Cointegration between Institutional Quality and Stock Market Development

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Abstract

This study investigates the cointegration between institutional quality (IQ) and stock market development (SMD) of Pakistan, over the period 1996-2016. We use robust autoregressive distributed lag (ARDL) bounds test to cointegration and error correction model (ECM) for estimation purpose. Empirical findings of ARDL bounds test ratify cointegration between IQ and SMD − while controlling for inflation. Moreover, the result of the ECM confirms the dynamic and long-run equilibrium association. Literature reveals that there is no formal evidence of IQ on SMD in the context of Pakistan. Thus, this research endeavor contributes to existing literature in this vital area. The study examines cointegration between IQ and SMD in Pakistan that limits the generalizability of findings. Nevertheless, it offers valuable policy implications to Pakistan's stock market regulators, government bodies and investors. The researchers may expand the research question to the Asian region regarding IQ and its impact translated by capital markets.

***Keywords*:** Stock market development, institutional quality, ARDL bounds testing, Pakistan

Introduction

Stock market development (SMD) emerged as an integral part of financial development. It reflects the visage of an economy regarding political stability and high velocity of economic activities. Growing stock market performance shows the confidence of investors in a stable financial system. Pakistan stock exchange captured the highest ever mark, i.e., 52876.46 points within no time in May 2017. The present stock rally has attracted the attention of international investors. Thus positive future inflows-like the foreign direct investment (FDI) and portfolio investment is expected ahead. The SMD assures that the financial system of a country is stable, while the weaker financial system demonstrates, the weaker institutional framework.

Kaufmann and Kraay have made tremendously cherished contributions to the analysis of chemistry between IQ and SMD. They have developed a set of six indicators, which are now the supreme and renowned measurements of IQ. The importance of good governance can never be undermined in developing countries. Good governance measured via IQ is an essential phenomenon for development, and it has a strong embedded connection with per capita income. A strong and positive causality leads to a high development due to better governance, and a weak/negative causal effect is a result of adverse governance (Kaufmann & Kraay, 2002). Quality of government is measured by the low level of corruption, protection of the rule of law, government effectiveness and accountability. The study of European countries assessing how the IQ affects economic development, reports that European quality of governance is highly correlated with social trust and socio-economic development; and human development index in

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particular. It is also obvious that the quality of governance seems to vary among different countries and regions (Charron, Dijkstra, & Lapuente, 2014).

IQ appears to be an essential part of the policy formulation process in emerging markets and plays a pivotal role in economic development, particularly in SMD. The literature on governance and SMD demonstrates a reasonable quantum of research in this regard from developed and emerging markets; however, to the best of our knowledge, there is no formal evidence in the context of Pakistan. As Pakistan stock market is at climax since the first quarter of 2017, therefore it is worth demanding to study its behavior regarding the role of IQ transformations in current marvelous performance. This pioneering effort attempts to fill the literature gap.

The purpose of this study is to investigate the dynamic and long-run equilibrium relationship between IQ and SMD of Pakistan, over the period ranging from 1996-2016, using quarterly data sourced from CEIC and World Bank databases.

The scope of study encompasses the stakeholder associated with Pakistan stock market, policymakers, potential investors and regulatory bodies. Also, the findings are useful for academician and students to understand the role of the institutional framework and trickle-down effect on stock market functioning in the context of emerging market, Pakistan. Literature reveals that there is no formal evidence of IQ on SMD in the context of Pakistan. Thus, this research endeavor contributes to existing literature in this vital area. It offers valuable policy implications to Pakistan's stock market regulators, government bodies and investors.

Literature Review

This section summarizes the relevant literature in line with the research objective. Kaufmann, Kraay, and Zoido (2002) constructed aggregate governance indicators, a useful measure of IQ. The six indicators for IQ acknowledged by Kaufmann *et al*. (2002) consist of; i) voice and accountability (VA), ii) political stability (PS), iii) government effectiveness (GE), iv) regulatory quality (RQ), v) the rule of law (RL), and vi) control on corruption (CC). Institutional factors play a vital role in the economic and financial development and pose pressure on policymaker to establish stabilized reforms to cater the uncertainty (Cherif & Gazdar, 2010). In the case of emerging markets, political risk, law and order, and bureaucratic quality appear as important determinants of SMD (Yartey, 2010). The study of capital flows, using composite IQ index, from rich to developing countries during 1970 to 2000 shows that low IQ impedes channeling these flows, and long-run development is dependent upon effective IQ (Alfaro, Kalemli-Ozcan, & Volosovych, 2008). Consistently, Papaioannou (2009) applies the same IQ index to assess the role of an institutional and political factor in international capital mobilization, demonstrates that well-functioning institutions are a vital and dynamic force of international bank flows. Asongu (2012) determines a positive and significant connection between IQ indicators and stock market performance in developing countries; the results suggest that countries with improved IQ framework assure high market capitalization, volume traded, optimistic turnover ratio, and greater quantum of listed firms.

Political corruption and poor governance are among the principal barriers to economic and social development. Bolgorian (2011) examined the corruption perception

index and SMD of 46 countries throughout 2007-2009, taking market capitalization and the total value of share trading as measures of SMD. The study reveals a strong and negative relationship between corruption and SMD. Lalountas, Manolas, and Vavouras (2011) argue that global development is a powerful tool to deal with corruption, particularly in middle and high-income countries, and seem least effective in the case of low-income countries. According to Aljazaerli, Sirop, and Mouselli (2016), there is an extensive debate on corruption and SMD with conflicting and ambiguous results. Some studies link corruption and its impact on SMD with the economic standing of a country, developed countries are adversely affected by corruption (De Rosa, Gooroochurn, & Gorg, 2010; Pinheiro, 2010). However it serves as a growth engine for developing and/or underdeveloped countries (Hillman & Krausz, 2004; Pinheiro, 2010; Wang & You, 2012).

H_1: Corruption has a negative impact on SMD

A study of industrialized countries, Cherif & Gazdar (2010), claims that political factors are very crucial for financial markets development. Comparative analysis of the impact of political risk on stock returns of emerging and developed markets documents that developed markets are more sensitive to such risk, relative to emerging market in producing rising stock return. Although the marginal difference is very narrow, the arguments propose that political risk in the developed market has increased over the last decade and decreased in emerging markets (Diamonte, Liew, & Stevens, 1996). Privatization is an important stimulator of political risk that in turn brings volatility in SMD, in particular, more explicit effect on local markets, while accelerated return in emerging markets, performing a price function (Perotti & Van Oijen, 2001). The magnitude, with which political risk influences the stock return of developed, emerging and frontier markets, is different according to the market category. However, government stability is a unique source of political risk in frontier markets (Dimic, Orlov, & Piljak, 2015). Cherif and Gazdar (2010) observe that political risk has no significant impact on SMD. Another study of emerging markets throughout 2000-12 exhibits a negative correlation of political risk and SMD, translates higher stock return in case of declining political risk (Lehkonen & Heimonen, 2015).

H_2: Political stability positively influences the SMD

GE captures perceptions of the quality of public and civil services with a degree of freedom from political pressures, the quality of policy formulation and implementation and corresponding government commitment and credibility towards these policies (Kaufmann, Kraay, & Zoido-Lobatón, 1999a). There is need to incorporate the preference among policy choices about minorities shareholder protectionism; the countries opt mass privatization strategies effectively focused on this issue and found the reasonable impact on the stock market (Pistor, Raiser, & Gelfer, 2000). A study of developing countries from African continent signifies the positive role of GE in superior stock market performance, particularly; GE parameters illustrate impressive market capitalization, high turnover ratio, traded volume and a large number of listed companies (Asongu, 2012). Those countries where effective government policies are truly implemented and efficient institutional environment available to investors guarantees an

improvement in stock market performance; the optimistic and effective policies reduce transaction and agency costs; which enhance shareholding. Conversely, investors with risk-averse attributes are reluctant to initiate investment decision in those countries with ineffective government establishment (Hooper, Sim, & Uppal, 2009).

H_3: Government effectiveness is positively associated with SMD

Pistor *et al*. (2000) study the laws protecting shareholders and creditors and find an increasing paradigm of remarkable changes governing such laws in transition economies, suggest strong trends towards convergence of statutory laws through transition economies. Lombardo (2000) explains that the required rate of return on equity is inversely connected with the enforceability of contracts, neutrality and observes that law and order affect expected return on equity independently on their impact on its financial risk, therefore provides robust considerations such as country and industry-specific risk factors. Gul and Qiu (2002) examine that law enforcement explains low information asymmetry and more developed finical markets. Hooper *et al*. (2009) express a positive association of RQ with equity returns. The effective RQ seems to be a precondition to financial market development.

H_4: Effective regulatory quality contributes positively to SMD

Previous literature shows that inflation is an important determinant of stock market performance (Islam, 2003; Kyereboah-Coleman & Agyire-Tettey, 2008; Omran & Pointon, 2001; Tiwari, Dar, Bhanja, Arouri, & Teulon, 2015). Therefore, we included inflation as an important control to SMD.

Summing up the above debate, IQ appears to be playing a pivotal role in economic development, in particular, SMD in emerging markets. Literature reveals an extensive amount of research in this regard from developed and emerging markets; however, to the best of our knowledge there is no formal evidence from Pakistan. This pioneering effort attempts to fill this gap by investigating the cointegration between SMD and IQ in the context of Pakistan. Thereafter, it contributes in existing literature on this vital phenomenon due to its unique nature, as elastic IQ potentially stimulates the amount of systematic risk, which in turn influences the traded volume and stock prices; depending upon the magnitude and direction.

Data and Methodology

Data and Variables

This section designates the data source and outlines the methodology used in this study. We sourced CEIC and World Bank databases to collect time series quarterly data over the period ranging from 1996 through 2016, about Pakistan IQ indicators, market capitalization, gross domestic product, and inflation. The phenomenal work of Kaufmann and Kraay (2002), Adjasi and Yartey (2007), Yartey (2010), and (Asongu, 2012) reveal a selection of IQ indicators. IQ indicators show the relative rank of the country, ranging from 0-100. Highest rank is assigned to countries with sound IQ, while lowest rank shows the poor state of IQ. For example, PS points of 80 for the country *a* reveals that country *a* is politically stable relative to country *b* which has 10 points. Figure 1 graphically presents these indicators, the historical pattern and trend as well (see appendix for detail). Market capitalization proportion to GDP, as a measure of SMD, is in

line with Aljazaerli et al. (2016), however consumer price index as a representation of inflation, has widely been used in literature (Islam, 2003; Kyereboah-Coleman & Agyire-Tettey, 2008; Tiwari *et al*., 2015; Tripathi & Kumar, 2014).

Integration Order and Lag Length

We employ Augmented Dickey-Fuller and Phillip-Perron (Dickey & Fuller, 1979, 1981) methodology to determine the order of integration for individual series in the study, in line with Chakraborty (2016). Unit root is tested using the following equation:

$$Y_t = \alpha_0 + \delta_1 Y_{t-1} + \sum_{j=1}^{p} d_j \Delta Y_{t-j} + \epsilon_t \dots\dots (1)$$

Where Y_t is a variable Y over time t. Yt-1 is the value of variable Y at time t-1, α_0 *and* δ_1 are the coefficients of estimations, and ϵ is error-term, *p* represents maximum lag length. Here null hypothesis is ($H0: \delta = 0$), implies there is unit root against the alternative that assumes no unit root ($H1: \delta < 0$). The decision is guided by comparison of t-statistics with DF critical values, H0 is rejected when t-stat>DF critical value, otherwise accepted. Table 1 exhibits the integration order lead by test statistics and *P*-value corresponding to ADF and PP, first and second columns display the list of variables and test title respectively, following columns present the test value and *P*-value facing each variable and test. The last column describes the decision in response to the integration order. The simple criteria guide the decision is; if *P*-value corresponding to t-stat is less than 5, the variable is stationary at the level I(0) otherwise not, a similar rule is applicable for I(1) order. Except for CC, none of the variables is stationary at the level. Therefore all of them including CC found stationary at first difference judged on *P*-value basis. The properties of the variable suggest that it is appropriate to apply the ARDL bounds testing approach for further estimation.

Table 1: *Integration Order of Stationarity*

Variable	Test	Integration order				Decision
		1(0)		1(1)		
		t-Stat.	*P*-value	t-Stat.	*P*-value	
SMD	ADF	-1.789	.070	-3.240	.001	I(1)
	PP	-1.195	.210	-3.536	.000	I(1)
GE	ADF	-.454	.515	-2.627	.009	I(1)
	PP	-.424	.526	-2.870	.004	I(1)
PS	ADF	-2.596	.283	-2.738	.006	I(1)
	PP	-1.873	.058	-3.011	.003	I(1)
RQ	ADF	-2.539	.110	-3.096	.031	I(1)
	PP	-1.728	.413	-3.377	.014	I(1)
CC	ADF	-3.473	.011	-3.354	.015	I(0,1)
	PP	-2.479	.124	-3.591	.008	I(1)
INF	ADF	-2.811	.197	-3.004	.003	I(1)
	PP	-.508	.493	-3.270	.001	I(1)

In the next step, we determine the appropriate lags using Akaike (AIC) and Schwarz information criterion (BIC) (Bozdogan, 1987; Neath and Cavanaugh, 1997), which suggest 2 lags are appropriate to be included for estimation.

ARDL Bounds Testing for Cointegration

Cointegration refers to the long-run relationships among several time series variables, which is commonly observed in social sciences like economics and corporate finance. According to Engle and Granger (2015), cointegration is a linear stationary combination between two or more non-stationary time series, interpreted as long-run equilibrium relationship among the variables. Time series analysis requires determining cointegration whether the group of non-stationary time series variables is cointegrated or not, due to changes in the respective order of integration, in case of policy amendments (Breitung, 2001; Dritsakis, 2004; Johansen, 1991; MacKinnon, Haug, & Michelis, 1999). The seminal Autoregressive Distributed Lag Modelling, commonly denoted as ARDL (Pesaran & Shin, 1998) with extended Bounds testing (Pesaran, Shin, & Smith, 2001) has become very popular investigation mechanism of long-run equilibrium relationship among variables.

According to Pesaran and Shin (1998), ARDL approach produces best consistent long-run coefficient estimation in case of underlying regressors integration order I(1) and/or I(0), particularly for small sample size. Whereas, the Bounds testing approach brings novelty to the problems of the long-run relationship between an explained variable and set of regressors when it is unknown that regressors are a trend or first difference stationary. In compliance with properties of underlying time-series variables (see table 1 for unit root testing), the ARDL Bounds test is the most appropriate approach for long-run equilibrium relationship estimation. The choice of ARDL gains support of previous studies those address the similar phenomena, see for example, Morley (2006), Duasa (2007), Odhiambo (2009), Altıntaş and Taban (2011), Shahbaz and Lean (2012), Alimi (2014), Raza (2015), Ali (2016), Sharif and Raza (2016), Sharif, Afshan, and Nisha (2017), and Faisal, Tursoy, and Resatoglu (2017).

The hypothetical model that transports the relationship between IQ and SMD can be expressed as;

$$SMD = f(GE, PS, RQ, CC, INF) \quad \ldots\ldots (2)$$

The econometric model for the above equation can be formed as follows;

$$SMD_t = \beta_0 + \beta_1 GE_t + \beta_2 PS_t + \beta_3 RQ_t + \beta_4 CC_t + \beta_5 INF_t + \mu_t \ldots\ldots (3)$$

However, the ARDL regression equation for above econometrics model can be written as;

$$\begin{aligned} SMD_t = {} & \beta_0 + \beta_1 GE_t + \beta_2 PS_t + \beta_3 RQ_t + \beta_4 CC_t + \beta_5 INF_t \\ & + \sum_{t-1}^{p} \lambda_1 \Delta SMD_{t-1} + \sum_{t-1}^{p} \lambda_1 \Delta GE_{t-1} \\ & + \sum_{t-1}^{p} \lambda_2 \Delta PS_{t-1} + \sum_{t-1}^{p} \lambda_3 \Delta RQ_{t-1} + \sum_{t-1}^{p} \lambda_4 \Delta CC_{t-1} \\ & + \sum_{t-1}^{p} \lambda_5 \Delta INF_{t-1} + \mu_t \ldots\ldots (4) \end{aligned}$$

Here, SMD represents stock market development, GE, government effectiveness, PS, political stability, CC, control of corruption, INF, inflations, Δ is the difference operator, *p* is the optimal number of lags, that is 2.

Short and Long-Run Equilibrium Relationship

After confirmation of long-run association-ship, error correction model (ECM) is applied to estimate short-run relationship among underlying variables. The sign of ECT must be negative and statistically significant, with a coefficient (η) ranging between zero and one, represents the speed of adjustment towards long-run equilibrium after a short-term shock that confirms the stability of the system. We estimate the following equation (5) for this purpose;

$$\Delta SMD_t = \varphi_0 + \varphi_1 \sum_{i=1}^{p} \Delta\, GE_{t-1} + \varphi_2 \sum_{i=1}^{p} \Delta\, PS_{t-1} + \varphi_3 \sum_{i=1}^{p} \Delta\, RQ_{t-1} + \varphi_4 \sum_{i=1}^{p} \Delta\, CC_{t-1} + \varphi_5 \sum_{i=1}^{p} \Delta\, INF_{t-1} + \eta ECT_{t-1} + \mu_t \dots\dots (5)$$

Where "ECT_{t-1}" represents the error correction term. Coefficients φ_0, φ_1, φ_2, φ_3, φ_4 and φ_5 give the short-run elasticities of GE, PS, RQ, CC, and INF respectively.

Furthermore, we estimate variance inflation factor (VIF) to determine the multicollinearity among the set of regressors using equation;

$$VIF = \frac{1}{1 - R^2} \dots\dots (6)$$

Results and Discussion

This section accounts for the empirical results of the ARDL Bounds Test, ECM, and diagnostic statistics.

Long-Run Equilibrium Relationship

We apply the ARDL Bounds test approach to measure the long-run relationship between IQ indicators and SMD of Pakistan. The results of Bounds Test are reported in table 2. If the F-statistics value (8.339) exceeds the upper bound I1 at all significance level (10%, 5%, and 1%), so we cannot reject the null hypothesis and accept alternative hypothesis that assumes IQ has a long-run association with SMD of Pakistan throughout 1996 to 2016. However, if it lies between upper and lowers bound, we remain inconclusive.

Table 2: *ARDL Bounds Test*

Bounds Test		Critical Value Bounds		
Test Statistic	Value	Significance	I0 Bound	I1 Bound
F-statistic	8.339	10%	2.26	3.35
		5%	2.62	3.79
		2.5%	2.96	4.18
		1%	3.41	4.68

Table 3 presents the results of the ARDL Long-Run form, cointegration equation, and some important model attributes respectively. The negative sign of cointegration coefficients and significant *P*-value signify the long-run association between IQ and SMD. Out of four, three IQ indicators; GE, and RQ positively and significantly influence the SMD over long-run bringing 32%, and 40% respectively compliance with one percent change among each of them. This implies that IQ is a very important determinant of

SMD over the long run. Some of the past studies offer similar supports to these findings (Charron *et al*., 2014; Cherif & Gazdar, 2010; Kaufmann *et al*., 2002). However, PS, CC, and INF have negative and significant long run effect on SMD incorporating 45%, 18% and 30% negative change respectively in response to one percent negative change among each of them. This negativity finds literature support see for example (Bolgorian, 2011; Kyereboah-Coleman & Agyire-Tettey, 2008; Tripathi & Kumar, 2014).

R-square shows the fitness of the model. The F-statistics (271.77) measures the fitness of model with significant p-value, implies that the model is suitable for estimation.

Table 3: *ARDL Long Run Form*

Variable	Coefficient	Std. Error	t-Statistic	*P*-value
GE	.315	.131	2.396	.021*
PS	-.447	.194	-2.302	.026*
RQ	.404	.079	5.098	.000*
CC	-.178	.083	-2.137	.038*
INF	-.300	.137	-2.189	.034*
C	-.342	.095	-3.586	.001*
CointEq(-1)	-.323	.044	-7.291	.000*
R-squared	.895	F-statistic		271.770
Adjusted R-squared	.892	Prob. (F-statistic)		.000*
Durbin-Watson stat	2.186			

(*) indicates significance at 5% level.

After confirmation of long-run association-ship, ECM is applied to estimate short-run dynamics and speed of adjustment towards long-run equilibrium and results are shown in table 4. The sign of the coefficient of ECT is negative (-.205) and statistically significant, which signals long-run equilibrium and implies that system corrects previous period disequilibrium at a speed of 20.5% quarterly and then convergence towards long-run equilibrium. All IQ indicators portray short-run equilibrium; GE is positively and significantly related with SMD, adjusting short-run disequilibrium at a speed of 20%. The results find support from previous research (Asongu, 2012). Unstable political conditions bring negative and significant negative change in SMD in the short-run, which is consistent with the argument that political instability raises the systematic risk that in turn influences the behavior of investors, and resulting contraction in stock market activities (Chau, Deesomsak, & Wang, 2014; Lehkonen & Heimonen, 2015).

Table 4: *Error Correction Model*

Variable	Coefficient	Std. Error	t-Statistic	*p*-value
D(GE)	.195	.067	2.908	.023*
D(PS)	-.308	.110	-2.782	.009*
D(RQ)	.243	.109	2.223	.035*
D(CC)	.252	.093	2.693	.012*
D(INF)	-.343	.074	-4.581	.000*
ECT(-1)	-.205	.052	-3.908	.000*
C	-.186	.063	-2.943	.009*

(*) indicates significance at 5% level.

Effective RQ is very important for SMD, its positive and significant results confirm the usefulness of RQ in translating positive impact on SMD, which is in line with the study of Hooper et al. (2009). The coefficient of CC is positive and interestingly significant. This complies with the philosophy that CC is an engine for growth and development in developing countries (Hillman & Krausz, 2004; Pinheiro, 2010; Wang & You, 2012). Moreover, according to Aljazaerli *et al*. (2016) corruption greases the wheel of the economy by expediting velocity of transactions that in turn permits private sector firms to be overwhelmed by governmentally enacted ineptitudes, and this is true in case of Pakistan. INF drives the SMD negatively; means 1% increase in INF curtails SMD by 34%, the result is consistent with past studies (Kyereboah-Coleman & Agyire-Tettey, 2008; Tripathi & Kumar, 2014).

Diagnostics and Stability Analysis of Model

To warrant the reliability, decency, and sensitivity of the model, diagnostic and stability tests are applied to check for normality (Jarque-Bera); serial correlation (Breusch-Godfrey LM Test); Heteroskedasticity (Breusch-Pagan-Godfrey Test); and stability analysis (Ramsey RESET: T-stat, F-stat, CUSUM and CUSUM square test). Test results are reported in table 5; the Jarque-Bera test satisfies the normality condition (residuals are normally distributed), a *P*-value of both Breusch-Pagan tests is greater than 5%, meaning that model is free from serial correlation and heteroskedasticity. The Ramsey RESET test ensures the stability and normality of model, consistent with other test results *P*-value corresponding to both t-stat and f-stat is not significant, implies that there is no misspecification in the model; therefore, it is stable and normal. The result of the CUSUM test shows that underlying parameters are stable, while the CUSUM square test confirms the systematic movement of parameters.

Table 5: *Diagnostics and Stability Analysis of Model*

Nature of Test	Purpose	Statistics
Jarque-Bera	Normal Distribution Test	2.619 (.269)
Breusch-Godfrey LM Test	Serial Correlation	.868 (.449)
Breusch-Pagan-Godfrey Test	Heteroscedasticity	.817 (.720)
Ramsey RESET Test: T-statistics	Stability	1.348 (.189)
Ramsey RESET Test: F-statistics	Stability	1.698 (.224)
CUSUM Test	Stability	Stable
CUSUM of Square Test	Stability and systemic	Stable and systematic

Note: P-value in parenthesis

Multicollinearity with Variance Inflation Factor

Multicollinearity is detected through VIF test using equation (6), the results are presented in table 6. None of the independent variables accounts for the multicollinearity problem, which implies a reliable estimation of the model.

Table 6: *Variance Inflation Factors (VIF)*

	Variance	VIF
CC	.705	1.271*
GE	.393	1.589*
PS	.725	1.689*
RQ	.830	1.377*
INF	.846	1.242*

(*) designates the VIF < 5. Multicollinearity exists when the value of VIF surpasses 5. The value of VIF corresponding to all of the regressors is less than 5, which indicates no sign of collinearity among independent variables.

Conclusion

The purpose of this study is to investigate the dynamic and long-run equilibrium relationship between IQ and SMD of Pakistan, over the period 1996-2016, using ARDL Bounds Testing approach of cointegration (Pesaran *et al*., 2001) to investigate long-run equilibrium relationship among variables. According to Pesaran and Shin (1998), ARDL approach produces best consistent long-run coefficient estimation in case of underlying regressor integration order I(1), I(0) or I(1) and I(0), particularly for small sample size. Whereas Bounds testing approach brings novelty to the problems of the long-run relationship between an explained variable and set of regressors, when it is unknown that regressors are a trend or first difference stationary. Integration order is examined by ADF and PP method, while AIC and BIC criteria determine lag order selection. After confirmation of long-run association-ship, ECM is applied to analyze the short and long-run relationship among underlying variables. The sign of ECT must be negative and statistically significant, with coefficient ranging between zero and one, represents the speed of adjustment towards long-run equilibrium after a short-term shock that confirms the stability of the system.

Empirical result of ARDL Bounds test reports a long run cointegration between IQ and SMD, which is confirmed by ECM with a negative sign of ECT coefficient and corresponding statistically significant *P*-value. This model also documents the short-run dynamic association between IQ indicators and SMD. GE and RQ positively influence the SMD both in short and long run. However, PS is alarming for SMD both in short and long run with a negative impact on SMD. CC stimulates the short run development on one hand; however it adversely drives the SMD in the long run, on the other. Our findings are consistent with previous literature (Asongu, 2012; Lehkonen & Heimonen, 2015; Bolgorian, 2011) which holds that effective and stable IQ stimulates the SMD.

Interestingly, we find PS positively and significantly drives the SMD, which is in agreement with the argument of Cherif and Gazdar (2010). Furthermore, the findings support the view of Yartey, (2010) that in the case of emerging markets, political risk, law and order, and bureaucratic quality are important determinants of SMD. The INF came across as a source of curtailing the stock market activities in short as well as long run. Multicollinearity, diagnostic and stability analysis reveal that the model is fit for estimation and fulfills the essential requisites to be a good model.

This study has important policy implications for stock market regulators, government agencies and investors in Pakistan. Firstly, it is clear that the stock market in Pakistan reached 50,000 points in January 2017. The current rise in stock prices is attracting the attention of international investors and future flows, such as investment in portfolio and FDI, are expected. Investors need to take into account all institutional factors, and other considerations at the micro and macro levels, which are typically characterized by increased market capitalization, trading volumes, and rising indexes, among others.

Secondly, continuous and regular policies are needed to create a more effective international image. As a result, the economy will find the right footing in the long run. Empirical evidence suggests that policymakers should closely monitor political stability and control over corruption in the long run.

Thirdly, the policies related to the GE and RQ would be the point of reference for future economic prosperity. All institutions must be agile and transparent to play a free and equitable role in economic development. Finally, the stock market reflects the economic conditions of a country. A wave of uncertainty efflux from weak institutional framework can potentially harm the stock market greatly. It is highly desirable that the pace of economic activities continue to increase to ensure sustainable economic and financial development. It is possible to maintain political and institutional peace, justice and public order to limit the level of systematic risk as low as possible to guarantee an optimal and sustainable SMD.

This research examines the cointegration between IQ and SMD in the context of Pakistan, while the expansion of the current methodology between IQ and economic and financial development is an important research area for future research. Also, gathering evidence in the Asian region can also make a healthy contribution.

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Appendix

Figure 1

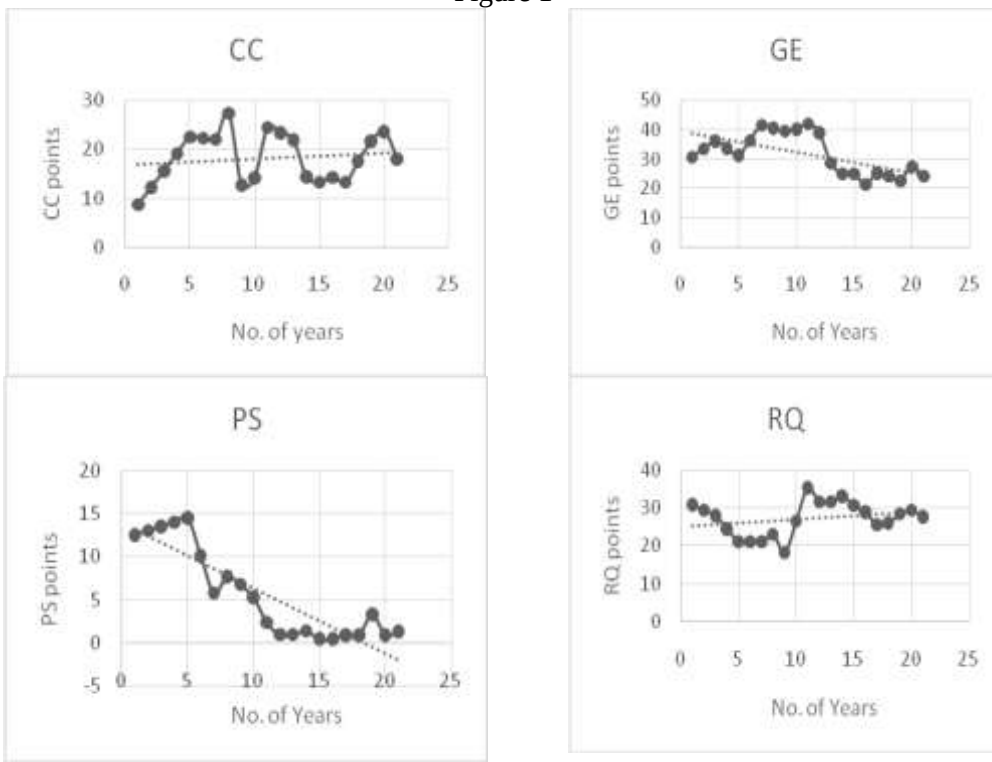

Figure 1 graphically illustrates the IQ indicator's points. CC points are shown on the left upper part of the diagram, GE points on right upper part, PS points on the left lower part, and RQ points on the right lower part. Bold points connected by a thick line are actual annual points for each indicator while dotted line demonstrates the trends respectively.