SHORT COMMUNICATION

Environmental Pollution a Negative Externality from China Pakistan Economic Corridor (CPEC): Policy implications for Pakistan

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Introduction

The China-Pakistan Economic Corridor (CPEC) is considered as the ‘flagship’ project of China’s Belt and Road Initiative (BRI) and has been widely acclaimed by both Chinese and Pakistani officials often terming it as ‘game-changer’ to overcome Pakistan’s lingering issues of energy and economic crisis. Within the framework of CPEC, China is investing more than 56 billion US dollars as Foreign Direct Investment (FDI) in various energy and infrastructure projects including a vast network of railways, highways, economic zones and gas pipelines. While much has been debated and written about various projects under CPEC in the existing academic discourses, vis-à-vis threats to the biodiversity (Nabi et al., 2017), its potential implications to environmental hazards (Ali, 2018) and to overcome energy shortfall of Pakistan (Kugelman, 2017). However, scientific study to reinforce the issues of environmental pollution, particularly relating to CPEC coal-based energy projects have been still lacking.

The pertained literature on CPEC consisted qualitative studies to inspect and judge different aspects such as importance of CPEC for both countries and its effects on geo political of South Asia. Challenges for CPEC in Pakistan, South Asia and foreign policy between China-Pakistan), as Nan, (2015) explained that this project is not only valuable for Pakistan and China, but it is also beneficial for the global economy by including several other countries. Furthermore, Li and Sun, (2015) and Irshad, etal., (2015) reported the importance of CPEC and it long and short-term benefits for both countries. Further, Hussain and Khan (2017) also stated that it will enhance the cooperation between two countries and advantageous for Chinese, Middle Eastern and South Asian people (Ali, 2016). Further, Wolf, (2017) explained the insights, potentials and challenges concerning CPEC and domestic level cooperation between China and Pakistan.

In addition, quantitative studies focused to shed a light on the impact of China Pakistan Economic Corridor (CPEC) (Such as, impact on gdp, socio-economy, trade, stock market, energy sector and infrastructure). CPEC will build rails and roads infrastructure and infrastructure development may decrease the poverty and increases the agriculture development in Pakistan (Ahmed & Mustafa, 2016). Most recent article examined the impact of CPEC impact on energy (energy consumption and energy saving potential) in the prospect of Pakistan (Mirza, Fatima, Ullah, 2019). A latest study surveyed in Pakistan and their research results shows that entrepreneur’s attitude and intentions to China and Pakistan Economic Corridor (CPEC) development is positive, it means CPEC project also designing an entrepreneurial environment (Kanwal et al., 2019).

A large number of studies (Begum, etal., 2015; Ozturk, and Acaravci, 2010) have discussed various elements and causes of CO2 emissions. Similarly, many researches (Khurshid, etal., 2018; Hadi, etal., 2018; Hussain, 2017; Hussain, 2015) on Pakistan-China relations in the context of economy, society and geopolitical point of view. Present study is aimed to investigate the CPEC development effects i.e. gross domestic product (gdp), foreign direct investment (fdi), trade openness (top), energy consumption (enguse) on environmental pollution (CO2) in Pakistan using FMOLS and DOLS methods.

Materials and Methods

Initially, this study applied Augmented Dicky Fuller (ADF) and Phillips Perron (PP) tests for detecting the unit root in the data. ADF test is the extended form of Dicky and Fuller tests (1979, 1981), which is extended by Dicky and Fuller by introducing lagged value of the dependent variable to remove autocorrelation (Asteriou and Hall, 2007). This test assumes the constant variance of error term and uncorrelated error term. In equation form it is written as:

$$\Delta Y_{t-1} = \beta_1 + \beta_2 t + \sum_{i=1}^{p} \alpha_i \Delta Y_{t-i} + \mu_t$$

Similarly, the second test used to detect stationarity is the test developed by Phillips and Perron (1998) test shortly written as PP test. PP test is the reform of t statistics in ADF test and it take into account the less restrictive nature of the error process (Asteriou and Hall, 2007).
Asafu-Adjaye, 2000; Mehrara and Musai, 2014) and energy (Sbia, et al., 2014; Wang et al., 2014) are influential factors of environmental pollution in Pakistan (Table 2). However, some studies also found a negative relationship among energy consumption and growth (Asafu-Adjaye, 2000; Mehrara and Musai, 2012; Shahbaz and Rahman, 2012; Ali, et al., 2013; Kumar and Kumar, 2013). The effect of foreign direct investment and trade openness is positive but their effect is in significant. However, Bakhsh et al. (2017) suggest the key role of foreign direct investment in CO₂ emissions.

The results reveal that the study recent inflow of foreign direct investment from China would enhance environmental pollution in Pakistan. The results of the

| variables     | Intercept & trend | Intercept & trend |
|---------------|-------------------|-------------------|
| gdp           | 1.086992 (0.9960) | -3.398641 (0.0223) |
| fdi           | -2.761718 (0.0777) | -3.370164 (0.0217) |
| enguse        | 0.375696 (0.9780) | -4.797507 (0.0077) |
| CO₂          | -1.519529 (0.5087) | -4.826022 (0.0007) |
| top         | -1.544643 (0.4963) | -2.400884 (0.3708) |

Phillips-Perron Test Statistic

| variables     | level  | 1st difference | level  | 1st difference |
|---------------|--------|----------------|--------|----------------|
| gdp           | 3.059424 (0.0420) | -6.498925 (0.0000) | -3.076820 (0.1316) | -6.433451 (0.0001) |
| fdi           | -2.090487 (0.2497) | -3.406713 (0.0200) | -2.022708 (0.5633) | -3.366766 (0.0780) |
| enguse        | 0.375696 (0.9780) | -4.796175 (0.0077) | -1.467173 (0.8159) | -5.349401 (0.0010) |
| top         | -1.544643 (0.4963) | -6.354144 (0.0000) | -2.409669 (0.3667) | -6.344303 (0.0001) |
| CO₂          | -1.498359 (0.5192) | -4.866675 (0.0006) | -0.827741 (0.9502) | -5.349733 (.0010) |

Results and Discussion

The results reveal that growth (Agugliaro et al., 2013; Lee and Brahmasrene, 2014; Oztruk and Bilgili, 2015) and energy (Sbia, et al., 2014; Wang et al., 2014) are influential factors of environmental pollution in Pakistan (Table 2). However, some studies also found a negative relationship among energy consumption and growth (Asafu-Adjaye, 2000; Mehrara and Musai, 2012; Shahbaz and Rahman, 2012; Ali, et al., 2013; Kumar and Kumar, 2013). The effect of foreign direct investment and trade openness is positive but their effect is in significant. However, Bakhsh et al. (2017) suggest the key role of foreign direct investment in CO₂ emissions.

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By following the previous studies (Merit and Boluk, 2016; Oztruk and Bilgili, 2015; Wang et al., 2014) CO₂ emissions were chosen as a proxy for environmental pollution. The proxy for economic growth (gdp) is natural log of gross domestic per capita. Likewise, the proxy for openness (top) in economy is trade as percentage of the GDP and lastly for inflow of foreign direct investment the present study uses foreign direct investment as a percentage of GDP. The main source of the data is World Development Indicators (WDI). DOLS show that 1% increase in growth will increase the environmental pollution by 0.0014%. Though, the effect is small but its effect is significant. However, this effect will increase in future due to higher economic growth in Pakistan. Similarly, the role of energy consumption is also effective and an increase in consumption of energy have significant impact on the pollution in Pakistan. On the other hand, the effect of foreign direct is not significant but its effect is positive increasing the environmental pollution in Pakistan (Muhammad et al., 2019; Bakhsh et al., 2017). The
effect of open trade policies have also positive influence on the pollution. Earlier workers also observed that trade openness increases the CO₂. The researches of (Zafar et al. 2019; Shahzad et al. 2017; Sbia et al., 2014).

Lastly, the results of the present study show the negative effects of energy on environment pollution. Similarly, the empirical studies (Tariq et al., 2019; Mert and Boluk; 2016; Wanget et al., 2014) have also shown that higher CO₂ emissions are caused due to energy consumption.

Conclusion

The results of the present study show the negative effects of energy on environment pollution. Therefore, the rise in energy consumption in future would further deteriorate the environment in Pakistan. Thus, to overcome the environmental issues, it is necessary to consider the sustainable development as a priority to ensure in the policymaking and implement environmental sustainability in the country.

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