.8	25.1	23.7	0.1	2	4.1
Std. Dev.	0.6	1.2	1.7	0.7	2	1.3
Observations	168	168	168	168	168	168

Source: E-Views' calculations. Data is taken from WDI

5. EMPIRICAL ANALYSIS AND ESTIMATION RESULTS

This section will discuss the various patterns of Intra industry trade, the results of different estimation techniques that are used to calculate IIT, and to decompose the intra-industry trade into its horizontal IIT and vertical IIT components. Vertical IIT component is further decomposed into its low-quality vertical intra-industry trade (LQVIIT) and high-quality vertical Intra industry trade (HQVIIT) components. Pakistan's intra-industry trade at the 1-digit industry level of SITC with major fifteen trading countries (Nine developing & six developed) shall be discussed with levels and trends. Estimation results regarding determinants of Pakistan's IIT with developed and developing countries, using panel data techniques have been presented at the end of this section. IIT is estimated for forty-three years from the time of 1976-2018. The G-L indices are calculated for the 1-digit industry level of SITC.

Table 2: IIT of Pakistan with World in 1-Digit industries of SITC (1976-2018)

Groups	GL_i	Groups	GL_i
Food & live Animals	99.37%	Mineral Fuels & Lubricants	0.36%
Beverages & Tobacco	55.81%	Chemical	1.89%
Crude Material Inedible Except Fuels	62.79%	Manufactured Goods	65.11%
Animal and vegetables oils and fats	1.87%	Machinery and Transport Equipment	0.23%
Commodity & transacts.	39.53%	Miscellaneous	30.23%
Total IIT			35.71%

Source: Own estimations and data is collected from the UN-COMTRADE

The presented values of IIT are the average of 43 years. The results of collected data that are used for estimating the intra-industry trade of Pakistan with the world indicate that in the last 43 years, IIT is reported 35.71% in overall trade of Pakistan (inter-industry trade were 64.29 %).

Pakistan IIT is found to have the largest share in the category of "Food & Live-Animals", "Crude-Materials Inedible except Fuels", and "Manufactured Goods" respectively, and IIT is found to be lowest in the category of "Animals Vegetables Oils & Fats", "Minerals Fuels & Lubricants", "Chemicals", and "Machinery & Transport Equipment". The graphical presentation of the results is depicted below.

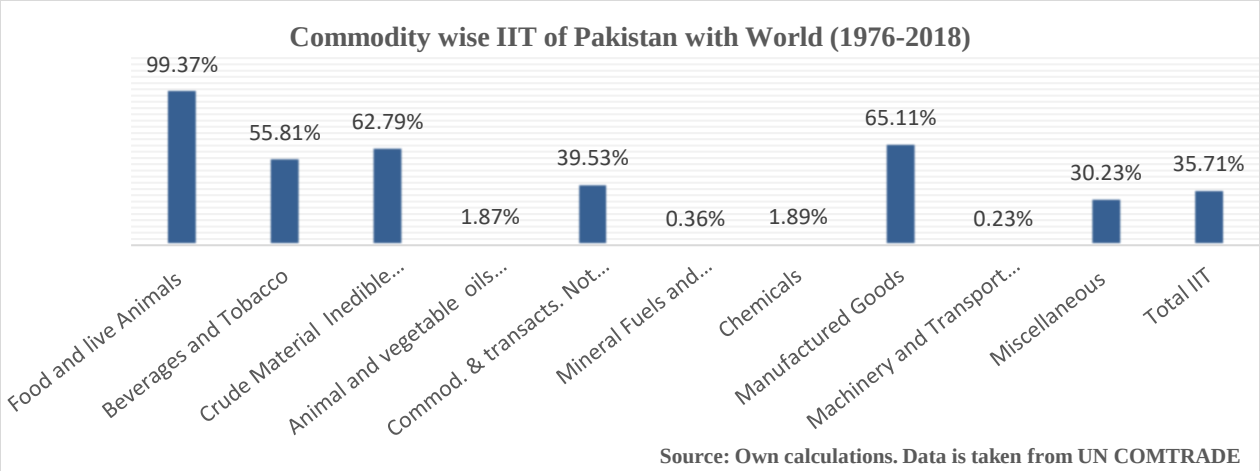


Figure 1: IIT between Pakistan and World in 1-Digit industries of SITC (1976-2018)

Levels of IIT at Three different Periods

Thirty years IIT is calculated from 1989 to 2018. The depicted values of IIT are average values for ten years each. The data, which are collected to calculate the IIT of Pakistan with the world represents that in the period of first 10 years (1989-1998) IIT is found to be more as compare to IIT in second and third ten-year periods, i.e. 1999-2008 & 2009-2018 respectively.

A big negative change has been noticed in IIT of Pakistan with the world that is a negative change of 10% from 37% to 27% in the second decade. In the third ten-year period of 2009-2018, a positive change of 7% has been reported and the IIT of Pakistan is calculated as 34% in contrast to 27% in the second ten-year period of 1999-2008. In these thirty years from 1989 to 2018 IIT of Pakistan with the world is calculated as 32% on average. These values are depicted in the Table 3.

Table 3: IIT of Pakistan with the world in three different time periods

IIT	Years			Average
	1989-1998	1999-2008	2009-2018	
With World	36%	25%	33%	31.3%

Source: Authors' estimations and data is collected from the UN-COMTRADE

Empirical Results of UV Estimations

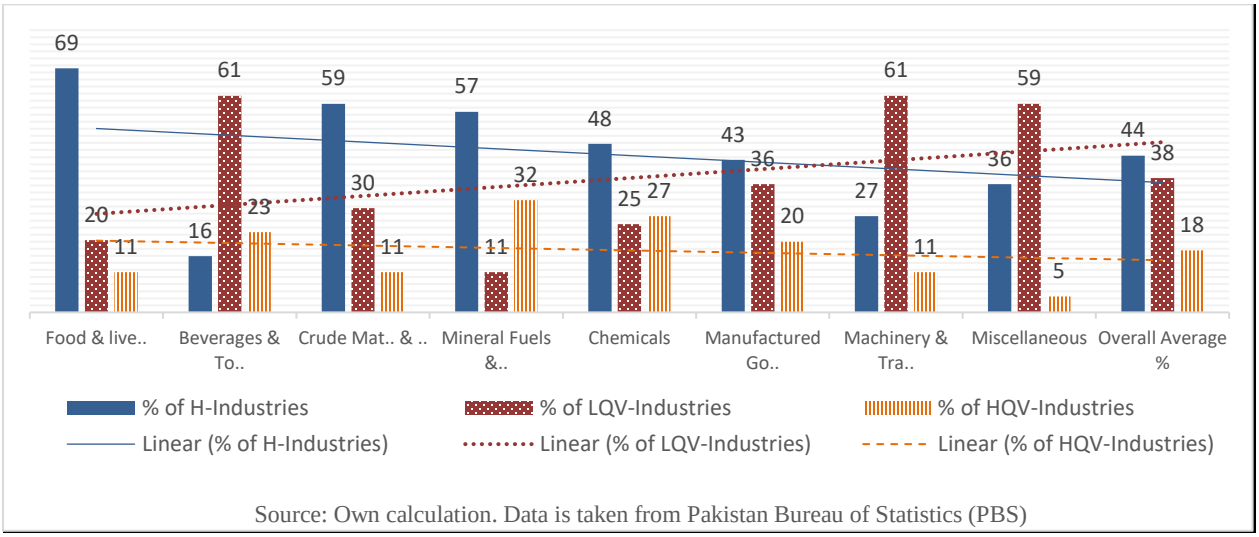
After the estimations, the study has reached the result that in the 1-digit industry level of SITC the dominant type of IIT is horizontal IIT only if $0.85 \leq UV^X/UV^M \leq 1.15$ holds. However, in the one-digit industries, the dominant type of IIT is LQVIIT if $UV^X/UV^M < 0.85$ holds. And in the one-digit industries, the dominant type of IIT is HQVIIT if $UV^X/UV^M > 1.15$ holds. VIIT has been distinguished as high-quality VIIT (if $UV^X/UV^M > 1.15$) and low-quality VIIT (if $UV^X/UV^M < 0.85$). The study has estimated all the 1-digit industries for all the year between the periods of 1976-2018. The estimated figures have been presented in Table 4 and depicted in Figure 2. Moreover, the classification of 1-digit industries of SITC under horizontal IIT, LQVIIT, and HQVIIT for the period of 1976-2018 has been depicted in Table 4. One could simply analyze from the following table that almost half (44.45%) of the 1-digit industries of SITC are classified under HIIT, and as for vertical industries are concerned LQV industries (38.07%) dominates HQV (17.56%).

Table 4: Share of Horizontal and Vertical (HQ, LQ) Industries (1976-2018)

1-Digit Industries	Horizontal Intra-Industries	Vertical Intra-Industries	
	H-Industries	LQV-Industries	HQV-Industries
Food and live Animals	69.19%	20.45%	11.36%
Beverages and Tobacco	15.90%	61.37%	22.73%
Crude Material & Inedible	59.09%	29.54%	11.36%
Mineral Fuels and Lubricants	56.82%	11.36%	31.82%
Chemicals	47.73%	25.00%	27.27%
Manufactured Goods	43.19%	36.37%	20.00%
Machinery & Transport Equipment	27.28%	61.37%	11.36%
Miscellaneous	36.37%	59.09%	4.54%
Overall Average %	44.45%	38.07%	17.56%

Source: Authors' estimations and data is collected from SBP and PBS

In Figure 3 we can see that the quantity of industries with no quality variation between import and export, i.e. horizontal industries, has the most 44.45 % share in total IIT in the specific period. However, the quantity of low-quality vertical industries has the 2nd most 38.07% share in total IIT. In contrast, high-quality vertical industries have a least 17.56% share in Pakistan overall IIT. Lines in the following chart shows the trend across the industries. Share of horizontal and vertical (HQ & LQ) industries in overall IIT has been shown in the following chart.



Source: Own calculation. Data is taken from Pakistan Bureau of Statistics (PBS)

Figure 2: **Share of Horizontal and Vertical (HQ, LQ) Industries (1976-2018)**

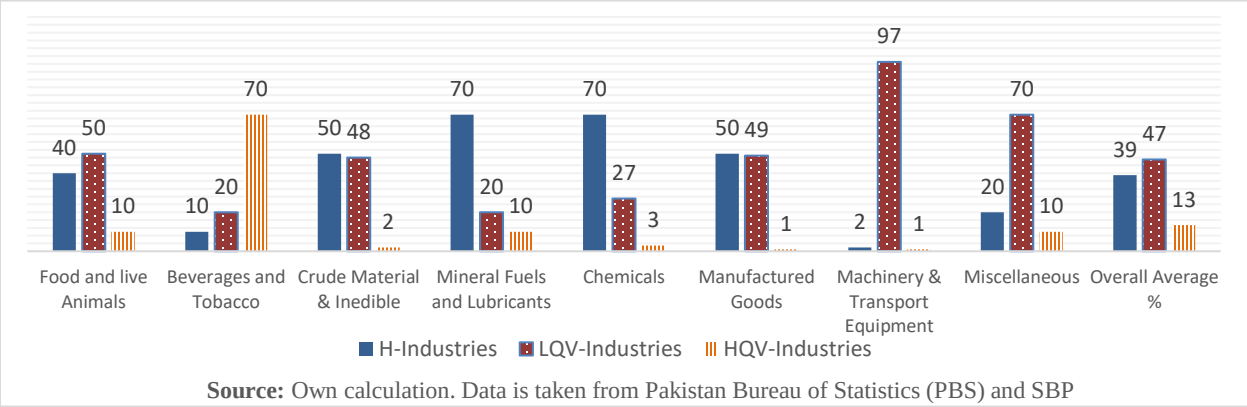
Level of Horizontal and Vertical (HQ & LQ) Industries in Time Period (1989-1998)1st decade

In decade one from 1989-1998, Pakistan's IIT was 37% as shown in Table 5. After decomposing IIT into its horizontal IIT and vertical IIT components, horizontal and vertical (HQ & LQ) industries are found to be 39%, 47%, and 13% respectively in the 1st decade. Low-quality vertical industries on average dominated 1-digit industries. Commodity wise detail shows that in the category of "Food and live Animals", "Manufactured Goods", "Machinery & Transport Equipment" and "Miscellaneous" LQ vertical IIT is found to be highest 50%, 49%, 97.00%, and 70.00% respectively and in the industries of "Beverages and Tobacco", and "Mineral Fuels & Lubricants" low-quality vertical IIT is found to be 20.00 and "20.00% lowest. Hence, in a decade, one dominance of low-quality vertical IIT justifies that the results of calculations are consistent with the literature. These values are depicted in the following Table 5 and Figure 3.

Table 5: Share of Horizontal and Vertical (HQ, LQ) Industries, Decade 1

1-Digit Industries	Horizontal Intra-Industries	Vertical Intra-Industries	
	H-Industries	LQV-Industries	HQV-Industries
Food and live Animals	40.00%	50.00%	10.00%
Beverages and Tobacco	10.00%	20.00%	70.00%
Crude Material & Inedible	50.00%	48.00%	2.00%
Mineral Fuels and Lubricants	70.00%	20.00%	10.00%
Chemicals	70.00%	27.00%	3.00%
Manufactured Goods	50.00%	49.00%	1.00%
Machinery & Transport Equipment	2.00%	97.00%	1.00%
Miscellaneous	20.00%	70.00%	10.00%
Overall Average %	39.00%	47.00%	13.38%

Source: Authors' estimations and data is collected from SBP and PBS



Source: Own calculation. Data is taken from Pakistan Bureau of Statistics (PBS) and SBP

Figure 3: Share of Horizontal and Vertical (HQ, LQ) Industries, Decade 1

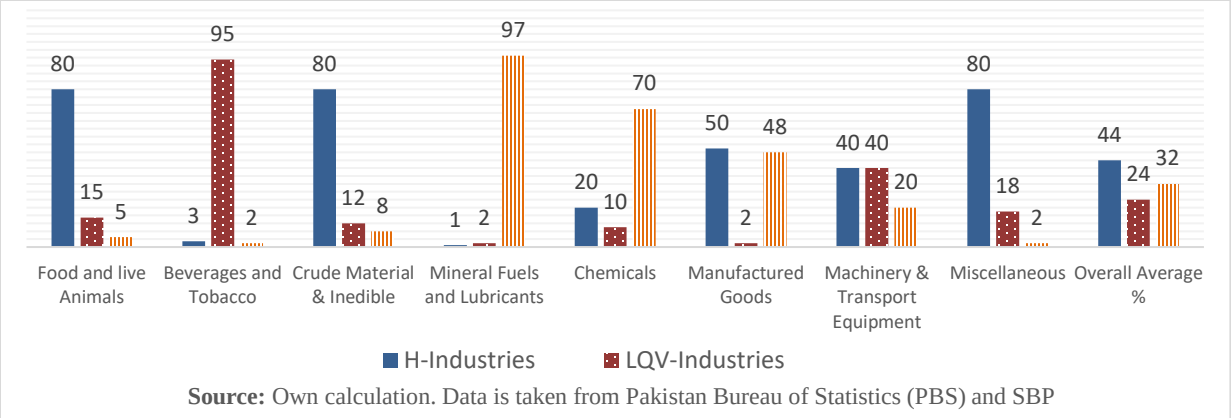
Level of Horizontal and Vertical (HQ & LQ) Industries in Time (1999-2008) decade 2

By comparing decade one and two, one can easily notice that high-quality VIIT showed an increasing trend in decade two from 14% to 32 % respectively. However, LQVIIT demonstrated a decreasing trend from 43% to 24% in decade two respectively and HIIT has demonstrated an increasing trend in decade two from 39.00 to 44.00%. These values are depicted in the following Table 6 and Figure 4.

Table 6: Share of Horizontal and Vertical (HQ, LQ) Industries, Decade 2

1-Digit Industries	Horizontal Intra-Industries	Vertical Intra-Industries	
	H-Industries	LQV-Industries	HQV-Industries
Food and live Animals	80.00%	15.00%	5.00%
Beverages and Tobacco	3.00%	95.00%	2.00%
Crude Material & Inedible	80.00%	12.00%	8.00%
Mineral Fuels and Lubricants	1.00%	2.00%	97.00%
Chemicals	20.00%	10.00%	70.00%
Manufactured Goods	50.00%	2.00%	48.00%
Machinery & Transport Equipment	40.00%	40.00%	20.00%
Miscellaneous	80.00%	18.00%	2.00%
Overall Average %	44.25%	24.25%	32.00%

Source: Authors' estimations and data is collected from SBP and PBS



Source: Own calculation. Data is taken from Pakistan Bureau of Statistics (PBS) and SBP

Figure 4: Share of Horizontal and Vertical (HQ, LQ) Industries, Decade 2

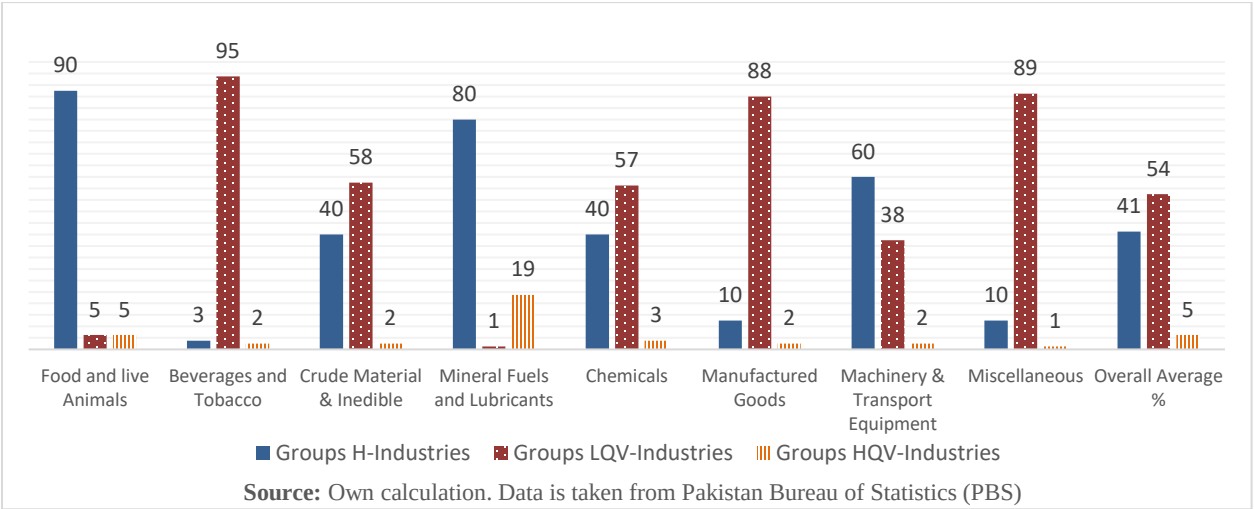
Level of Horizontal and Vertical (HQ & LQ) Industries in Time 2009-2019 decade 3

Product-wise in the category of "Beverages and Tobacco", "Crude Material & Inedible", "Manufactured Goods", "Chemicals and Miscellaneous" LQVIIT is found to be highest 95%, 58%, 57%, 88% and 89.00% respectively and in the category of "Food and live animals", and "Mineral Fuels & Lubricants" LQVIIT is found to be 5.00% and 1.00% lowest respectively. These values are depicted in Table 7 and Figure 5.

Table 7: Share of Horizontal and Vertical (HQ, LQ) Industries, Decade 3

1-Digit Industries	Horizontal Intra-Industries	Vertical Intra-Industries	
	H-Industries	LQV-Industries	HQV-Industries
Food and live Animals	90.00%	5.00%	5.00%
Beverages and Tobacco	3.00%	95.00%	2.00%
Crude Material & Inedible	40.00%	58.00%	2.00%
Mineral Fuels and Lubricants	80.00%	1.00%	19.00%
Chemicals	40.00%	57.00%	3.00%
Manufactured Goods	10.00%	88.00%	2.00%
Machinery & Transport Equipment	60.00%	38.00%	2.00%
Miscellaneous	10.00%	89.00%	1.00%
Overall Average %	41%	54%	05%

Source: Authors' estimations and data is collected from SBP and PBS



Source: Own calculation. Data is taken from Pakistan Bureau of Statistics (PBS)

Figure 5: Share of Horizontal and Vertical (HQ, LQ) Industries, Decade 3

Concluding Remarks and Comparison of Three Decades

In Figure 6 trends of industries classified under horizontal and vertical (LQ& HQ) IIT over time have been depicted. LQ vertical industries are reported with an increasing trend in time (1989-2018) i.e. the number of LQ vertical industries is increasing over time in Pakistan. It eventually means that LQVIIT is also increasing over time in Pakistan. HQ vertical industries are showing a decreasing trend, which simply means, HQVIIT in getting lower in Pakistan over time. However, horizontal industries are reported with an almost constant trend. These values are depicted in Table 8 and Figure 6.

Table 8: Share of Horizontal and Vertical (HQ, LQ) Industries of three decades.

Decade/ Industry Type	H-Industries	LQV-Industries	HQV-Industries
Decade 1	39%	47%	13%
Decade 2	44%	24%	32%
Decade 3	41%	54%	5%
Average	41%	42%	17%

Source: Authors' estimations and data is collected from SBP and PBS

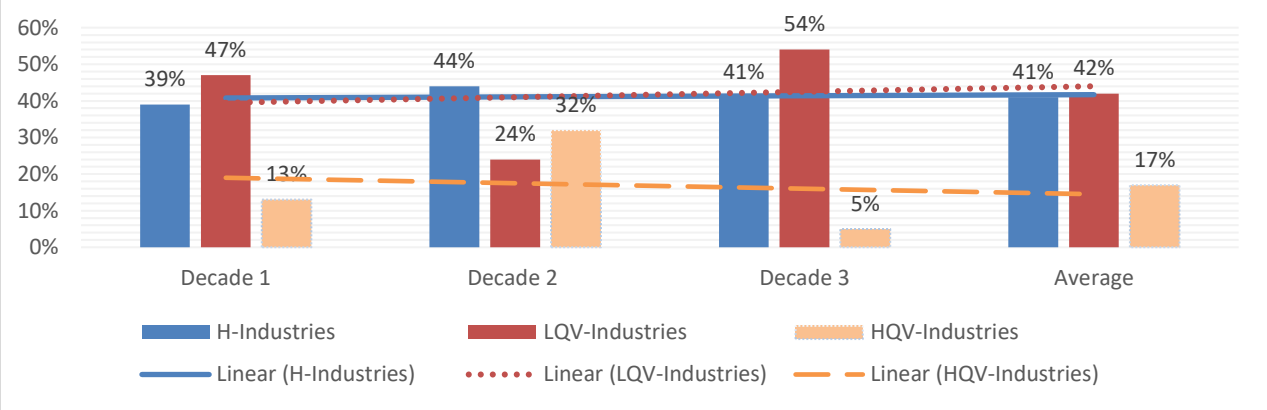


Figure 6: Share of Horizontal and Vertical (HQ, LQ) Industries of three decades.

Trend, Level & Dominance of Horizontal and Vertical (HQ & LQ) IIT Commodity Wise Over Time (1989-2018)

Data used in this study indicates that the category of "Food and Live Animals", "Mineral Fuels and Lubricants", "Machinery and Transport Equipment" is dominated by HIIT. LQ vertical IIT has shown an increasing trend in the category of "Beverages and Tobacco", "Crude Material & Inedible", "Chemicals", "Manufacturing Goods", and "Miscellaneous". Industries classified under HQ vertical IIT are very low in Pakistan, but they have shown an upward trend in the category of Minerals Fuels & Lubricants, "Manufacturing Goods" and Machinery. None of the 1-digit industry is dominated by HQ vertical IIT. Therefore, as concluding remarks we can say that this analysis reported that LQVIIT is the dominant form of IIT in total IIT of Pakistan. All the facts and figures are depicted in the Figure 7.

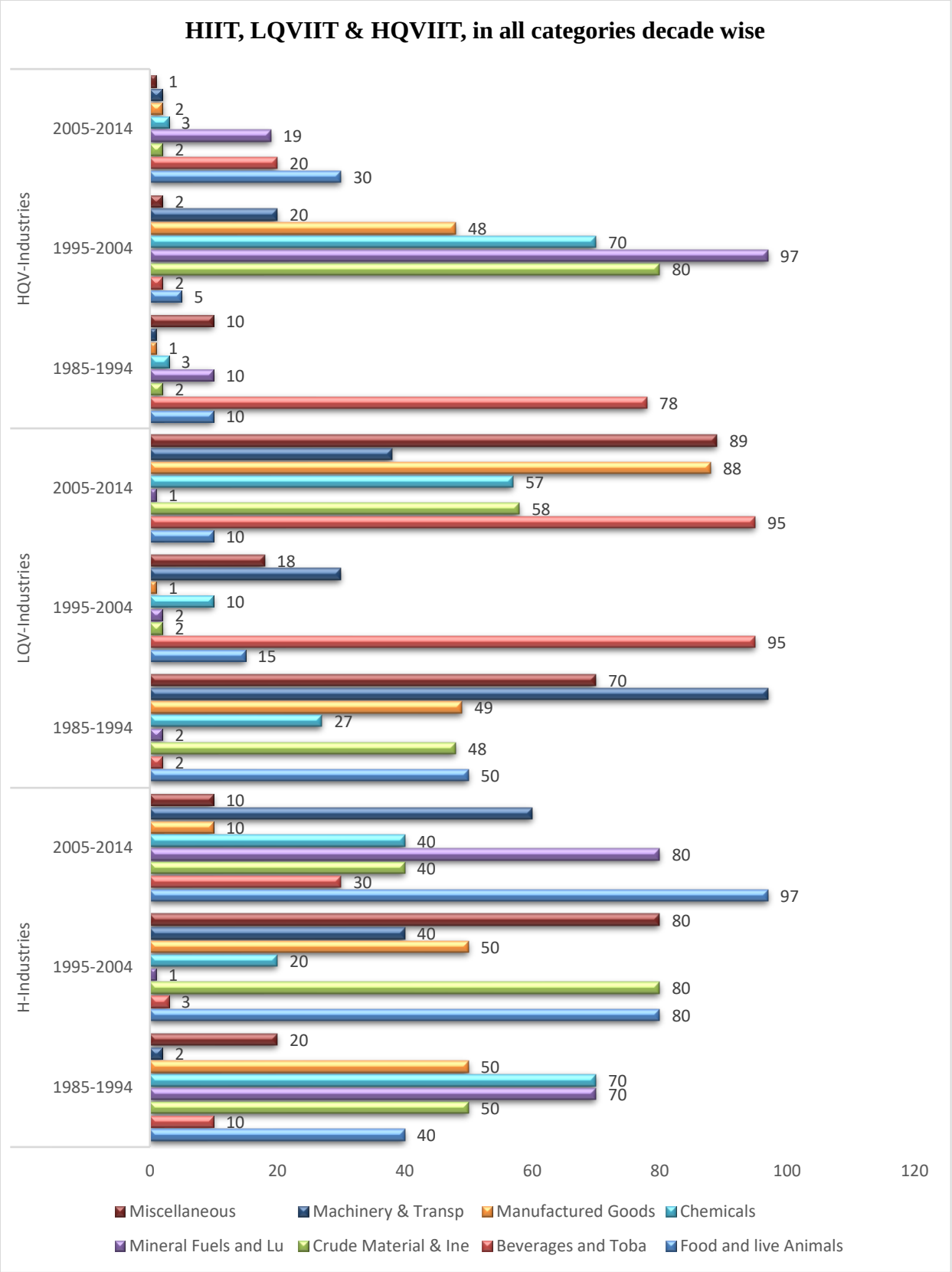


Figure 7: Plots of HIIT, LQVIIT & HQVIIT, decade wise in all categories

IIT of Pakistan with Selected Developing and Developed Countries.

At the 1-digit aggregation level of SITC, IIT has been calculated for forty-three years from 1976 to 2018. Twelve countries (China, Malaysia, UAE, India, Turkey, Iran, Germany, Japan, UK, US, Canada & Australia) have been divided into two groups (1st group of developing countries & 2nd group of developed countries). In each group, six countries have been placed. These 12 countries are considered as the major trading countries of Pakistan in the developing and developed world. In 43 years from 1976 to 2018, Pakistan IIT with the group of developing countries is found to be 23.39% and with the group of developed countries, it is reported as 22.54%. Pakistan has the most IIT 23.39% with developing countries. Therefore, our estimation results are consistent with the literature (IIT between developing countries is more of horizontal nature (HIIT) and IIT between developing and developed is more of vertical nature (Falvey, 1981).

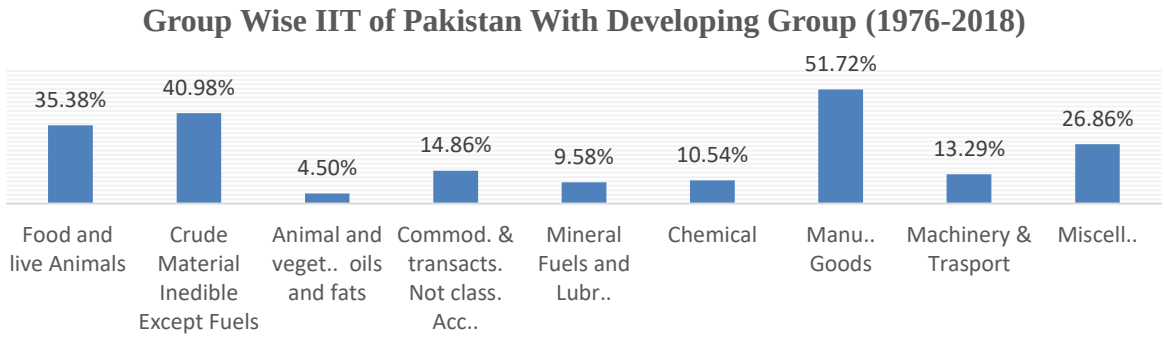
Table 9: IIT of Pakistan with selected developing and developed countries (1976-2018)

Groups & Country		Food and live Animals	Crude Material Inedible	Animal and veget.	Commod. & transacts	Mineral Fuels	Chemical	Manu. Goods	Machinery & Trasport	Miscell.	All Groups
Developing	CHINA	70.00	90.00	0.23	0.34	30.00	0.32	99.21	0.34	0.45	32.30
	MALAYSIA	44.98	2.32	0.72	25.76	0.76	4.76	79.87	4.87	76.98	26.78
	UAE	9.03	41.86	13.95	30.23	4.65	23.25	23.35	25.58	6.97	21.78
	INDIA	34.89	23.87	0.56	11.98	16.55	11.76	46.90	2.35	46.54	21.71
	TURKEY	27.90	55.81	2.23	13.95	4.65	20.93	21.87	11.62	23.25	20.22
	IRAN	25.50	32.00	9.30	6.90	0.87	2.23	39.34	34.98	6.98	17.57
All Countries		35.38	40.98	4.50	14.86	9.58	10.54	51.72	13.29	26.86	23.39
Developed	GERMANY	58.09	76.87	2.45	27.66	2.32	0.54	83.72	0.76	32.55	31.66
	JAPAN	32.55	72.09	2.32	18.60	32.25	0.32	74.42	0.23	51.16	31.55
	UK	16.21	51.61	6.97	46.51	11.62	0.32	41.86	0.43	51.16	25.19
	US	44.18	23.25	0.32	37.20	4.63	6.97	27.90	0.32	2.32	16.34
	CANADA	25.58	2.32	4.65	39.53	0.43	13.95	51.67	0.43	2.32	15.60
	AUSTRALIA	25.65	11.76	4.60	37.20	0.65	0.89	51.17	0.65	2.23	14.89
All Countries		33.71	39.65	3.55	34.45	8.65	3.83	55.04	0.47	23.62	22.54

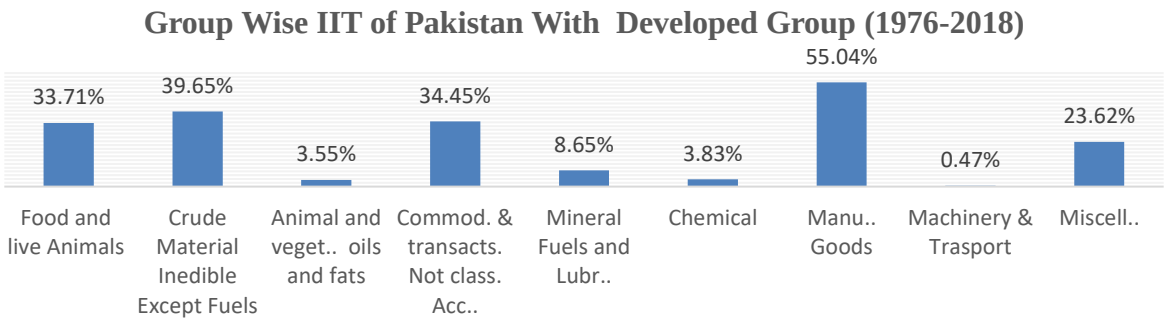
Source: Authors' estimations and data is collected from SBP and PBS

In the group of developing countries, commodity wise in the category of "Manufacturing Goods" Pakistan IIT is reported highest 51% while country-wise in the category of "Manufacturing Goods" China and Turkey reported 99.2% and 21.8% highest level, and the lowest level of IIT respectively. Category of "Animals, vegetable oils and fats" reported the lowest level of IIT i.e. 4.50%. IIT of Pakistan is found to be most with China, Malaysia, and UAE with the IIT level of 32%, 26%, and 21.78% respectively. IIT of Pakistan with India, Turkey, and Iran is reported 21%, 20%, and 17% respectively.

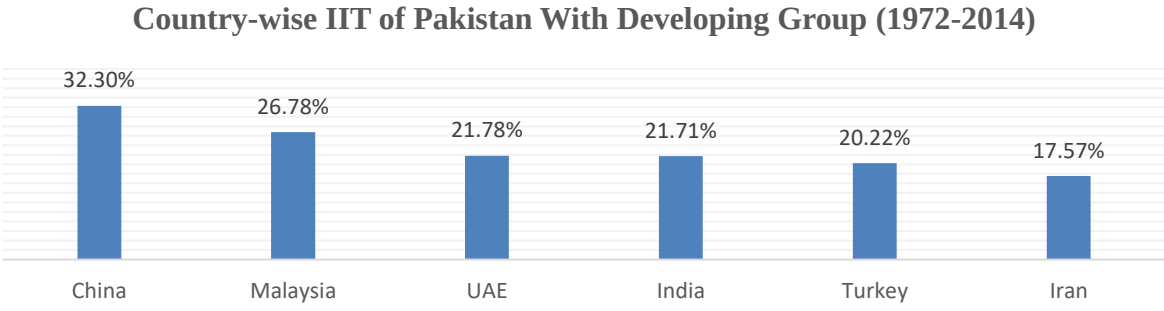
In the group of developed countries, in the category of "Manufacturing Good" Pakistan IIT is found to be the highest 55.04% commodity wise. On the other hand, country-wise in the category of "Manufacturing Goods" Germany and the US reported 83.72% and 27.90% highest and lowest level of IIT respectively. The lowest level of IIT 0.47% is reported in the category of "Machinery and Transport Equipment". Moreover, IIT of Pakistan is found to be most with Germany, Japan, and the UK and the level of IIT with these countries is 31.66%, 31.55%, and 25.19% respectively. These Values are depicted in the following table and bar graphs.



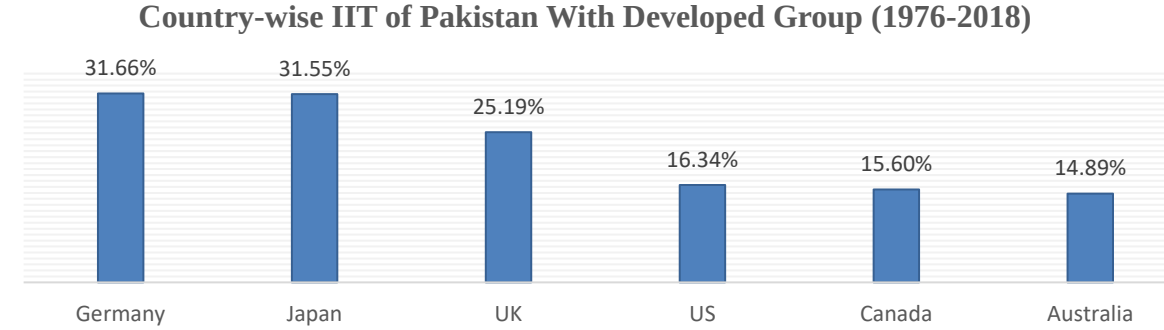
Source: Own calculation. Data is taken from UN COMTRADE



Source: Own calculation. Data is taken from UN COMTRADE



Source: Own calculation. Data is taken from UN COMTRADE



Source: Own calculation. Data is taken from UN COMTRADE

Figure 8: IIT of Pakistan with selected developing and developed countries, Group and Country-wise (1976-2018)

Deciding Factors of IIT

Estimation shows that in the groups of developed and developing countries in the "Manufacturing Goods" industry Pakistan's IIT is found to be highest. Therefore, country-specific determinants of IIT between Pakistan and her developed and developing major trading countries at the 1-digit industry level of SITC will be examined.

Data for estimations have been collected from World Development Indicator (WDI) from 2004 to 2018. A set of panel-data with two dimensions, time and countries has been used for estimations. Two augmented gravity models are estimated using STATA. The following augmented gravity model (discussed in methodology equation 10) has been estimated for both groups of developed and developing countries to examine the determinants of IIT.

$$lnIIT_{khft} = \alpha_0 + \beta_1 lnAGDP_{hft} - \beta_2 lnDPCGDP_{hft} - \beta_3 lnDHCAP_{hft} - \beta_4 lnDGDP_{hft} - \beta_5 lnWDIST_{hf} + u_{hft} \quad (11)$$

Estimations and Results

Two Random Effects (RE) models have been estimated to analyze the deciding factors of IIT. The results of Hausman tests, RE models, BP test, Pesaran test, and F-test for two models of developed and developing countries have been stated in Table 10.

Table 10: Results of two RE models at the 1-digit level of SITC

Variables	Model One (For Developing Countries)			Model Two (For Developed Countries)		
	Coefficient	*Z-Stat*	*P-Value*	*Coefficient*	*Z-Stat*	*P-Value*
AGDP	1.3038	5.14	0.000	3.6022	3.37	0.001
DPCGDP	-0.1086	-3.95	0.000	-0.2241	-1.85	0.080
DHCAP	0.2335	1.98	0.042	0.0273	0.46	0.644
DGDP	-0.8302	-4.15	0.000	-2.1481	-2.33	0.020
WDIST	-0.0466	-0.78	0.437	-1.5517	-9.62	0.000
CONSTANT	-8.1312	-3.55	0.000	-22.9473	-5.53	0.000
BPLM Test			0.000			0.000
Hausman Test			0.882			0.607
Pesaran CD Test			0.873			0.389
F-Test			0.000			0.000
R^2	*Within*	*Between*	*Overall*	*Within*	*Between*	*Overall*
	0.0179	0.6335	0.3521	0.1622	0.8379	0.6321

Source: Authors' calculations. Data is taken from WDI & WITS (UN COMTRADE)

All variables except distance in the first model for developing countries and differences in human capital in the second for developed countries are statistically significant. Signs and coefficient of all the variables are as expected. AGDP measures the market size, and it has a significant positive impact on IIT in both models. The opening of international trade makes the market size larger. The increase in the market size enables the producers to produce more and get the benefits of economies of scale. EOS in production lesson the cost of production and increases the opportunities for firms to maximize their profit. Therefore, as the market size increases, IIT will also increase. The impact of AGDP on IIT is in line with the previous findings of Balassa (1979), and Krugman (1985).

The impact of variable DPCGDP is found with a significant negative impact on IIT in all models. The difference in per-capita GDP is a proxy used for consumer's preferences/tastes. Therefore, if the individual's tastes/preferences become different in both the trading countries, then the people shall start demanding goods of different attributes. Hence, the possibility of bilateral IIT between trading countries

will be lessened. The results of this study regarding DPCGDP are in line with the previous studies of Linder (1961).

In this study difference in human capital endowment (DHCAP) is reported with a significant positive impact on IIT in the first model (for developing countries) and a positive insignificant influence on IIT in the second model (for developed countries). So, the result for the 1st model (for developing countries) is consistent with the finding of Turkcan (2005). However, it has been shown that 88% of Pakistan's trade-in "Manufacturing Goods" industry is of LQ vertical IIT (LQVIIT). That means the higher the difference in factor endowments the higher will be the VIIT. Therefore, our finding supports the positive impact of human capital differences on IIT. On the other hand, the IIT between developing and developed economies is of the vertical type. The difference in the market's size of the two economies shows their ability to produce different goods. If the difference in the market size of Pakistan and her trading country is higher, the IIT between them will be less. DGDP is highly significant and with a negative sign in all models. Hence, the results are from the previous studies of Turkcan (2005), and Greenaway et al. (1994).

Interestingly distance is not explaining IIT of Pakistan in the 1st model (for developing trading countries). The distance variable (WDIST) has an insignificant negative influence on the IIT in the first model, but a negative significant influence on the IIT in the second model. It confirms that distance does not affect the IIT of Pakistan to its developing trading countries at one-digit analysis. It has been depicted that IIT of Pakistan is found to be the 2nd most 31.4 percent with Malaysia from 2008-2018, and the distance between Pakistan and Malaysia is highest (4509 Km) in the group of developing countries. On the other hand, IIT share of Pakistan is at fourth and fifth (among six developing countries) with its border-sharing trading countries (Iran and India) which is very low.

6. CONCLUSION

The primary aim of this research paper was to decompose IIT of Pakistan into HIIT, LQVIIT & HQVIIT and measuring the IIT of Pakistan with its fifteen major trading countries as well as with the groups of developed and developing major trading countries at the 1-digit industry level of SITC. The secondary objective was to analyze the country-specific determinants of Pakistan's IIT with the groups of major developed and developing trading countries separately. The present study used unit value indices to distinguish industries classified under Horizontal IIT and vertical IIT, GL indices to measure the extent of IIT with fifteen major trading partners, and Augmented Gravity model with panel data techniques to examine the country-specific factor/determinants of IIT of Pakistan with the groups of developed and developing major trading countries.

In the last forty-three years on average, the share of IIT in total trade of Pakistan with the world is 31% in one-digit industries of SITC. Product-wise, in the category of "Food & Live Animals" (99.37%), and "Manufactured Goods" (65.11%), Pakistan's IIT is found to be highest, while in the category of "Animals Vegetables Oils & Fats" (1.87%), and "Machinery & Transport Equipment" (0.23%) Pakistan's IIT is found to be lowest. In the last two decades, an increasing trend has been noticed in IIT of Pakistan, i.e., a positive change of 7%, as the share of Pakistan's IIT in total trade was 27% in the second decade while 34% in the last decade.

It can be concluded that, in Pakistan industries classified under HIIT dominate the industries classified under VIIT, while the industries classified under LQVIIT dominate the industries classified under HQVIIT, in given years (1976-2018). In Pakistan, the highest number of horizontal industries have been found in the category of "Food and live animals" (69.19%), and "Manufacturing Goods" (43.19). In contrast, the maximum number of LQ vertical industries have been noticed in the category of "Beverages & Tobacco" (61.37%), and "Machinery & Transport Equipment" (61.37%) while the HQ vertical industries are in

maximum number in the group of "Mineral Fuels & Lubricants" (31.82) and Chemicals (27.27) from 1972 through 2014.

Interestingly, In the last three decades, LQV industries have shown an increasing trend while HQV industries have shown a decreasing trend and horizontal industries have been reported with a constant trend. Besides, in the last decade (2009-2018) Pakistan's IIT is dominated by LQV industries (54%), however, the share of horizontal industries was 41% while HQV industries are estimated only 17% in total one-digit industries of SITC.

IIT of Pakistan is more with developing nations rather than with developed countries in the period of 1976-2018. In the group of developing countries, country-wise, IIT of Pakistan is found to be most with China (32.30%), Malaysia (26.78%), UAE (21.78%), India (21.71%), Turkey (20.22%), Iran (17.57%), Saudi Arabia (16.61%), Afghanistan (13.93%) and Kuwait (8.9%). However, category wise in the group of developing countries, Pakistan's IIT is highest in the category of "Manufacturing Good" (51.72%) while lowest in "Animals and Vegetable Oil" (4.50%). In the group of developed countries, country-wise, IIT of Pakistan is found to be most with Germany (31.66%), Japan (31.55%), UK (25.19%), US (16.34%), Canada (15.60%), and Australia (14.89%). However, category wise in the group of developed countries, Pakistan's IIT is highest in the category of "Manufacturing Good" (55.04%) while lowest in "Machinery and Transport" (0.47%).

Based on the findings of the random effect model, on the on hand, in the group of developing countries, country-specific variables, i.e., market size, and the difference in human capital has a positive significant impact on IIT, while the difference in consumer preferences, and the difference in market size, has a negative and highly significant impact on IIT, however, interestingly distance variable is statistically insignificant and failed in influencing IIT of Pakistan with developing countries. On the other hand, in the group of developed countries, the result of all the variables are as expected. However, the variable of 'difference in human capital' is insignificant and failed in explaining IIT of Pakistan with developed countries.

Since the share of IIT in total trade of Pakistan is growing sharply over time, hence, trade policymakers may encourage EOS, product innovation, and capital improvement which are the basis of IIT (HIIT& VIIT). However, to accelerate the extent, and share of IIT of Pakistan with the developed and developing world, policymakers may specifically pay special attention to the significant determinants and encourage trade with neighboring countries.

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Do Corruption and Trade Openness Impede FDI?

ABSTRACT

Foreign direct investment (FDI) has been given much attention in the recent past just because of its contribution to economic development. However, there are several socio-economic factors that impede FDI. Therefore, the objective of current study is to probe whether corruption and trade openness affect FDI. The study uses data from 1990-2015 for SAARC countries and employs panel ARDL model to retrieve short- and long-run results. The findings reveal that corruption plunges the FDI in long-run, while trade openness increases FDI. On the contrary, we report heterogeneous results in short-run. Additionally, we deduce a few policy implications based on the findings of this study.

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1. INTRODUCTION

Foreign direct investment (FDI) is one of the indispensable factors that contributes to economic growth of both developed and developing countries. There is plethora of studies which reports that FDI ameliorates economic development, income inequality, poverty, and unemployment (Feridun & Sissoko, 2011; Herzer et al., 2014; Magombeyi & Odhiambo, 2018; Zeb et al., 2014). Given the imperativeness of FDI, countries try to escalate it. However, social, economic, and political situation of developing countries hinders FDI inflows, which mitigates sustainable economic development and economic welfare. Thus, it is necessary to probe the influencing factors of FDI especially for developing countries.

Parallel to this, corruption has been an imperative socio-economic issue across the globe. Over the time, corruption has surged in almost each and every county. On the top of its social impact, corruption also has economic impacts (Alola et al., 2019). The prior literature notes that corruption has both positive and adverse effect on GDP growth. Several studies conclude that corruption is grease for the economic wheel, implies that corruption increases GDP growth (Leff, 1964; Acemoglu & Verdier, 1998). On the contrary, there exists a strand of literature which reports that corruption hinders economic growth (Farooq et al., 2013). Moreover, corruption can also affect FDI. There are several studies which report that corruption effects FDI, however, there is dearth of literature that explores the relationship between corruption and FDI for developing countries. Hence, there is need to examine the impact of corruption on FDI to devise policies in order to ameliorate FDI inflows in developing countries.

In addition to this, Trade Openness (TO) be regarded as one of the prime factors that affect FDI. However, TO can either increase or plunge FDI. TO, through free trade agreements and low trade barriers, can attract FDI inflows. Whereas, TO can mitigate FDI through exchange rate and interest rate. The relationship between TO and FDI is ambiguous, therefore, it should be re-investigated for developing countries to provide additional evidence, which can complement the existing related studies.

Given the above backdrop, the study aimed at probing the effect of corruption and TO on FDI for selected SAARC countries: namely Pakistan, India, Maldives, Bhutan, Sri Lanka, Bangladesh and Nepal. The SAARC countries are set of developing countries that grow at impressive speed along with several socio-economic issues (e.g., corruption). The present study extends the existing body of knowledge by probing the impact of corruption and TO on FDI for SAARC countries. To the best of our knowledge, there does not exist any study that analysis the aforementioned objective in the case of SAARC countries.

2. LITERATURE REVIEW

The current section highlights previous research related to corruption, trade openness, and FDI. Mauro (1995) conclude that corruption impedes FDI. Similarly, Epaphra and Massawe (2017) employ corruption perception index and control of corruption (as proxies for corruption) and conclude that corruption decreases FDI.

On the contrary, Peres (2018) notes that corruption increases the FDI inflows in developing countries while there is negative relationship between corruption and FDI for developed countries. Similarly, Azam et al. (2013) reveal that corruption boosts the FDI inflows. The modern literature regarding foreign direct investment and corruption has not reached at final decisive solution. Some researchers provide evidence that corruption negatively affect foreign direct investment, while some favor that corruption lead to more friendly environment for foreign investors. Woo and Heo (2009) empirically test the relationship between level of corruption and foreign direct investment in context of non-OECD Asian countries. The study concluded that corruption in non-OECD countries retard FDI level.

Similarly, Cuervo-Cazurra (2006) probes the impact of corruption on investment inflow for 106 host countries. The study concluded that investors belong to OECD member countries not hesitate to do investment in countries with high degree of corruption. The ground reality is that investors formalized with corrupt officials to deal in such environment are well known for them. Alemu et al. (2011) empirically verified that corruption decline investment. The researchers reached to decisive point that corruption adversely affect economic sovereignty by incorporating insecurity and unconducive relationship, which badly hit inflow of FDI.

Bellos and Suasat (2012), and Helmy (2013) also report the negative impact of corruption on FDI for several set of countries. On the other hand, recent study by Gossel (2018) for Sub-Saharan African region concluded that corruption boost FDI inflow. However, Dinko et al. (2001) note that corruption is harmful for the overall economy, because it effects the state's regulation. Also, the study finds that foreign direct investment is negatively correlated with corruption. Moran (2012) argues that, although FDI ameliorates the welfare of the society yet it exerts adverse effects on various sectors. In addition to this, corruption started to increase, and if there persists more corruption then more FDI will inflow.

Parallel to this, Ang (2008) concludes that trade openness, financial development, and infrastructure increase FDI inflows.. The findings conclude that trade openness positively and significantly affect FDI. Kakar and Khilji (2011) also examine the nexus between FDI and trade openness in case of Malaysia and Pakistan. The results report that there is positive relationship between FDI inflows and trade openness in case of both countries. Abrego (1999) conclude that trade openness plunges FDI in Costa Rica and OECD countries. Babatunde (2011) reveals the relationship between trade openness and FDI. Also, FDI merely depends on trade openness. Adebayo et al. (2021) investigate the relationship between FDI and selected macroeconomic variables. For this analysis, authors employ wavelet approach, ARDL, FMOLS, and DOLS methodologies. The results depict that trade both openness and exports have positive impact on FDI inflows.

Similarly, Liargovas and Skandalis (2012) also report that FDI in developing countries has positive relationship with trade openness, and the strength of the relationship is relatively strong for developing economies. Aizenman and Noy (2006) explain that two way causality between FDI and trade openness exists for selected dataset. Cantah et al. (2018) argue that trade openness has positive impact on FDI inflows, while analyzing Sub-Saharan Africa. Bibi et al. (2014) scrutinize the relationship of FDI with selected macroeconomic variables, i.e., inflation, trade openness, real exchange rate, export, and import in Pakistan. Contrary to the existing literature, the study notes that trade openness impedes FDI inflows in Pakistan.

3. DATA

The key purpose of this study is to probe the effect of corruption and TO (trade openness) on FDI (foreign direct investment) for SAARC countries. Hence, the dependent variable of this analysis is FDI, whereas the key independent variables are corruption (measured by corruption perception index – CPI) and TO. In addition to this, we employ economic growth (real GDP per capita – GDP) as control variable. The study covers the time 1990-2015 for SAARC countries: namely Pakistan, India, Maldives, Bhutan, Sri Lanka, Bangladesh and Nepal. We exclude Afghanistan from this analysis since the data for Afghanistan is not available. Also, we transform all data series into natural logarithmic form to control the issues of non-normal distribution and heterogeneity. Table 1 reports the summary of data.

The descriptive statistics are presented in Table 2. Also, all variables are converted into logarithmic form to control heterogeneity and to achieve normal distribution. Further, as can be seen from Table 2 that mean value is highest for GDP, which is 13.22. On the contrary, CPI has lowest mean value, which is 1.65. The most volatile variable of this analysis is FDI since the standard deviation for FDI is 0.43. Kurtosis explains that variables of this study do not have thick tails. Moreover, all selected variables are negatively skewed,

as can be seen from the values of skewness. Additionally, Jarque-Bera test statistics reveal that all selected variables are non-normally distributed.

Table 1: Data description

Variable	Measurement scale	Source
Foreign Direct Investment (FDI)	Percentage of flows in country relative to GDP	World Development Indicators
Corruption Perception Index (CPI)	An index based on 13 different assessments and surveys about perceived corruption in a country	Transparency International
Trade Openness index (TO)	Volume of exports plus imports divided by GDP	World Development Indicators
Real GDP per capita (GDP)	Constant per capita $2005	World Development Indicators

Table 2: Descriptive statistics

	FDI	CPI	GDP	*TO*
Mean	6.38	1.65	13.22	10.28
St. Dev.	0.43	0.31	0.27	0.22
Kurtosis	2.11	1.98	1.87	2.32
Skewness	-0.10	-0.09	-0.17	-0.21
Jarque- Bera	(0.00)***	(0.00)***	(0.00)***	(0.00)***

Note: All variables are transformed into logarithmic form. (.) denotes P-value. Further, ***, **, * represents level of significance at 1%, 5%, and 10%, respectively.

4. METHODOLOGY

There are several channels through which corruption and trade openness effect FDI. For instance, corruption affects GDP growth, inflation, crimes, inequality, and cost of production. On the other hand, these aforementioned indicators mitigate FDI. Moreover, corruption propels foreign investors to pay bribe, thus it discourages foreign investors to invest in a host country. In addition to this, corruption promotes inefficiency, rent seeking, and merit-ignorance, causing FDI to plunge. Similarly, it is perceived that investors are biased toward open economies. Further, less restrictions on trade and capital flows encourage foreign investors to invest in host countries.

In the prior studies on the determinants of FDI (foreign direct investment), several economic indicators have been embodied as potential drivers of FDI. However, the most widely employed determinants are GDP per capita and trade openness index. Therefore, we also use these aforementioned variables in our econometric model. In addition to this, we augment our model by incorporating corruption as another determinant of FDI. The econometric model that we employ in this analysis is reported as follow:

$$FDI_{it} = \beta_0 + \beta_1 GDP_{it} + \beta_2 TO_{it} + \beta_3 CPI_{it} + \varepsilon_{it} \quad (1)$$

In Eq. (1), FDI, GDP, TO, and CPI is foreign direct investment, real GDP per capita, trade openness index, and corruption perception index, respectively. Subscripts i and t are cross-sectional units and time, respectively. Additionally, β_i (i= 0, …, 3) is coefficient, whereas ε_{it} is error term.

To investigate the dynamic relationship (i.e., short- and long-run estimates) among corruption (CPI), TO, and FDI, the present study utilizes panel ARDL model developed by Pesaran et al. (1999). Further, we employ PMG-ARDL specification of panel ARDL in lieu of MG-ARDL and DFE due to the fact that PMG-ARDL renders homogeneous long-run estimates across all cross-sections. Also, panel ARDL (e.g., PMG-ARDL) can be applied if the variables follow diverse order of integration (i.e., I(0) or/and I(1)). Moreover,

panel ARDL is immune to panel data issues, e.g., cross-sectional dependence and heterogeneity. These aforementioned reasons compel to employ panel ARDL in this study.

5. IMPLICATIONS AND SUGGESTIONS

5.1. Unit Root Test

Panel ARDL is not applicable if the order of integration in at I(2) or higher, therefore, we discern the order of integration for all data series by employing Levin et al. (2002) unit root test. The findings from the aforementioned test are posted in Table 3.

Table 3: Results from LLC unit root test

Variable	I (0)	I (1)
FDI	-0.88	-4.23***
CPI	-2.87	-2.95***
TO	-1.06	-3.84**
GDP	-6.22	-6.18***

Note: *, **, *** denote level of significance at 10%, 5%, and 1% respectively.

As Table 3 explains that unit root exists in all variables at I(0). However, all data series are integrated at I (1), implies that data do not have unit root at first difference. In addition to this, we also employ CIPS unit root test for robust findings. The results from CIPS unit root test are mentioned in Table 4.

Table 4: Results from CIPS unit root test

Variable	I (0)	I (1)
FDI	-1.01	-2.88***
CPI	-2.13	-3.63***
GDP	-0.79	-2.71***
TO	-1.56	-2.60***

Note: Critical value at 1% is -2.57. *, **, *** denote level of significance at 10%, 5%, and 1%, respectively.

The findings from CIPS unit root test, reported in Table 4, explain that we fail to reject the null hypothesis of there is unit root at I(0). On the contrary, the null hypothesis could be rejected at I(1). Thus, all selected variables of this analysis are integrated of order 1.

5.2 Long-run estimates

This section renders long-run results from panel ARDL approach. Further, Table 5 explains that the CPI (corruption perception index) is negative as well as statistically significant. The value of -0.12 implies that a 1% escalate in CPI decreases FDI by 0.12%. The possible reason behind the finding could be this, that, corruption reduces the profit due to increase in the cost, which propel investors not to invest in country with high corruption perception index. This finding, of the present study, is in line with the conclusion of Ohlsson (2007).

Moreover, TO is also both positive and significant. The value of 0.08 indicates that 0.08% increase in FDI is fostered by a 1% increase in TO. The possible reason for this finding could be the reality that an open economy attracts more FDI as compare to the economy that imposes relatively high trade barriers. This conclusion of the present study is in line with the findings of Ang (2008). The coefficient of control variable (i.e., economic growth) is positive yet statistically significant. Also, this describes that, in long-run, economic growth does not boost FDI in SAARC countries.

Table 5: Long-run results from panel ARDL

Variable	Coefficient	Prob.
CPI	-0.12	0.00***
TO	0.08	0.00***
GDP	0.03	0.12

Note: *** represents level of significance at 1%.

5.3. Short-run estimates

Table 6 reports short-run results from panel ARDL approach. Further, the ECT (error correction term) is negative as well as statistically significant. It indicates that 96% of a shock converges in 1 year. Moreover, lag of TO is negative yet statistically significant. This implies that a 1% increase in TO plunges FDI by 0.07%. In addition to this, all short-run estimates are statistically insignificant. This indicates that CPI and GDP do not effect FDI.

Table 6: Short-run results from panel ARDL

Variable	Coefficient	Prob.
CPI	-0.71	0.18
CPI (-1)	0.15	0.65
TO	-0.03	0.55
TO(-1)	-0.07	0.01**
GDP	-0.02	0.57
GDP (-1)	-0.05	0.74
ECT	-0.96	0.03**

Note: ** denotes level of significance at 5%.

4.4. Country-wise short-run estimates

Table 7 reports the country-wise short-run estimates. The ECT (error correction term) in case of all countries is negative as well as significant. Moreover, this implies that there exists co-integration among CPI, TO, FDI, and GDP. Also, in short-run, CPI mitigates FDI in all SAARC countries except Bangladesh and India, where CPI escalates FDI. Further, TO upsurges FDI in case of India, Maldives, and Sri Lanka. However, CPI decreases FDI in case of Bangladesh, Bhutan, Nepal, and Pakistan. In addition to this, GDP escalates FDI in all selected countries except Bangladesh, where there exists insignificant relationship between GDP and FDI.

Table 7: Country-wise short-run results

Variables	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Srianka
ECT	-0.07 **	-3.39***	-0.45 ***	-0.21 **	-0.19***	-0.27 **	-0.18 ***
CPI	0.75 **	-0.61***	0.06	-2.34 ***	-0.072**	-0.72 *	-0.14***
TO	-0.06 ***	-0.27***	0.16 **	0.05 *	-0.02 **	-0.12 ***	0.05**
GDP	0.02	-0.03 ***	0.15 ***	0.06***	-0.02 **	0.32 *	0.01 *

Level of significance: * denotes 10%, ** denotes 5%, and *** denotes 1%.

6. CONCLUSION

FDI (foreign direct investment) is an inevitable ingredient that contributes to sustainable economic development. However, several factors hinder FDI inflows in developing countries. Hence, the current study explores whether corruption (CPI) and trade openness (TO) impede FDI in case of SAARC countries. We borrow panel ARDL methodology to examine the short and long-run estimates. The findings reveal that CPI decreases the FDI in long-run, whereas TO escalates the FDI in long-run. Further, we report heterogeneous results in country-wise short-run analysis.

On the basis of present study's findings, we propose that government officials and policy makers should control corruption by initiating ethical and moral building programs. Further, there should be laws, rules, and punishment (e.g., imprisonment) to control corruption. In addition to this, SAARC countries should move towards cash-less economy in order to mitigate corruption. Parallel to this, SAARC countries need to cut the trade barriers to ameliorate FDI. The policy makers and government officials should rationalize the trade barriers and adopt trade liberalization for high FDI inflows. Governments should provide incentives to foreign investors who wants to invest in host countries. Additionally, there should be tax exemption schemes and subsidies to foreign investors. The cost of commencing and doing business is relatively high in developing countries, therefore, policy makers should devise policies to reduce these type of costs. Further, policymakers should sign agreements on free trade, which will surge trade openness that ultimately increases FDI inflows in SAARC countries.

There exist a few limitations of this study. First, we ignore the issue of cross-sectional dependence and slope heterogeneity, which may lead to spurious results. Second, we do not employ co-integration test explicitly and test co-integration with the help of ECT (error correction term). For future research directions, researchers can employ second and third generation panel data methods to control cross-section dependence and slope heterogeneity. Further, quantile based models could also be used to explore the non-linear (asymmetric) relationships.

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