

Research Article

The Impact of Stock Market Development on Economic Growth; a Panel Study in the Economies of Pakistan, India and China

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Abstract

The stock market development is essential for the economic development and growth. This study is an important attempt at analyzing the importance of the relationship between stock market development and economic growth in Pakistan, India and China. The data for GDP and stock market capitalization has been taken from world bank from 1993-2016. This data frame has considered the smart portion of China, Pakistan Economic Corridor. The panel regression is applied by using Stata 12. The Hausman specific test specifies that random effects model is better for the sample used in this study. The results revealed that stock market capitalization has a positive significant impact on GDP. The policy makers must realize the stock market capitalization, numbers in the development of the economies. This study will help the policy makers to understand the impact and importance of stock market capitalization in these economies for the economic development indicators.

Keywords: Stock Market Capitalization; Panel Regression; Hausman Specific Test and Random Effects Model

Introduction

Economic growth has been very important in any economy since the industrialization has involved in the history of humans [1]. The policy makers want the indicators of economic growth and development in positive numbers. These indicators are the source of information for the stakeholders of the economy [2]. The stakeholders of the economy, give a push or pull to the economy because of their interests. The economists are very crucial for any country to understand the interests of the stakeholders and to value the economic growth and stability in the economy [3]. Industrialization has rung the bell of development and country growth around the economies of the world [4]. Industrialization is the only source to introduce quick development in any country [5]. Research and development is the key to industrialization, which is the main source of economic growth and development [6]. Research and development are reflected in the development of industrialization in any economy.

To know which economy is paying attention towards research and development, the stock market index numbers are extremely important for the researchers and the policy makers [7]. Because the research and development will lead to industrialization and industrialization will lead to stock market development and stock market growth will lead to economic development and growth [8]. Stock market capitalization is the indicator that shows the interest and confidence of the stakeholders in the industrialization process in the economy [9]. It is said that the better numbers of market capitalization ratio shows that the stakeholders are more motivated and satisfied [10]. The interests of stakeholders are the primary concern for industrialists and the better financial development and economic growth [11].

Stakeholders are always attracted to those countries which have high potential to immediate and better growth [12]. There are many different types of economies all over the world [13]. The stock markets of developed industrialized countries are maturing and stable [14]. Those stakeholders who want stability and better constant earning are more interested in these types of stock markets [15]. On the other hands economies like Pakistan, India and China have great potential to score better numbers in the near future, stakeholders and investors can earn better growth and immediate profits by investing in these types of stock markets. There are very few studies on particularly considering these three countries. Our study has been considering the smart portion of the effect of China, Pakistan economic corridor which has not been considered by many studies in these economies, the study related to this topic has been studied on large scale but the significance of our study is to cover these economies after the effect of China Pakistan economic corridor on these economies. Since 2016 Pakistan, China and India are under the immense pressure of world political influences. There are a lot of unfavorable variables like; instability of Pakistan government, the political clashes of North Korea and USA, the war against terrorism. So the future of this topic in these economies might be the victim of lots of ups and downs. The policy makers must realize the importance of China, Pakistan economic corridor and the negative influences of instabilities and uncertainties.

Literature Review

The world has just come back from a huge financial crisis [16]. The stable economies have not faced the strong after effects as compare to more volatile economies. But no doubt these stable stock markets could not bear the episodes of these types of financial crisis.

Table 1: Summary Statistics (Stata 12).

Summary of the basic statistics of the data					
Variable	Observations	Mean	Std. Dev	Min	Max
GDP	72	1.72E+12	2.70E+12	5.15E+10	1.12E+13
stmarkcap	72	1.04E+12	1.60E+12	4.90E+09	8.19E+12

Table 2: Pooled regression model (Stata 12).

Results				
pooled regression model				
GDP as dependent and stmarkcap as independent variable				
Number of observations			72	
F(1,70)			535.22	
Prob > F			0	
R-squared			0.8843	
Adj R-squared			0.8827	
Root MSE			9.40E+11	
GDP	Coefficient	Std. Err.	t	p> t
stmarkcap	1.52	0.066	23.12	0
constant	1.27E+11	1.30E+11	0.97	0.334

Table 3: Fixed effects model (Stata 12).

Results				
Fixed effect panel regression model				
GDP as dependent variable and stmarkcap as independent variable				
Number of observations			72	
F(1,70)			384	
Prob > F			0	
R-squared			0.8843	
GDP	Coefficient	Std. Err.	t	p> t
stmarkcap	1.41	0.072	19.62	0
constant	2.45E+11	1.26E+11	1.95	0.066

The financial crisis has rung the alarming bell for the more volatile stock markets [17]. The stock markets with huge potential and with least stability have to understand the worth of stock market growth. The gross domestic products numbers have faced multiple jerks during the history since 1990. The financial crisis has dropped the numbers of GDP around the world. The period of five years starting from 2010 has not faced a better number. But overall the GDP numbers are very much improved since 1990 [18]. The problem is that there are lots of researchers who have contributed their contribution in this particular economic field, but there is still a huge gap due to inconsistencies in the world of literature and relevant scholarships. These inconsistencies have introduced a research gap for the upcoming researchers in this field. The panel regression has revealed a positive impact on stock market development on the economic growth and economic development in Pakistan, India and China. The policy makers must understand the importance stock market stability for the better numbers of economic growth in these countries.

The random effects model is better and it is confirmed by

Hausman specific test. The random effect model predicts the positive impact of market capitalization on gross domestic products in this Asia specific region. The results are statistically significant and can be understood and considered by the policy makers. The stock market capitalization has positive impact on GDP in Pakistan, India and China. No doubt currently the China is more aggressive than Pakistan and India in development. China is now planning a CHINA PAKISTAN ECONOMIC CORRIDOR in Pakistan and in the near future the stock markets of Pakistan and China are potentially more feasible as compare to other stock markets.

Doing research in the field of macroeconomics has been always a matter of differing opinion. The different economic situation in every country is different and therefore the findings can be significantly different in every economy. The researchers are always aware of different findings. The impact of stock market growth and economic development has been studied in the field of research a lot, but still, the researchers do not find a conclusive verdict on it. There are many valuable researchers who have come to different conclusions.

Marques (2013) [19], has studied the Portugal Economy, It has been claimed that the stock market growth does granger cause the economic growth. For this research he used time series study from 1993-2011 and granger causality test. He also claimed that Portugal is a smaller economy as compare to other European countries but still this economy matters for the stakeholders. Babajide (2016) [20], argues a very confident findings that stock market strongly and significantly changes to the economic growth, at the same time he advises the policy makers to consider this impact with deep interest for future policy making process. He also adds his conclusions by testing the relationship of many macroeconomic factors, along with interest rates and the stock market growth.

Muhammad Aamir Ali (2014) [21], argues that GDP per capita is strongly influenced by stock market development. His study is based on the Asian big economies from 1991-2011. He also considers many other macroeconomic variables in his study. Ayadi (2015) [22], argues by considering the data from 1985-2009 that the GDP has significant negative impact on the stock market liquidity and size. This is a panel study and in this study, he advises the policy makers to consider the impact of stock market growth in the economy. The evidence of his conclusion is very strong as he has conducted his research with a very wide range of panel data. His result has created a big consistency with Marques (2013) and Babajide (2016) because their findings were not defining the direction of the relationship between these variables and Carpenter (2017) [23], conducts research in China economy and comes up with a very strong analysis of the fastest growing economy in the world. He argues that the stock market is playing a vital role in the field of economics and stock market growth is extremely important in economic growth in China. His findings are in line with Marques (2013) and Babajide (2016).

Every year the new research opens a new door for the policy makers, the conclusive and consistent findings do not come on to the stage. The different time series and cross sectional studies are the pillars of rich literature. Now the era of 2017 has come up, but this topic is still fighting for consistent findings. And this is the beauty of economics and social science which most of the times gives inconsistent findings lead to more researches in the future.

Table 4: Random effects model (Stata 12).

Results				
Random effect panel regression model				
GDP stmarkcap				
Number of observations		72		
Wald chi2		416		
Prob > chi2		0		
R-squared		0.8843		
GDP	Coefficient	Std. Err.	z	p> z
stmarkcap	1.43	0.07	20.41	0
constant	2.23E+11	2.82E+11	0.79	0.429

Table 5: Hausman Specific test (Stata 12).

hausman specific test	
test: H0: difference in coefficients not systematic	
prob>chi2	0.1782

Faisal (2017) [24], argues with time series research totally based in China. He applied auto regressive model and the data is collected from 19990-2015. He studied the impact of stock market growth on economic development and FDI in China. He studied the positive impact of FDI on stock market growth and negative impact of financial development. He also applied granger causality run, which also predicts the uni directional relationship similarly Barro (2017) [25], argues by studying 30 countries and he also explains the worth of stock market by saying that when the stock market gets crushed the economy feels depression. The depression is significantly related to the performance of stock market performance. The inconsistent findings over the different economies are the main concern for the future researchers and this is the only reason for research gap. The impact of stock market growth on economic growth and the economic development is the important topic of research in these days.

Methodology

The framework for this study is based on and supported by rich literature. Most of the researchers have used stock market capitalization (stmarkcap) as independent variable and gross domestic product (GDP) as the dependent variable. The following econometric model is supported by Marques (2013), Babajide (2016), Muhammad Aamir Ali (2014) and Carpenter (2017). The panel regression is applied in this study, the panel study is a very strong econometric tool for forecasting [26]. There are three models which have been used in this study, firstly the pooled regression model in which the panel of the data is not considered, it is basically the simple regression model which is more relaxed. Secondly the fixed effects model is applied. The fixed model is very effective when the panels are considered to be invariant over the countries. It is assumed in the fixed effects models that there are no significant changes in the culture of the countries [27]. Finally the Hausman test is applied to check which one is better than fixed effects model and random effects model [28].

In our study there are three countries have been used, Pakistan, India and China. No doubt these countries have huge cultural differences, but as far as the Asian significance is concerned, these countries are in the same region [29]. After the fixed effect model the

random model is applied, which is again a relaxed model as compared to fixed effect model. The data are consisted over 25 years for each country, the data span is from 1993-2016 and data are collected from the world bank data bank. The Stata 12 is used as statistical software in this study. The reason for selecting this span is very critical, during this span the economies of Pakistan, India and China have faced a lot of ups and downs. Particularly Pakistan has been facing the war against terrorism since 2001 [30] which has put a lot of effects on the stock market numbers.

In the model the GDP is considered dependent variable and stmarkcap as independent variable. The GDP is gross domestic product values in US dollars and stock market capitalization is also measured in US dollars.

$$[gdp]_{it} = \beta_0 + \beta_1 [stmarkcap]_{it} + \varepsilon_{it}$$

In the above equation the dgp is dependent variable and stmarkcap as independent variable. The β_0 & β_1 are used as constant and coefficient respectively. The "i" means numbers of panel (countries) whereas "t" is used as a time. On the other side " ε_{it} " is used as the error term in the equation. Finally the robust function test [31] on random effects model is applied in Stata 12, the robust function controls for the serial correlation and accounts for the heteroscedasticity problem [32].

Results and Discussion

Table 1 shows the summary statistics, which shows 72 observations in this study, the table 2 shows the results of pooled regression. The value of the coefficient of determination is 88.43%, which shows that the pooled regression model is explaining 88.43% explanation in the model, the 11% explanation cannot be covered by the model [33]. The R-square numbers are very important for the overall fit of the model [34]. The stock market capitalization is explaining almost 90% variation in the dependent variable which is Gross Domestic Products (GDP). The probability of F-statistics are 0.0000 which shows that model is the best fit [35].

The coefficient of stmarkcap is significant as the p-value of the coefficient is 0.0000. The p-value shows the significance level of the constant or coefficients [36]. The coefficient value of stmarkcap is 1.528407 which shows the positive impact of stmarkcap on GDP. The constant is insignificant. The results suggest that stock market capitalization plays significant and more elastic role in the economic growth and economic development.

The table 3 shows the results of fixed effects panel regression. The value of the coefficient of determination is 88.43%, which shows that this regression model is explaining 88.43% explanation in the model, the 11% explanation still can not be covered by the model. The probability of F-statistics is 0.0000 which shows that model is the best fit.

The coefficient of stmarkcap is significant as the p-value of the coefficient is 0.0000. The coefficient value of stmarkcap is 1.414606 which shows the positive impact of stmarkcap on GDP. The constant is significant at 10% significance level.

The table 4 shows the results of random effect panel regression. The value of the coefficient of determination is 88.43%, which shows

that this regression model is explaining 88.43% explanation in the model, the 11% explanation still can not be covered by the model. The probability of F-statistics are 0.0000 which shows that model is best fit.

The coefficient of stmarkcap is significant as the p-value of the coefficient is 0.0000. The coefficient value of stmarkcap is 1.435821 which shows the positive impact of stmarkcap on GDP. The constant is not significant even at 10% significance level.

Table 5 shows the Hausman effect results, the p-value of the model is 0.17 which is more than 0.05. The model is in the favor of fixed effects model if the p-value of Hausman specific test is less than 0.05 and the model is in the favor of random effects model if the p-value of the model is more than 0.05. The Hausman specific test signifies the favor of random effect model because all these three countries are different to each other. That is why fixed effect model is not supporting the panel regression results rather random effect model is fine for these countries. The selection of random effect model by Hausman specific test clears that the random effect is covering the heterogeneity among the countries.

The panel regression model based on time-fixed effects model has also been tested, the model is the best fit because the p-value of F-statistics is 0.0000. The R-square value of the model is 92.53%, which shows the strength of the model. Only 7% of the model is remained unexplained. The p-value of each individual year is insignificant it means that this model is not fit for the data.

$$[gdp]_{it} = 2.23e+11 + 1.435821[stmarkcap]_{it} + \varepsilon_{it}$$

The F-statistics show the results of coefficients for each year in panel regression model based on time-fixed effects model. And the p-value of F-statistics in more than 0.05 which shows that this fixed effects model for time fixed regression is not the best fit for the model. The robust model of random effect panel regression has also been tested, and this model controls the heteroscedasticity and serial correlation problem in the model. Results show that panel regression with the robust function, based on random- effects model. The model is best fitted because the p-value of F-statistics are 0.0000. The R-square value of the model is 88.43%, which shows the strength of the model. Only 12% of the model is remained unexplained.

By applying the robust function the model does not show the more different results. The p-value of F-statistics are 0.0000 that shows that the model is the best fit and can be relied upon. The R-square value within the panel is 84.99% and the R-squared value between the panels is 97.33%. So overall it can be concluded that the model is covering maximum explanation and variations. The wald_chi2 value is 1435.26 that shows the significance of the model overall.

The F-statistics model shows the p-value 0.0825, it means the fixed time effects model is significant at 10% significance level. The fixed time effects model is not significant as significant the random effects model. So the random effects model is better as compare to time fixed effects.

Conclusion

The policy makers must understand the worth of panel regression results because panel data cover the time series and cross sectional effects at the same time. Policy makers must understand the strength

of panel regression for forecasting purpose, the panel regression always provides strength and significance of the findings of the research. The modern researchers are more focused on panel data, because of its capability of covering more effects and deviations of the data. The Hausman specific effect model signifies the significance of random effect model. The three countries' data from 1993-2016 is a valid sample for the study. The policy makers of these countries may use the results and findings for future planning. The panel regression is very important and significant tool for analyzing the econometric model. The market capitalization has shown the positive impact on GDP, therefore the policy makers must understand the importance of stock market development on economic growth of these countries. The results show that GDP is influenced by 1.4 degrees with the change of stock market capitalization in this region. The concept of industrialization is totally reflected by stock market capitalization, because the financial market is developed by stock markets in the economies. The panel data have covered the time series and cross sectional data at a time in the regression analysis. The results of this study are very reliable because the panel data allowed the researchers to control the panels for cultural differences.

The policy makers must understand the importance of stock market numbers in any economies. The interest of stakeholders is directly and indirectly reflected by the stock market capitalization and stock liquidity. The industrialization is mandatory for the economic growth and economic development. The industrialization attracts the interest of stakeholders, particularly the interest of shareholders and lenders. The development of industrialization gives two fold benefit to the economy. The better industrialization is the only source to increase the stock market growth and ultimately enhance the economic growth of the economy. The results of the robust model in shows reliable numbers for the policy makers, the robust model means the results are controlled for serial correlations but still the coefficient of determination 88.43% which is very reliable for the policy makers. The model is a panel which has controlled the dynamics of time series study and cross sectional study as well. China, Pakistan economic corridor will be the key for Pakistan and China; these have already been pulled a bulk of investments in these economies and have shown its impact on the stock market. The future of these economies is very important to consider because the huge investment will change the numbers in the stock markets and will have an effect on the indicators of economic growth and development.

This study will be very beneficial for the policy makers as this study has shown the significant results which are to be considered for future policies and decisions for these countries, currently Pakistan has been observing downfall in the stock market because of political instability and quick change of Prime Minister upon the orders of the supreme courts. These fluctuations need to be controlled for stable and consistent growth of the stock market in the future. The internal and external factors are very important to react in the favor of the stock and financial market development. The government as to play a critical role, and all reinforcement bodies must make sure that incoming era the country should not face any political instability bubble. Similarly, China is thought to be the economic leader in near future because of quick growth and stable economic conditions. So far India has to understand the importance of this region in the future, India must understand the political and economical challenges and to

react in the favor of development.

Since India and Pakistan tension has not been exactly solved, the uncertainties are always there. It will be a huge challenge for these economies to cut the edges in the future. This region has got the potential to lead the world in all aspects of economic growth and development. The confidence of stakeholders will increase the industrial development in this region, which will act as catalyst for the financial development in these economies. But these potential investors are only attracted on the basis of good governance and stable political and economical conditions. The policy makers must try to work together, China, India and Pakistan can boost the stock market by working closely and winning the confidence of each other. China can play a major in stabilizing the tension between Pakistan and India. Once these two countries understand each other and China can mediate and moderate the relationships, then this will help in south Asia development. Other countries like Russia, Bangladesh, and Sri Lanka can get benefit out of the future development.

Now researchers are the key to play a maximum role in the development of these countries. The continuous and consistent findings of researchers may influence the actual importance in the sight of these countries. Policy makers will be motivated on the basis of practical and real time findings of the researchers. This region shall be considered as the key area of research in the coming future for the economists and researchers of financial development and economic growth. As far as the industry is concerned the financial development can be considered as the indirect indicator of economic growth and development. This region is rich in resources, the only factor which is required is the stable environment for the investors and research and development. The industrialization can extract multiple substitute for the future humanity.

Limitations

The study is still wide open for the upcoming researchers. Pakistan, India and China are the main concern these days. China, Pakistan Economic Corridor is the backbone for the future economic development indicators [37]. The study is only limited up to 1993-2016, but the upcoming researchers may stretch the research span of analysis. The more panels may be brought into the study and more years may bring into the panel study. Time series and cross sectional studies may be very helpful for the future researchers and the policy makers. The moderators and mediators can also be applied to the given model. Many independent variables are not used in this model that can act as controlled variables. In fact, this study is aimed to study the sole impact of stock market capitalization on GDP.

References

1. Beck T, Levine R. Stock markets, banks, and growth: Panel evidence. *Journal of Banking and Finance*. 2004; 28: 423-442.
2. Demirguc-Kunt A, Ross L. Stock markets, corporate finance, and economic growth: an overview. *The World Bank Economic Review*. 1996; 10: 223-239.
3. Wade R. Governing the market: Economic theory and the role of government in East Asian industrialization. Princeton University Press. 1990.
4. Enisan AA, Olufisayo AO. Stock market development and economic growth: Evidence from seven sub-Saharan African countries. *Journal of Economics and Business*. 2009; 61: 162-171.
5. Harrison A. Openness and growth: A time-series, cross-country analysis for developing countries. *Journal of development Economics*. 1996; 48: 419-447.
6. Chen B, Feng Y. Determinants of economic growth in China: Private enterprise, education, and openness. *China Economic Review*. 2000; 11: 1-15.
7. Arellano PD, Demetriades PO, Luintel KB. Financial development and economic growth: the role of stock markets. *Journal of Money*. 2001; 33: 16-41.
8. Chenery HB, Sherman R. Industrialization and growth: a comparative study. Washington DC. 1986.
9. McCarthy J. Pass-through of exchange rates and import prices to domestic inflation in some industrialized economies. *Eastern Economic Journal*. 2007; 33: 511-537.
10. Krishnamurthy S, Zhou J, Zhou N. Auditor reputation, auditor independence, and the stock-market impact of Andersen's indictment on its client firms. *Contemporary Accounting Research*. 2006; 23: 465-490.
11. Firth M. The impact of size, stock market listing, and auditors on voluntary disclosure in corporate annual reports. *Accounting and Business Research*. 1979; 9: 273-280.
12. Guerrero SL, Lapalme M, Herrbach O, Seguin M. Board member monitoring behaviors in credit unions: The role of conscientiousness and identification with shareholders. *Corporate Governance An International Review*. 2017; 25: 134-144.
13. Cheremukhin AG, Golosov M, Guriev S, Tsyvinski A. The Industrialization and Economic Development of Russia through the Lens of a Neoclassical Growth Model. *The Review of Economic Studies*. 2017; 84: 613-649.
14. Fama EF. The behavior of stock-market prices. *Journal of Business*. 1965; 38: 34-105.
15. Asumadu-Sarkodie S, Owusu PA. The causal effect of carbon dioxide emissions, electricity consumption, economic growth, and industrialization in Sierra Leone. *Energy Sources Part B Economics Planning and Policy*. 2017; 12: 32-39.
16. Ivashina V, Scharfstein D. Bank lending during the financial crisis of 2008. *Journal of Financial Economics*. 2010; 97: 319-338.
17. Lemmon ML, Lins KV. Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis. *The journal of finance*. 2003; 58: 1445-1468.
18. Baig T, Goldfajn I. Financial market contagion in the Asian crisis. *IMF Staff Papers*. 1999; 46: 167-195.
19. Marques LM, Fuinhas JA, Marques AC. Does the stock market cause economic growth? Portuguese evidence of economic regime change. *Economic Modelling*. 2013; 32: 316-324.
20. Babajide AA, Lawal AI, Somoye RO. Stock market response to economic growth and interest rate volatility: evidence from Nigeria. *International Journal of Economics and Financial Issues*. 2016.
21. Ali MA, Amir N. Stock Market Development and Economic Growth: Evidence from India, Pakistan, China, Malaysia and Singapore. *International Journal of Economics Finance and Management Sciences*. 2014; 2: 220-226.
22. Ayadi R, Arbak E, Ben-Naceur S, Groen WP. Financial Development, Bank Efficiency and Economic Growth Across the Mediterranean. *Mediterranean Prospects*. 2015.
23. Carpenter JN, Whitelaw RF. The Development of China's Stock Market and Stakes for the Global Economy. *Annual Review of Financial Economics*. 2017; 9: 233-257.
24. Faisal F, Muhamad PM, Tursoy T. Impact of Economic Growth, Foreign Direct Investment and Financial Development on Stock Prices in China: Empirical Evidence from Time Series Analysis. *International Journal of Economics and Financial Issue*. 2016.
25. Barro RJ, Ursua JF. Stock-market crashes and depressions. *Research in Economics*. 2017; 71: 384-398.
26. Kao C. Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*. 1999; 90: 1-44.

27. Greene W. Fixed and random effects in stochastic frontier models. *Journal of productivity analysis.* 2005; 23: 7-32.
28. Hausman JA. Specification tests in econometrics. *Econometrica.* 1978; 46: 1251-1271.
29. Thompson AH, Chesson LA, Podlesak DW, Bowen GJ, Cerling TE, Ehleringer JR. Stable isotope analysis of modern human hair collected from Asia (China, India, Mongolia, and Pakistan). *Am J Phys Anthropol.* 2010; 141: 440-451.
30. Hadar LT. Pakistan in America's War against Terrorism: Strategic Ally or Unreliable Client?. *Cato Institute.* 2002.
31. Hoechle D. Robust standard errors for panel regressions with cross-sectional dependence. *The Stata Journal.* 2007; 7: 281.
32. Baltagi BH. *Econometric analysis of panel data.* John Wiley and Sons. 2008.
33. Nagelkerke NJ. A note on a general definition of the coefficient of determination. *Biometrika.* 1991; 78: 691-692.
34. Cameron AC, Windmeijer FA. An R-squared measure of goodness of fit for some common nonlinear regression models. *Journal of Econometrics.* 1997; 77: 329-342.
35. Goudet J. FSTAT (version 1.2): a computer program to calculate F-statistics. *Journal of heredity.* 1995; 86: 485-486.
36. Rice WR. Analyzing tables of statistical tests. *Evolution.* 1989; 43: 223-225.
37. Abid M, Asfaq A. CPEC: Challenges and opportunities for Pakistan. *Pakistan Vision.* 2015; 16: 142-169.