Pakistan Economic and Social Review
Volume 59, No. 1 (Summer 2021), pp. 51-84

THE IMPACT OF MACROECONOMIC FACTORS ON CARBON DIOXIDE EMISSION IN SOUTH ASIA: A PANEL ANALYSIS

RIZWAN ALI, RAI IMTIAZ HUSSAIN AND SHAHBAZ HUSSAIN*

Abstract. This research aims to analyze the impact of macroeconomic factors on Carbon Dioxide emissions in South Asia by using the penal data from 1995 to 2018. The issue of Carbon Dioxide emissions is ignored in most South Asian Countries. Secondary data was used to perform the panel analysis. The data was obtained from the World Bank. The use of the ADF-unit root test checked the stationarity of variables. Moreover, different econometric techniques - such as Hausman, Correlation, and ordinary least-square tests- were applied to evaluate the impact of the macroeconomic factors on Carbon Dioxide emissions. The results show that income, energy consumption, urbanization, and Carbon Dioxide emissions were positive and statistically significant long-run relationship, and those variables enhance the level of Carbon Dioxide emissions. Whereas trade openness, financial development was negative and insignificant connected with Carbon Dioxide emissions. Hence, the results suggest that trade openness and financial development improve environment quality. The research also filled the existing literature gap in applying the Ordinary Least Square (OLS) technique for South Asian countries to analyze this related

*The authors are respectively MS Scholar at Department of Management Sciences, Lecturer at Department of Commerce and Assistant Professor at Department of Management Sciences, University of Okara, Okara – Pakistan.
Corresponding author's e-mail: rai.hussain@uo.edu.pk

issue. Limited studies were available in Carbon Dioxide emissions and were not tested in South Asia, which was a vital issue nowadays.

Keywords: Income, Trade Openness, Energy Consumption, Urbanization, Financial Development, Carbon Dioxide Emissions.

JEL Classification: F61, O12

I. INTRODUCTION

In the last few decades, the effect of macroeconomic factors on Carbon Dioxide emissions has received rising attention from researchers and academia. Corbin Dioxide emissions are a source of generating heat in the atmosphere-ocean and the earth's surface, which is called global warming that it leads to global changes (Alvarez, Segura, & Martínez-ferrero, 2014). The opinion of the United Nations Framework Convention on Climate Change (UNFCCC) is "global climate changes which are directly or indirectly linked with human activities that alter the composition of the global atmosphere and which is in addition to natural climate periods" (GEO4, 2007). Carbon Dioxide emissions are the problem affecting their foreign direct investment (FDI) and the environment in developing countries (Dogan & Seker, 2016). However, Bajpai (2018) found that the Asian economies face environmental degradation due to the flow of industrial waste, polluted air affecting their health. The growth and development are measured by different key factors further; some critical factors increase the growth and development, like free trade openness and foreign direct investment (FDI). Some above factors have an impact on natural resources and sustainability (Dogan & Seker, 2016).

Moreover, Carbon Dioxide emissions are the primary reason for greenhouse gas they have and acquire costly consideration in previous years. Many stimulating factors make the environment polluted and international trade (Cetin & Ecevit, 2015). The "General Agreement on Tariffs and Trade" (GATT) trade among different countries has enhanced significantly, increasing ease of doing business. Similarly, the current rule of GATT to the World Trade Organization (WTO) has increased global trade. The current strategy creates the "Trade Facilitation

Agreement (TFA), which is predicted that the worldwide business by up to one trillion $ dollar within a year with high returns for developing countries. Also, Carbon Dioxide emissions in the global value chain are increasing more quickly than the few economic indicators like population or real income. The role of financial development in the economic growth (GDP) situation truly affects the environmental quality (Al-mulali & Ozturk, 2015). It depends upon the utilization of financial resources, which is closely linked with economic growth. Business development & economic growth can impact Global Warming, such as controlling energy consumption and enhancing trade to reduce greenhouse gas emissions (Al-mulali & Ozturk, 2015).

Economic development demands the change of raw material into finished goods at a considerable quantity level using fuel gained through fossil fuels. The use of fossil fuels releases GHG (greenhouse gas), which is scientifically approved as a major cause of global warming. It is a fact that the maximum use of fuel as energy and conversion of raw material into finished goods being dangerous results in the form of declining God gifted resources and atmospheric harmful and critical changes (Ahmed, 2016). It is found that the relationship between energy usage and environmental degradation in different countries' energy consumption or over natural resources encourage greenhouse gasses and adversely influence the environment (Aydin & Esen, 2017; Park *et al*., 2015; Saud, Chen, & Haseeb, 2018).

It is expected that the gas called greenhouse would increase the high level of 2^0C that might be 1.5^0C, according to the individual's level for 2020. In previous years the effects of the economy and different factors of environment quality on each Other are shown using the Environment Kuznets Curve (EKC). The assumption of the relationship between the economy and CO_2 gas shows in an inverted-U relationship assumption of EKC expressed an Inverted-U relationship through the income per capita and many precautions of environmental quality. In these conditions, quartic of per capita or linear polynomials are primarily used to explain the gas of CO_2. There are many factors which caused environmental pollution such as natural changes in climate, over raining, flood in various countries fair in forests changes as mentioned earlier in the environment are the main reasons that caused environmental pollution.

These events profoundly influence natural resources and human lives, which are most important (Kamran, Teng, Imran, & Owais, 2019). The Environment Kuznets curve (EKC) assumes a reverse U-shaped relationship between the actual output and environmental quality because atmosphere pollution increases up to a limit of GDP. After this, it declines with the development of GDP (Dogan & Turkekul, 2015).

The economic growth and development of a few Asian countries remain at the top position in the previous few years. These countries listed the leading economies of the world, like China and India. Economic growth directly impacts financial development and indirect influence on the environment that is the primary source of environmental degradation on the population's health (Aydin & Esen, 2017). In some situations reducing the level of CO_2 emission would unfavourably impact the economic growth for which the countries are willing to attain economic growth. The Asian countries are demanding more economic growth for this purpose; Asian countries used extra natural resources, which harmed the environment quality (Al-mulali & Ozturk, 2015). Scientists have warned that humans produce 30% of Carbon Dioxide emissions since 1750. The industrial communities produce 90% extra heat due to oceans are also affected by the climate (Dhiab & Dkhili, 2019).

Previous studies of (Bakhah *et al*., 2017; Salahuddin, Ali, Sc, Vink, & Gow, 2018; Sasana & Aminata,2019) on the relationship of energy consumption, economic growth, industrialization, FDI and Carbon Dioxide emission also identified that CO_2 emission had increased in Asian countries. This study explains the impact of Trade openness, Urbanization, energy consumption, income, and Financial Development on Carbon Dioxide emissions in South Asian countries. Previous researchers mainly reported the relationship between economic growth and Carbon Dioxide emissions (Acquaye *et al*., 2016; Shahbaz *et al*., 2016b; Bakhsh *et al*., 2017). However, this study will attempt to pinpoint the significant contributions to literature through CO_2 emissions based energy consumption and other subjected variables in South Asia challenges and prospects and recommended proper alleviation measures now and after enhancing this research. This research will be a new contribution in the literature about South Asian countries to stipulate appropriate policy implications by keeping in view the environments and

sustainability for completed and underway study problems from these studies in the future periods (CO_2 emission and energy demands).

II. REVIEW OF LITERATURE

CARBON DIOXIDE EMISSIONS

Global warming has become a major environmental problem facing the present period. If an appropriate policy is not devised for a significant reduction of CO_2 emissions below current levels within the next few years, the quality of the environment will further degrade. CO_2 emission will harm human health, ecosystems, and the economy. There is an increasing debate, which suggests that a new course of action is required to reduce CO_2 emissions at a minimum possible cost so that the benefits exceed the value (Shah, 2018). Further, the key contributors to Carbon Dioxide emissions are economic accomplishments by using fossil fuels, mainly & oil use (Solarin & Lean, 2016). According to the World Health Organization (WHO) study, pollution from the atmosphere is one of the most significant health threats that caused 7 million deaths in 2010.

According to the 'International Energy Agency' (IEA), Carbon Dioxide emissions were recorded at the highest level last year. The results show that CO_2 is increased 17 percent in 2020 as compared to the previous year. The situation is improved in the later months due to the uncertain status of COVID.19. Due to lockdowns and restrictions in different countries, CO_2 emissions have declined by 30%, as in previous years averages (Borunda, 2020).

INCOME

There is also an indication that as average income rises, the marginal influence of economic growth on Carbon Dioxide emissions is dropping. GDP indicates that reducing countries 'disparities will increase global warming by redistributing low-marginal countries' incomes to emit CO_2 to those with a high tendency. And it can be concluded that the world now faces a rivalry between climate change and social equity (Ravallion, Heil, & Jalan, 1997). In the United States energy information administration in 2009, OECD high-income countries accounted for almost 40 % of the world's total CO_2 emissions (Hassan & Salim, n.d.).

According to the original statement, EKC argues that initially, economic growth will lead to degradation of the environment. Still, slowly as income level enhances, this degradation will decrease, and a secure environment would occur in prosperous countries (Tu, 2009).

The EKC identifies a changing relationship between economic growth and environmental conditions. There is a first stage in which ecological degradation rises with per capita income until it reaches a certain level. Ecological pollution starts to decline with per capita income increasing (Ferra, 2003). Although the latter area is commonly considered a high-income area where infrastructure and access would also be sufficient, substantial variations have been found in the available human and financial resources, which translates into differing disparities in the provision of radiotherapy (Zubizarreta, Dyk, & Lievens, 2016). Further, those households become more environmentally sustainable as income increases and public policy complies with the specific output and consumption processes. In these two latter cases, the need for environmental quality plays a crucial role (Mcconnell & Mcconnell, 2015).

TRADE OPENNESS

Globalization, international trade increased dramatically, leading to concerns about its effect on Carbon Dioxide emissions and energy consumption (Rahman, 2013). Trade openness is indirectly good for the environment by its impact on per capita income, but not correct in developing countries. Since trade openness could raise production and revenue (Muhammad, Hye, & Kumar, 2012), there may be a trade-off between rising average living standards and regulating global warming. These two trade-offs indicate that reducing poverty would worsen global warming by higher real wages or lower inequality (Ravallion, Heil, & Jalan, 1997).

The removal of trading and technological innovation restrictions increased the growth rate and improved the production rate throughout the world. Both the developed and developing countries improved their economics through globalization and international trade. However, the set and emerging economies often have succeeded in achieving their socio-economic objective through international trade. As compared to

their peers, few developing countries quickly designed and produced an outstanding trading objective. As a result of their fast achievement of the industrializing economy, these countries earned 50% of the world's GDP during 2013 (Ahmed, 2016; Economic Surveys, 2013).

ENERGY CONSUMPTION

Energy consumption is an essential input for the process of production. Energy is attained through machinery and human capital. The Continuously energy supply is imperative to maintain and enhance the current level of output and living standards, as energy consumption among the industries is so large (Hundie, 2018). Energy use is also closely linked with economic development (Hafiz M, 2016). As more consumers of energy and as major emitters of CO_2 emissions, the world economy is giving considerable concern not only to India and China. But also to the world's rest nations (Wolde-rufael & Idowu, 2016). The energy system is dominated by coal in both countries, accounting for 63.7% of China's total energy consumption in 2015 and accounting for more than 50% of the world's coal consumption (BP BP - BP, London, 2015). Since the 1990s, CO_2 emissions from energy use in the newly developed countries have increased significantly compared to industrialized countries (Kasman & Selman, 2015).

In 2007, the overall world transport sector accounted for 23% worldwide and 27% of OECD countries of the global Carbon Dioxide emissions, much of which can to road transport. The world transport sector & energy consumption is expected to rise 2% per annum, with the highest growth rates in emerging economies. However, overall transport energy usage and carbon emissions are estimated to be approximately 80% more than the current 2030 rates (Work, 2007). Nowadays, the transport sector depends on oil consumption for 95% and represents 60 percent of overall oil consumption. However, it dominates the share of CO_2 emission compared to air and rail transport; furthermore, road vehicles use about one-third of global oil resources (Saboori, Sapri, & Baba, 2014).

URBANIZATION

Urban settlements are among human societies' most complex structures and important habitats (Doygun & Alphan, 2006). Urbanization continues to be a significant social trend that is growing every day globally as people are increasingly moving from rural to urban areas in search of social and greener pastures security. In an ideals case, urbanization encourages growth, opens doors to further economic development, and generates further capital and innovation to reshape science & other human activities (Ali, Abdul-rahim, & Ribadu, 2016). One of the most seeking stylized evidence of the demographic trend during a country's growth cycle is the rapid and historically unparalleled movement of people from rural to urban areas. By 2015, 3,943 billion people were living in cities, more than half of the world population (53.86 percent) 2050 around 64% of emerging countries' people will be urbanized (Bekhet & Othman, 2017) since urban megacities have more people, cars, traffic jams, etc. Although, as we know, there are more opportunities for jobs, better medical services, and higher wages in urban conurbations that will draw more and more people to these cities (B. Liu, Tian, Li, Song, & Zhanxin, 2018).

Rapid growth in China's energy consumption resulted in large-scale urban infrastructure and housing construction encouraged by urbanization and increased residential energy use driven by rural to urban migration (Ouyang & Lin, 2016). Because of income growing policies, developed countries are opening up their markets, and their populations are in the process of urbanization, creating possible environmental threats.

Could urbanization can lead to increased Carbon Dioxide emissions and energy consumption in developing countries? Previous studies have neglected to include both the national and income levels in their research, making it difficult to understand the degree to which urbanization and real income influence environmental pollution in this community of nations (Afridi, Kehelwalatenna, Naseem, & Tahir, 2019).

FINANCIAL DEVELOPMENT

The development was later replaced by a more meaningful and attractive term, "sustainable development." Sustainable development is defined as 'balancing the satisfaction of human needs with the

conservation of the natural ecosystem so that these needs can be met not only in the present but also in the indefinite future; environmental sustainability means the capacity of the environment to continue to work correctly indefinitely (Rehman, Ali, 2007). Global trade will make it possible for highly polluting companies to move to low-income countries where pollution regulations are usually less stringent (Elden, 2001). Effective financial intermediation allows consumers to take out loans and purchase big-ticket products such as vehicles, etc., which raises CO_2 emissions indicates that stock market growth leads to low borrowing costs ease CO_2 emissions (Sadorsky, 2010).

The results show the stock market growing in low borrowing costs, loosening liquidity restrictions for listed firms and boosting productivity increase energy use. Thus, CO_2 emissions the other thought; however, it maintains the financial (Abbasi & Riaz, 2016). Financial development is crucial as it can improve the economic system of countries. Financial development promotes a range of differences among the nations like; decline in risk of financial loss, the burden of liabilities, availability of investment and capital flow, fuel-efficient production, and technology (Sadorsky, 2010).

INCOME AND CARBON DIOXIDE EMISSIONS NEXUS

The Kuznets Curve (KEC) phenomenon is an inverted U-shaped relationship between income and environmental degradation. Therefore, a different researcher used various variables to measure environment quality, carbon dioxide emissions (CO_2), sulfur dioxide emissions, etc. Whereas most recent empirical work has used Carbon Dioxide emissions as an environmental pollution measure (I. Ozturk, 2017; Saud *et al*., 2019), per capita income and Carbon Dioxide emissions have a directional relationship (Afridi et al., 2019).

In this investigation, the bound test approach applying to co-integration found that both countries have long run but no significant relationship between income and Carbon Dioxide emission in the short and long run (Wolde-rufael & Idowu, 2016). The Gulf Cooperation Council (GCC) countries found a statistically significant & positive relationship between income and Carbon Dioxide Emissions in the long

run from 1995 to 2016. Also, results explain that high-income level countries generate a high level of CO_2 emissions (Dhiab & Dkhili, 2019).

This paper has reviewed penal data from 1960-2001 and evaluated to what degree both the current and stock of democracy in a country have essential and independent effects on SO_2 & CO_2 emissions. Although they found no evidence for the short-run impact of the current level of democracy, they found no evidence for the long-run stockpiles of democracy to help lower emissions of SO_2 and CO_2 emission (Baek & Pride, 2014). Therefore, they concluded that their income distribution from the wealthy to the poor would reduce overall household emissions. Most importantly, observation usually mentions changes in CO_2 emissions between families of earning levels. Some studies also target the relationship between the unequal distribution of income and household Carbon Dioxide emissions from a psychological perspective.

H1*: There is a positive statistically significant relationship between income and CO_2 emissions*

TRADE OPENNESS AND CARBON DIOXIDE EMISSIONS NEXUS

Some studies have recognized theoretical and empirical-based models for analyzing trade openness on Carbon Dioxide emissions. The effect of trade openness on environment quality is a significant component in the origination of trade policies. Using the same equation model (Sun *et al*., 2019; Dhiab & Dkhili, 2019). This study explores the causal relationship between trade openness and CO_2 emission. The results show that short and long-run trade openness controlling the level of Carbon Dioxide emission (Dogan & Turkekul, 2015).

There is a systematic relationship between trade openness and Carbon Dioxide emissions. When countries do more exports, the country economically secures their use of advanced technology, effective energy use, and strict environmental laws for the production process. That is the primary cause of reducing CO_2 emissions (Boamah *et al*., 2017). Examine the impact of trade on CO_2 emission by using the (105) developed and developing countries from 1990-2017. By using FOLS and DOLS conform that variables are linked in an extended period. The findings explain long-run has a positive impact on environmental

degradation and cause to increase the environmental quality. They confirm the unidirectional causal relationship between trade and CO_2 emissions (Zandi & Haseeb, 2019).

In the European Union, countries also enhance trade, leading to a decrease in Carbon Dioxide emission (Park, Meng, & Baloch, 2018). Carbon Dioxide emissions and trade openness have a significant positive relationship in the long run (Fan & Hossain, 2018). In contrast, it was found negative in the studies of (Dhiab & Dkhili, 2019). The literature shows contradictory results; therefore, it is tested here.

***H2**: There is a significant positive relationship between trade openness and CO_2 emissions*

ENERGY CONSUMPTION AND CARBON DIOXIDE EMISSIONS NEXUS

Many researchers worked on energy consumptions. The impact of energy consumption on CO_2 emission was analyzed in Afridi et al. (2019), which found a positive correlation between per capita energy consumption and per capita CO_2 emissions. In contrast, Dogan & Turkekul (2015) found in studies that a one percent rise in energy consumption increases Carbon Dioxide emissions by 1.16% & 0.89% in both the short-term and long-term in the USA. The policymaker should control energy use and CO_2 emissions in sub-Saharan countries (Cetin & Ecevit, 2015). The research applied the ARDL bound test approach and find the co-integration between electricity consumption and Carbon Dioxide emissions. The findings of this study that electricity consumption and stimulate Carbon Dioxide emissions in the short term & long term (K., Ozturk, I. & Sohag, 2017).

This study explains the usage of energy and environmental degradation from 1971-2016, for the short-run and long-run. The results show a positive relationship between energy consumption and Carbon Dioxide emissions (Kamran *et al*., 2019). This investigation was used as a fixed and random effect model. The nexus between energy use & CO_2 emissions in 23 Sub-Saharan African countries, from 1993-2014, found that energy consumption harms environment quality (In & Africa, 2019). Examine the relationship between the variables use co-integration, bound

test short, and long-run relationships and found a positive impact (Ã, 2009). The casual relationship between non-renewable energy consumption like fossil for cooking enhances the CO_2 emission and air pollution. The generalized method of Movement (GMM) model was used in the studies of (Ã, 2009) for 34 developing & underdeveloped countries from 1995 to 2015.

On the other hand, renewable energy improves environmental degradation. The objective of this study finds 122 countries' impact of energy use on Carbon Dioxide emission, and DOLS use the estimation method for log-run relationships. Energy use has a statistically significant and positive effect on CO_2 in all income level countries (Ehigiamusoe & Lean, 2019).

The casual relationship among financial development, energy consumption, and CO_2 emissions found Kuznets curve N shape in an extended period. The results found unidirectional energy use, financial development, and Carbon Dioxide emissions (Kivyiro & Arminen, 2014). A lack of previous studies in OIC countries addressing energy types on CO_2 emissions has encouraged these researchers to focus on this investigation.

***H3**: There is a positive statistically significant relationship between energy consumption and CO_2 emissions*

URBANIZATION AND CARBON DIOXIDE EMISSIONS NEXUS

The urbanization factor was casually included in the environmental function through the working of (Farhani & Ozturk, 2015) using the STIRPAT model on panel data from 1995-2010 in china. Examined this study, urbanization enhance energy consumption and Carbon Dioxide emission. The described theoretical and ecological both recognize that urbanization can have a positive & negative impact on environmental degradation in emerging economics. The expected that urbanization has continued to increase in those countries (Zhang & Lin, 2012).

The study explains the effect of Urbanization on Carbon Dioxide emissions. When the CO_2 emission increase as income level increase, found the relationship income, positive production impact on CO_2 emissions (Al-mulali, Normee, Che, & Gholipour, 2012). They use

ordinary least square FMOLS for panel data from 1980 to 2008. They found that 84% of the countries have a statistically significant & positive impact on the long-run relationship between CO_2 emission & urbanization. Only 16% of countries have mixed results (Zhang & Lin, 2012). A positive association was found in the study of Wang, Chen, & Kubota (2015) between urbanization and CO_2 emission and oil use and CO2 emission. The results also suggested that globalization and urbanization positively impact CO_2 emissions in 44 countries of Sub-Saharan Africa (SSA). A causality check is also conducted, which considers both of these issues. The calculated urbanization coefficient is positive & statistically significant and highly consistent across the various estimation techniques (Sheng & Guo, 2016). In the above literature, most studies discuss the relationship between CO_2 emissions and urbanization in developed countries and high-income levels. This research focuses on emerging economic countries contributing to developing countries' literature that is empirical and theoretical.

H4*: There is a positive relationship between Urbanization and CO_2 emissions*

FINANCIAL DEVELOPMENT AND CARBON DIOXIDE EMISSIONS NEXUS

Examine with the help of Dynamic Ordinary Least Squares (OLS) & Full Modified Ordinary Squares (FMOLS) method; found that the long-run dynamic relationship of financial development and CO_2 emission based on the panel data of 23 countries from 1985 to 2011. This investigation finds the relationship between financial development and CO_2 emissions in the Middle East and African countries from 1990 to 2011. The results examine the high level of financial development that could enhance energy consumption and R&D, promoting technological invasions lower CO_2 emissions (Omri, Daly, Rault, & Chaibi, 2015).

Investigate the co-integration financial development and CO_2 emissions based on the GMM model and penal data 155 countries. The results found that economic events could statistically significantly raise carbon dioxide emissions (Jiang & Ma, 2019). In this study, use a signal country data use. The results show that financial development has a

positive effect on CO_2 emissions. In the long run, financial development improves the environment quality (Boutabba, 2014). In contrast, financial development has no impact on the environment (Science *et al*., 2016; Sadeghieh, 2016).

Financial development has a determining effect on Carbon Dioxide emissions in the entire sample. Examine the financial development and economic growths mitigate CO_2 emissions in high-income group countries, but has a bidirectional impact on low & middle-income level countries (Ehigiamusoe & Lean, 2019). Furthermore, the researcher discovers that financial development impacts different regions and countries. It also shows the theoretical research's viewpoint to some degree because it is fair to find both the positive and negative effects divergent in different countries in the world. Although the impact of financial development on Carbon Dioxide emissions exists in dispute, significant theoretical values for environmental policy decisions have been given by the related research.

H5*: There is a positive statistically significant relationship between financial development and CO_2 emissions*

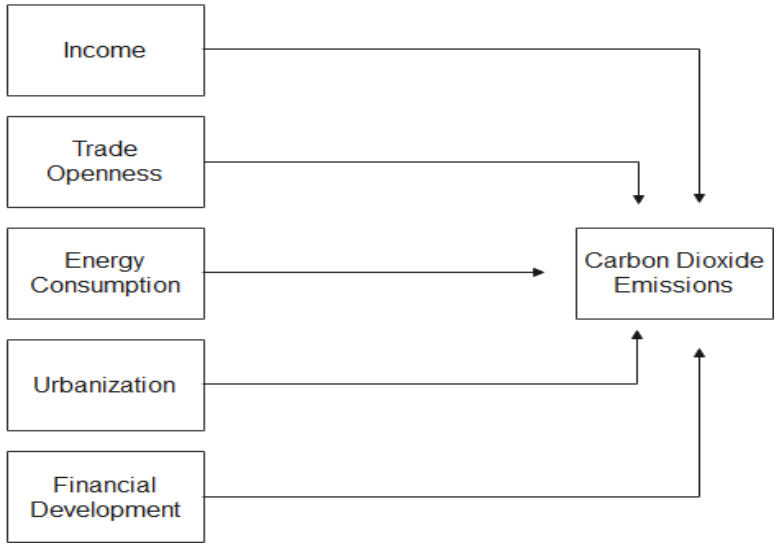
THEORETICAL FRAMEWORK

The study presents an exploration framework according to the aim and reviews of the above literature. Income, Trade openness, Energy consumption, Urbanization, Financial development is the independent variables and the Carbon Dioxide emissions dependent variable. It describes all main variables, and their relationships are discussed as follows:

Based on previous literature review and theoretical background (I. Ozturk, 2017; Saud *et al*., 2019; Dhiab & Dkhili, 2019; Boutabba, 2014 Zandi & Haseeb, 2019; Afridi *et al*., 2019; Sheng &Guo,2016; Jiang & Ma, 2019) provide the procedure for the investigation of independent variables and dependent variable Carbon Dioxide emissions in Figure 1.

Figure 1

Theoretical Model



III. METHODOLOGY

EMPIRICAL MODEL AND DATA SOURCES

This study CO_2 emission is used as a dependent variable and independent variables Income, Trade, Energy consumption, Urbanization, and Financial Development. Panel Data was collected from World Bank Development Indicators (WDI) for eight countries of South Asia from 1995 to 2018, with total observations for this study were 192 annually. The proxy used for Carbon Dioxide emissions was "metric tons per capita" (Noomen *et al*., 2015; Lu, 2018; Jiang & Ma, 2019; Rehman, 2016). Financial Development used "Domestic credit to private sector provide by banks % of GDP" as a proxy (Jiang & Ma, 2019; Dogan & Seker, 2016; Saud *et al*., s2018; K., Ozturk, I. & Sohag, 2017). Trade openness used "exports and imports % of GDP" as a proxy (Rehman, 2016; Wolde-rufael & Idowu, 2016; Saud et al., 2018). Income used "per capita real GDP" as a proxy (constant 2010 US$) (Fareed & Zeehan, 2018; Afridi *et al*., 2019; Baek & Pride, 2014), whereas energy consumption used "kg of oil equivalent per capita" (Rehman, 2016;

Farhani & Ozturk, 2015; Ehigiamusoe & Lean, 2019). Urbanization used "% urban-population of total populations" as a proxy (Jiang & Ma, 2019; Grunewald *et al*., 2017; Farhani & Ozturk, 2015) to estimate the impact on the CO_2 emission.

TABLE 1

Explanation of Variables and Data Source

Variables	Explanation	Source of Data
Carbon Dioxide emission	Metric per tons per capita	WDI
Income	Per Capita Real GDP (constant 2010 US$)	WDI
Trade Openness	Import and export % of GDP	WDI
Energy Consumption	Kg of oil equivalent per capita	WDI
Urbanization	% of the total population (Constant 2012 US$)	WDI
Financial Development	Domestic credit to private sector provide by banks % of GDP	WDI

IV. DATA ANALYSIS

DESCRIPTIVE STATISTICS

The descriptive statistics Table shows the mean, median, standard deviation, the minimum and maximum value of the independent and dependent variable by applying the statistical software Eviews. There are selected eight countries in Asia, the total number of observations 192 from 1995-2018. Table 2 shows the average and median values of income, trade openness, energy consumption, Urbanization, Carbon Dioxide emissions, and financial development close to each other. The average mean value of Income (Y), Trade Openness (TO), Energy Consumption (EC), Urbanization (UBR), Carbon dioxide emissions (CO_2) and financial development (FD) are respectively 1854.87, 68.80, 324.80, 26.79, 0.82 and 25.77.

Descriptive statistical analysis shows that Carbon Dioxide emissions Jarque Bera (JB) value is 122.37, and the probability of the Jarque Bera is 0.00. It means this variable of data is a sample and normally distributed.

Furthermore, these results explain the Jarqubera value of Income, Trade Openness, Energy Consumption, Urbanization, and Financial development are respectively 143.39, 31.09, 11.47, 9.68, and 13.60, and the value of Jarque Bera probability is 0.00, which means the data are simple. The p-value of Jarque Bera shows the goodness of fit test whether sample data have a normal distribution, and all variables value is zero, which shows the normality of data.

TABLE 2

Descriptive Statistics

	CO_2	Y	TO	EC	UBR	FD
Mean	0.82	1854.87	68.80	324.80	26.79	25.77
Median	0.64	994.81	52.74	340.31	26.92	24.90
Maximum	3.60	8049.93	184.09	636.57	40.89	87.53
Minimum	0.03	209.41	0.00	8.55	10.83	0.00
Std. Dev.	0.72	1980.59	40.13	158.12	7.44	17.86
Skewness	1.53	1.80	0.98	-0.58	-0.11	0.64
Kurtosis	5.42	5.199	3.05	2.76	1.92	3.14
Jarqu-Bera	122.37	143.39	31.09	11.47	9.68	13.60
Probability	0.00	0.00	0.00	0.00	0.00	0.00
Sum.	158.16	35135	13209.96	6236.26	5144.27	4948.90
Sum Sq.Dev.	100.13	7.49	307683.0	477598	10599.36	60953.20
Observations	192	192	192	192	192	192

Note* CO_2 = Carbon Dioxide emission, Y = Income, TO = Trade openness, EC = Energy Consumption, URB = Urbanization, FD = Financial Development.

Unit Root Test

First, check the stationarity of the selected variables. The results from unit root tests indicate that all the selected variables are stationary after taking the first difference. The condition for the panel co-integration test is fulfilled because all the variables are I (1). The next step is to apply panel co-integration tests to determine the long-run relationship between the variables chosen. Pedroni panel co-integration test results are reported

in Table 3. The null hypothesis shows all the selected variables are not co-integrated.

In contrast, the alternative hypothesis shows that all the variables co-integrated. In Table 3, Pedroni co-integration results revealed that the null hypothesis could be rejected, as shown by values panel v-statistics, panel rho-statistics, group rho-statistics, and grouped-ADF-statistics. Furthermore, eleven tests out of seven tests can reject the null hypothesis. The acceptance of the alternative hypothesis shows the existence of co-integration between variables in the long run.

Finally, we conclude that all the selected variables are co-integration based on both the panel co-integration test results. There is a long-run relationship among all the selected variables.

TABLE 3

Unit Root Test

Variable	Inverse chi-squared		Inverse Normal		Log Inverse chi-squared		Log Inverse Normal	
	Statistic	Pro	statistic	Pro	statistic	Pro	statistic	Pro
CO_2	68.361	0.000	-5.915	0.000	103.532	0.000	-8.075	0.000
Income	58.061	0.000	-3.385	0.001	81.555	0.000	-6.076	0.000
Trade openness	91.590	0.000	-6.123	0.000	116.619	0.000	-8.617	0.000
Energy consumption	126.299	0.000	-9.382	0.000	123.541	0.000	-9.266	0.003
Urbanization	55.346	0.000	-4.579	0.000	51.999	0.000	-4.327	0.001
Financial development	58.018	0.000	-5.158	0.000	79.587	0.000	-6.389	0.000

CORRELATION TEST ANALYSIS

The correlation coefficient tells us about the relationship between variables. They show positive, negative, and no correlation, a high correlation between variables means that both of the variables have a significant relationship.

TABLE 4

Correlation Test Analysis

	CO_2	Y	TO	EC	URB	FD
CO_2	1.000					
Income	0.833	1.000				
Trade openness	0.127	0.517	1.000			
Energy consumption	-0.368	-0.597	-0.597	1.000		
Urbanization	0.654	0.414	0.057	-0.287	1.000	
Financial Development	0.407	0.426	0.183	0.077	-0.001	1.000

Note* CO2 = Carbon Dioxide emission, Y = Income, TO = Trade openness, EC = Energy Consumption, URB = Urbanization, FD = Financial Development

Table 4 shows that income and Carbon Dioxide emissions have a strong positive relationship with a value of 0.83 (Noomen *et al*., 2015; Omri *et al*., 2015; Nazir *et al*., 2018). Carbon Dioxide emissions and financial development also have a positive correlation. Financial development requires increased use of machinery and energy, especially in the industrialized economy, producing more CO_2 emissions. Trade openness has a positive but weak relationship with Carbon Dioxide emissions having a correlation value of 0.12 (Park *et al*., 2018; Grunewald *et al*., 2017). A possible reason for this environmental effect of trade may be a strong dependence on coal-powered technology for growth, household energy use, and the various pollution industries within those areas, with specialization patterns in high-pollutant commodities.

Energy consumption has a negative relationship with Carbon Dioxide emissions, with a correlation value of -0.37 (Kasman & Selman, 2015; Al-mulali & Ozturk, 2015; Lu, 2018). A possible reason for this effect of trade on the environment may be a heavy reliance on coal-powered technology for growth, household energy use, and the various pollution industries within these areas, with specialization patterns for high-polluting goods. Furthermore, urbanization has a positive relationship with Carbon Dioxide emissions, which is consistent with prior studies of Dogan & Seker (2016), Zhu *et al*. (2012) and Ameer, (2018). Thus, it more pressure on the existing infrastructure, and therefore, the deforestation process is gaining momentum upward. Higher

degradation increases CO_2 emissions exponentially, particularly in developing forest-poor countries. Financial development also has a positive relationship with Carbon Dioxide emission (K., Ozturk, I. & Sohag, 2017; Saud *et al*., 2018). Financial sector growth could boost demand for energy consumption and expand the scale of production, which would increase Carbon Dioxide emissions.

PANEL LEAST SQUARE

TABLE 5

Panel Least Square

Variables	Coefficient	Prob.
Income	0.3472	0.002
Trade openness	-0.1110	0.256
Energy consumption	0.5553	0.000
Urbanization	0.6076	0.004
Financial development	-0.0220	0.530
CO_2	-6.4390	0.000
R-Squared	0.9000	
Adjusted R-Squared	0.8933	
F-Statistic	134.29	
Prob.(F-statistic)	0.0000	

Note* Significant level 0.05

The panel least square results indicate that income is significantly associated with Carbon Dioxide emissions. The coefficient value is 0.3472, and the probability value of 0.002. The coefficient level shows that a positive relationship. Hence the null hypothesis is rejecting, and the alternative hypothesis is accepted. The coefficient value is 0.5550 (P-value 0.000). The p-value indicates that the probability value is significant, and the coefficient value shows a positive relationship between energy consumption and Carbon Dioxide emissions. Therefore we accepted the alternative hypothesis and rejected the null.

The coefficient value is 0.6076 (P-value 0.004), indicating that if a 1% value of urbanization increases, then carbon dioxide emissions will increase by 60%. The P-value of Urbanization is less than the level of significance at 0.10. Consequently, this study rejects the null hypothesis and accepts the alternative. The coefficient of financial development is -0.0220, with P-value is 0.530. The result shows that if 1% of the values of financial development increase, then the value of Carbon Dioxide emissions will decrease by 22%. The P-value show there is insignificant, and the coefficient value shows a negative relationship between financial development and Carbon Dioxide emissions. The P-value indicates that it is negligible. Furthermore, P-value is 0.256 (coefficient -0.1110), P-value is higher than the significance level at 0.10. Moreover, the coefficient value indicates a negative relationship between trade openness & Carbon Dioxide emissions and rejects the alternative hypothesis.

It means that when trade openness and financial development increase, there will be low-level Carbon Dioxide emissions, which suggest that more financial development and trade openness improve environmental degradation. There has been an argent debate regarding the relationship between income, trade, energy, urbanization, & economic development on CO_2 emissions. Some research suggests that financial development increases carbon dioxide emissions, while other studies indicate financial development decreases carbon dioxide emissions. However, our result shows no statistically significant positive relationship between carbon dioxide emissions and economic development. Some studies show that trade openness also statistically insignificant, and negative relationships improve environmental quality.

After analyzing the energy consumption, we find statistically significant and positive relationships, and some researchers found a positive & considerable relationship between income and CO_2 emissions. However, energy consumption also found a high level of per capita Carbon Dioxide emissions. There is a statistically substantial & positive relationship between urbanization and CO_2 emission.

V. DISCUSSION AND CONCLUSION

DISCUSSION

This research investigates the impact of macroeconomic variables on Carbon dioxide emission. After analysis, the study accomplished that five of its hypotheses are acknowledged, indicating that the first hypothesis. "There is a positive statistically significant relationship between income and Carbon Dioxide emission," This hypothesis was accepted after the studies noted that income has a positive impact on Carbon Dioxide emissions (Dhiab & Dkhili, 2019; Chiu, 2016; Saidi & Mbarek, 2016; Y. Liu, Zhang, & Liu, 2020). It means that our results are consistent with previous researches.

The second hypothesis was formulated as "There is a negative relationship between Trade Openness and Carbon Dioxide emission," which was rejected. The results were also consistent with previous researchers of Saidi & Mbarek (2016); Hepburn, Bowen, & No, (2012); Sun et al., (2019). Furthermore, the third hypothesis, "There is a positive statistically significant relationship between energy consumption and Carbon Dioxide emission", also accepted based on our results, and other studies also find the same finding (Shaari & Karim, 2020; Dhiab & Dkhili, 2019; Kamran *et al*., 2019; In & Africa, 2019). Some researchers also analyzed the correlation between urbanization and Carbon dioxide emission. Therefore, this research also developed the fourth hypothesis, "There is a significant positive relationship between urbanization and Carbon Dioxide emission" there also found the hypothesis also accepted the result with other studies (Ma, Ge, & Wang, 2017; L. Li, Hong, Tang, & Na, 2016; In & Africa, 2019; Saidi & Mbarek, 2016).

Therefore, the fifth hypothesis, "There is a positive statistically significant relationship between financial development and Carbon Dioxide emission," is also accepted. It demonstrates the favourable outcome & it also indicates the sign in its data our results related to some studies of (Saidi & Mbarek, 2016; Jiang & Ma, 2019).

CONCLUSION

The principal purpose of this paper is to find the relationship between income, trade openness, energy consumption, urbanization &

financial development on Carbon Dioxide emissions. The sample size chosen for this situation is panel data from 1995-2018. We employed in this study the Descriptive Statistics, Hausman Test, Unit root test, correlation, and ordinary least square of panel data. The correlation test appears to be the presence of a panel long-run equilibrium relationship among Financial Development (FD), Energy Consumption (EC), Trade Openness (TO), Urbanization (URB), & Carbon Dioxide Emissions (CO_2). The findings also mean that their variables move in the same direction over the long term. Further, the unit root test was used to check each variable's stationarity and Augmented Dickey- fuller (F-ADF). Finally, the Hausman test analyzes the fixed or random-effect model, and the null hypothesis accepts or reject.

When the income levels increased, it automatically enhanced the purchasing power, and people purchase more products and consumption. Like electricity, oil, etc., is the major problem of carbon dioxide emissions. Moreover, when the import of goods in any country. The industry does not work and does not pollute the environment. Furthermore, energy is also the main carbon dioxide emission factor because most energy production is from fossil fuel and coal. Rapid growth in the world energy consumption results in large- scale urban population, and the construction industry is increasing environmental degradation. Financial development also affects the environment. Usually, when a country financially stable installs more industrial plants, industry wastage causes global warming. This study shows that South Asian countries should redesign environmental rule regulation/policies to overcome environmental quality.

The policymakers should make a policy of income equally distributed and more import than the export because trade improves the environment quality. Nowadays, global energy sources should convert oil, coal to wind, solar and hydropower plants and control the rural migration to the urban area. Financially developed countries use advanced technology for production, they lass an effect on the environment. More economic growth increases environmental degradation, but the drop in economic growth will enhance un-employments further, which is already resigned at around ten per cent annually. Further results show a low-income level of countries generates

a low level of Carbon Dioxide emissions (H_1). Secondly, a higher level of urbanization produced a high level of Carbon Dioxide emissions (H_2). Thirdly, more consumption of energy of countries generates more Carbon Dioxide emissions (H_3). Fourthly, financial development has a positive effect on environmental quality (H_4), and finally, the result proves that trade openness positively influences CO_2 emissions (H_5).

RESEARCH IMPLICATIONS

The study results show that CO_2 mitigation policies based on income, urbanization, and energy consumption cannot prove fruitful as financial growth is an integral part of reducing greenhouse gases. The ADF unit root test is standard and includes a report. The variables are non-stationary at their lowest levels, but they become stationary at their first differences.

Also, policy implications can include using the financial sector through macroeconomic institutions to encourage urbanization & energy-efficient investments. The monetary policy can be formed other accessibility low-interest rates and additional discounts for South Asia's economic friendly production method. The financial sector will play a significant role in environmentally friendly production and improve environmental quality.

Further energy production by (fossil fuels) is the primary determining inn deteriorating the environment. Hence, we highly recommend giving the subsidy on renewable energy sources (solar & wind) through different fiscal and monetary measures.

LIMITATIONS AND FUTURE DIRECTIONS

Every research has some limitations; first of all, this research is limited to Carbon Dioxide emissions and only emerging economic countries select. Second, the barrier is this study examined Carbon Dioxide emissions. This strength for this study because CO_2 emissions are a central key element to reduce environmental degradation. Thirdly, a limitation is this research use only secondary data during the time of 1995 to 2018.

For future research extension, the current study model could be observed in other under developing countries and cross different economic growth levels. Moreover, greater generalizability could be tested through longitudinal design. In this study, only twenty-three years of data include the next period that can be increased for this study, may give some different results. Furthermore, check the relationship by adding a meditating variable like a foreign direct investment (FDI).

REFERENCES

Ã, F. H. (2009). An econometric study of CO 2 emissions, energy consumption, income and foreign trade in Turkey, 37, 1156–1164. https://doi.org/10.1016/j.enpol.2008.11.012.

Abbasi, F., & Riaz, K. (2016). CO 2 emissions and financial development in an emerging economy : An augmented VAR approach. Energy Policy, 90, 102–114. https://doi.org/10.1016/j.enpol.2015.12.017.

Acquaye, A., Feng, K., Oppon, E., Salhi, S., Ibn-mohammed, T., Genovese, A., & Hubacek, K. (2016). Measuring the environmental sustainability performance of global supply chains : A multi-regional input-output analysis for carbon, sulfur oxide and water footprints. Journal of Environmental Management. https://doi.org/10.1016/j.jenvman.2016.10.059.

Afridi, M. A., Kehelwalatenna, S., Naseem, I., & Tahir, M. (2019). Per capita income, trade openness, urbanization, energy consumption, and CO 2 emissions : an empirical study on the SAARC Region.

Ahmad, W., & Majeed, M. T. (2019). The impact of renewable energy on carbon dioxide emissions : an empirical analysis of selected South Asian countries, 9(4), 527–534.

Ahmed, K. (2016). Revisiting the emissions-energy-trade nexus : evidence from the newly industrializing countries. Environmental Science and Pollution Research. https://doi.org/10.1007/s11356-015-6018-x

Ali, H. S., Abdul-rahim, A. S., & Ribadu, M. B. (2016). Urbanization and carbon dioxide emissions in Singapore : evidence from the ARDL approach. Environmental Science and Pollution Research. https://doi.org/10.1007/s11356-016-7935-z

Al-mulali, U., & Ozturk, I. (2015). The effect of energy consumption, urbanization, trade openness, industrial output, and the political stability on the environmental degradation in the MENA (the Middle East and North African) region. Energy, 84, 382–389. https://doi.org/10.1016/j.energy.2015.03.004.

Al-mulali, U., Normee, C., Che, B., & Gholipour, H. (2012). Exploring the bi-directional long-run relationship between urbanization, energy consumption, and carbon dioxide emission. Energy, 46(1), 156–167. https://doi.org/10.1016/j.energy.2012.08.043.

Alvarez, I. G.-, Segura, L., & Martínez-ferrero, J. (2014). Carbon emission reduction : the impact on the financial and operational performance of international companies. https://doi.org/10.1016/j.jclepro.2014.08.047.

Ameer, K. M. and A. (2018). Effect of economic growth, trade openness, Urbanization, and technology on the environment of Asian emerging economies. https://doi.org/10.1108/MEQ-05-2018-0087.

Amri, F. (2017). Carbon dioxide emissions, output, and energy consumption categories in Algeria. https://doi.org/10.1007/s11356-017-8984-7.

Aydin, C., & Esen, Ö. (2017). SC. https://doi.org/10.1016/j.eneco.2017.11.010

Baek, J., & Pride, D. (2014). On the income – nuclear energy – CO 2 emissions nexus revisited. Energy Economics, 43, 6–10. https://doi.org/10.1016/j.eneco.2014.01.015

Bajpai, A. (2018). Child rights in India: Law, policy, and practice. Oxford University Press.

Bekhet, H. A., & Othman, N. S. (2017). Impact of urbanization growth on Malaysia CO2 emissions : Evidence from the dynamic relationship. Journal of Cleaner Production, 154(June), 374–388. https://doi.org/10.1016/j.jclepro.2017.03.174

Boamah, K. B., Du, J., Bediako, I. A., Boamah, A. J., Abdul-rasheed, A. A., & Owusu, S. M. (2017). Carbon dioxide emission and economic growth of China — the role of international trade. https://doi.org/10.1007/s11356-017-8955-z

Boutabba, M. A. (2014). The impact of financial development, income, energy and trade on carbon emissions : Evidence from the Indian economy. Economic Modelling, 40(2014), 33–41. https://doi.org/10.1016/j.econmod.2014.03.005.

BP, London, 2015. (2015). No Title. London. Retrieved from BP, B. P. (2015). BP statistical review of world energy. BP, London.

Bui, M., Adjiman, C. S., Bardow, A., Anthony, E. J., Boston, A., Brown, S., ... & Hallett, J. P. (2018). Carbon capture and storage (CCS): the way forward. Energy & Environmental Science, 11(5), 1062-1176.

Cetin, M., & Ecevit, E. (2015). Urbanization, Energy Consumption and CO2 Emissions in Sub-Saharan Countries : A Panel Cointegration and Causality Analysis (January). https://doi.org/10.15640/jeds.v3n2a7.

Chandr, V. (2011). The CO 2 emissions-income nexus : Evidence from rich countries. Energy Policy, 39(3), 1228–1240. https://doi.org/10.1016/j.enpol.2010.11.050.

Chiu, Y. (2016). Carbon dioxide, income and energy: Evidence from a non-linear model. Energy Economics. https://doi.org/10.1016/j.eneco.2016.11.022.

Corruption, Trade Openness, and Environmental Quality : A Panel Data Analysis of Selected South Asian Countries. (2007), (Winter), 673–688.

Dhiab, L. Ben, & Dkhili, H. (2019). Impact of income, trade, urbanization, and financial development on CO2 emissions in the GCC countries International Journal of Advanced and Applied Sciences, (September). https://doi.org/10.21833/ijaas.2019.07.005.

Dogan, E., & Seker, F. (2016). The influence of real output, renewable and non-renewable energy, trade and financial development on carbon emissions in the top renewable energy countries. Renewable and Sustainable Energy Reviews, 60, 1074–1085. https://doi.org/10.1016/j.rser.2016.02.006.

Dogan, E., & Turkekul, B. (2015). RESEARCH ARTICLE CO 2 emissions, real output, energy consumption, trade, urbanization and financial development : testing the EKC hypothesis for the USA. https://doi.org/10.1007/s11356-015-5323-8.

Doygun, H., & Alphan, H. (2006). Monitoring urbanization of Iskenderun, turkey, and its negative implications, 145–155. https://doi.org/10.1007/s10661-006-2524-0

Economic, W., & Surveys, F. (2013). World Economic and Financial Surveys World Economic Outlook April 2013 Hopes, Realities, Risks.

Ehigiamusoe, K. U., & Lean, H. H. (2019). Effects of energy consumption, economic growth, and financial development on carbon emissions : evidence from heterogeneous income groups, 22611–22624.

Elden, T. H. M. S. (2001). International Trade Intensity and Carbon Emissions : A Cross-Country, 10(1).

Fareed, Muhammad and Rizwan Nazir &. Zeehan. 2018. Financial development, Income, Trade and Urbanization on CO2 Emissions: New Evidence. 9:17–37.

Elden, T. H. M. S. (2001). International Trade Intensity and Carbon Emissions : A Cross-Country, 10(1).

Faiz-Ur-Rehman, Ali, A., & Nasir, M. (2007). Corruption, trade openness, and environmental quality: A panel data analysis of selected South Asian countries. The Pakistan Development Review, 673-688.

Fan, H., & Hossain, I. (2018). Technological Innovation, Trade Openness, CO 2 Emission and Economic Growth : Comparative Analysis between China and India, 8(6), 240–257.

Farhani, S., & Ozturk, I. (2015). Causal relationship between CO 2 emissions, real GDP, energy consumption, financial development, trade openness, and Urbanization in Tunisia. https://doi.org/10.1007/s11356-015-4767-1.

Ferra, P. (2003). A new environmental Kuznets curve Analysis? Relationship between direct material input and income per capita : evidence from industrialized countries, 46, 217–229. https://doi.org/10.1016/S0921-8009(03)00123-X

Friedl, B., & Getzner, M. (2003). Determinants of CO 2 emissions in a small open economy, 45, 8–9. https://doi.org/10.1016/S0921-8009(03)00008-9.

Grunewald, N., Klasen, S., Martínez-zarzoso, I., & Muris, C. (2017). The Trade-off Between Income Inequality and Carbon Dioxide Emissions. Ecological Economics, 142, 249–256. https://doi.org/10.1016/j.ecolecon.2017.06.034.

Hafiz, M, M. M. (2016). The Impact of Urbanization and Energy Consumption on CO 2 Emissions in The Impact of Urbanization and Energy Consumption on CO 2 Emissions in South Asia, (June 2018).

Hassan, K., & Salim, R. (n.d.). Population aging, income growth and CO 2 emission : Empirical evidence from high-income OECD countries Population aging, income growth and CO 2 emission : Empirical evidence from high-income OECD countries.

Hepburn, C., Bowen, A., & No, W. P. (2012). Prosperity with growth : Economic growth, climate change and environmental limits October 2012 Centre for Climate Change Economics and Policy, (109).

Hundie, S. K. (2018). Turkish Journal of Agriculture - Food Science and Technology Modelling Energy Consumption, Carbon Dioxide Emissions and Economic Growth Nexus in Ethiopia : Evidence from Cointegration and Causality Analysis, 6(6), 699–709.

In, U., & Africa, S.-S. (2019). Economic Growth, CO2 Emission, Energy consumptions and urbanization in Sub-Saharan Africa (April).

Jiang, C., & Ma, X. (2019). The Impact of Financial Development on Carbon Emissions : A Global Perspective.

K., Ozturk, I. & Sohag, K. (2017). The effects of electricity consumption, economic growth, financial development and foreign direct investment on CO 2 emissions in Kuwait, 2015, 1–30.

Kamran, M., Teng, J., Imran, M., & Owais, M. (2019). Science of the Total Environment Impact of Globalization, economic factors and energy consumption on CO 2 emissions in Pakistan. Science of the Total Environment, 688, 424–436. https://doi.org/10.1016/j.scitotenv.2019.06.065.

Kasman, A., & Selman, Y. (2015). CO2 emissions, economic growth, energy consumption, trade and urbanization in new EU member and candidate countries : A panel data analysis, 44, 2014–2016.

Khan, M. K. (2019). Effect of energy consumption and economic growth on carbon dioxide emissions in Pakistan with dynamic ARDL simulations approach, (2018).

Kivyiro, P., & Arminen, H. (2014). Carbon dioxide emissions, energy consumption, economic growth, and foreign direct investment : Causality analysis for Sub-Saharan Africa. Energy, 74, 595–606. https://doi.org/10.1016/j.energy.2014.07.025

Li, K., & Lin, B. (2015). Impacts of Urbanization and industrialization on energy consumption / CO 2 emissions : Does the level of development matter ?, 52, 1107–1122. https://doi.org/10.1016/j.rser.2015.07.185.

Li, L., Hong, X., Tang, D., & Na, M. (2016). GHG Emissions, Economic Growth and Urbanization : A Spatial Approach, (x). https://doi.org/10.3390/su8050462

Liu, B., Tian, C., Li, Y., Song, H., & Ma, Z. (2018). Research on the effects of urbanization on carbon emissions efficiency of urban agglomerations in China. Journal of Cleaner Production, 197, 1374-1381.

Liu, B., Tian, C., Li, Y., Song, H., & Zhanxin, M. (2018). Research on the Effects of Urbanization on Carbon Emissions Efficiency of Urban Agglomerations in China. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2018.06.295.

Liu, Y., Zhang, M., & Liu, R. (2020). The Impact of Income Inequality on Carbon Emissions in China : A Household-Level Analysis, 1–22.

Loughner, C. P., Allen, D. J., Zhang, D. L., Pickering, K. E., Dickerson, R. R., & Landry, L. (2012). Roles of urban tree canopy and buildings in urban heat island effects: Parameterization and preliminary results. Journal of Applied Meteorology and Climatology, 51(10), 1775-1793.

Lu, W. (2018). The impacts of information and communication technology, energy consumption, financial development, and economic growth on carbon dioxide emissions in 12 Asian countries.

Ma, X., Ge, J., & Wang, W. (2017). and carbon dioxide emissions and the policy implications for China : a co-integrated vector error correction (VEC) analysis. Natural Hazards. https://doi.org/10.1007/s11069-017-2807-5.

Mcconnell, K. E., & Mcconnell, K. E. (2015). and Development Economics : Income and the demand for environmental quality Income and the demand for environmental quality, (March 2001), 383–399. https://doi.org/10.1017/S1355770X9700020X.

Muhammad, Q., Hye, A., & Kumar, A. (2012). Munich Personal RePEc Archive Economic Growth, Energy Consumption, Financial Development, International Trade and CO2 Emissions in Indonesia.

Muni, A. A. and K. (2016). No Title Effect of Economic Growth, Trade Openness, Urbanization, and Technology on Environment of Selected Asian Countries, (74571).

Musai, M., & Mohammadi, M. (2014). Relationship between Economic Growth, Trade, and Environment : Evidence from D8 Countries, 4(2), 320–326. https://doi.org/10.6007/IJARAFMS/v4-i2/895.

Noomen, A., Hammoudeh, S., Khuong, D., & Ricardo, J. (2015). On the relationships between CO 2 emissions, energy consumption and income : The importance of time variation. Energy Economics, 49, 629–638. https://doi.org/10.1016/j.eneco.2015.02.007.

Omri, A., Daly, S., Rault, C., & Chaibi, A. (2015). Financial development, environmental quality, trade and economic growth : What causes what in MENA countries ☆. Energy Economics, 48, 242–252. https://doi.org/10.1016/j.eneco.2015.01.008.

Ouyang, X., & Lin, B. (2016). Carbon dioxide (CO 2) emissions during Urbanization : A comparative study between China and Japan. Journal of Cleaner Production. https://doi.org/10.1016/j.jclepro.2016.12.102.

Ozturk, I. (2017). The dynamic relationship between agricultural sustainability and food-energy-water poverty in a panel of selected Sub-Saharan African Countries. Energy Policy, 107(April), 289–299. https://doi.org/10.1016/j.enpol.2017.04.048

Ozturk, U. A. I. (2015). The influence of economic growth, urbanization, trade openness, financial development, and renewable energy on pollution in Europe. Natural Hazards. https://doi.org/10.1007/s11069-015-1865-9.

Park, Y., Meng, F., & Baloch, M. A. (2018). The effect of ICT, financial development, growth, and trade openness on CO 2 emissions : an empirical analysis.

Rahman, M. Z. (2013). Relationship between Trade Openness and Carbon Emission : A Case of Bangladesh, 1(4), 126–134.

Ravallion, M., Heil, M., & Jalan, J. (1997). A less poor world, but a hotter one ? Carbon emissions, economic growth and income inequality.

Rehman, U. (2016). Munich Personal RePEc Archive What drives carbon dioxide emissions in the long-run ? Evidence from selected South Asian Countries, (75420).

Saboori, B., Sapri, M., & Baba, M. (2014). Economic growth, energy consumption and CO 2 emissions in OECD (Organization for Economic Co-operation and Development)' s transport sector : A fully modified bi-directional relationship approach. Energy. https://doi.org/10.1016/j.energy.2013.12.048.

Sadeghieh, M. (2016). Financial Development, CO 2 Emissions, Fossil Fuel Consumption and Economic Growth : The Case of, (February).

Sadorsky, P. (2010). The impact of financial development on energy consumption in emerging economies. Energy Policy, 38(5), 2528–2535. https://doi.org/10.1016/j.enpol.2009.12.048.

Saidi, K., & Mbarek, M. Ben. (2016). The impact of income, trade, urbanization, and financial development on CO 2 emissions in 19 emerging economies. https://doi.org/10.1007/s11356-016-6303-3.

Salahuddin, M., Ali, I., Sc, M., Vink, N., & Gow, J. (2018). The effects of Urbanization and Globalization on CO 2 emissions : evidence from the Sub-Saharan Africa (SSA) countries, (Navarro 1998).

Sasana, H., & Aminata, J. (2019). Energy Subsidy, Energy Consumption, Economic Growth, and Carbon Dioxide Emission : Indonesian Case Studies, 9(2), 117–122.

Saud, S., Chen, S., & Haseeb, A. (2018). Impact of financial development and economic growth on environmental quality : an empirical analysis from Belt and Road Initiative (BRI) countries.

Saud, S., Chen, S., Haseeb, A., Khan, K., & Imran, M. (2019). The nexus between financial development, income level, and the environment in Central and Eastern European Countries : a perspective on Belt and Road Initiative Agency for International Development.

Science, E., Dogan, E., & Turkekul, B. (2016). CO 2 emissions, real output, energy consumption, trade, urbanization and financial development : testing the EKC hypothesis for the USA, (January). https://doi.org/10.1007/s11356-015-5323-8.

Shaari, M. S., & Karim, Z. A. (2020). sustainability The Effects of Energy Consumption and National Output on CO 2 Emissions : New Evidence from OIC Countries Using a Panel ARDL Analysis, 1–12.

Shahbaz, M., Loganathan, N., Tasneem, A., Ahmed, K., & Ali, M. (2016a). How urbanization affects CO 2 emissions in Malaysia ? The application of STIRPAT model. Renewable and Sustainable Energy Reviews, 57, 83–93. https://doi.org/10.1016/j.rser.2015.12.096.

Shahbaz, M., Nasreen, S., Ahmed, K., & Hammoudeh, S. (2016b). Trade openness-carbon emissions nexus: The importance of turning points of trade openness for country panels. Energy Economics. https://doi.org/10.1016/j.eneco.2016.11.008.

Sheng, P., & Guo, X. (2016). The Long-run and Short-run Impacts of Urbanization on Carbon Dioxide Emissions. Economic Modelling, 53, 208–215. https://doi.org/10.1016/j.econmod.2015.12.006.

Shunsuke, M. (n.d.). RIETI Discussion Paper Series 08-E-013 Does Trade Liberalization Reduce Pollution Emissions ?

Solarin, S. A., & Lean, H. H. (2016). Natural gas consumption, income, Urbanization, and CO 2 emissions in China and India. Environmental Science and Pollution Research, 23(18), 18753-18765.

Sources, E., & Economics, P. B. (2018). Analyzing the causalities between economic growth, financial development, international trade, tourism expenditure, and / on the CO2 emissions in Greece, (March 2017). https://doi.org/10.1080/15567249.2016.1263251.

Sun, H., Clottey, S. A., Geng, Y., & Fang, K. (2019). Trade Openness and Carbon Emissions : Evidence from Belt and Road Countries, 1–20.

Tiwari, A. K., Shahbaz, M., & Hye, Q. M. A. (2013). The environmental Kuznets curve and the role of coal consumption in India: co-integration and causality analysis in an open economy. Renewable and Sustainable Energy Reviews, 18, 519-527.

Tu, S. (2009). The relationship between income and environment in Turkey : Is there an environmental Kuznets curve ?, 37, 861–867. https://doi.org/10.1016/j.enpol.2008.09.088.

Wang, Y., Chen, L., & Kubota, J. (2015). The relationship between urbanization, energy use and carbon emissions : evidence from a panel of Association of Southeast Asian Nations (ASEAN) countries. Journal of Cleaner Production, 1–7. https://doi.org/10.1016/j.jclepro.2015.06.041.

Wolde-rufael, Y., & Idowu, S. (2016). Income distribution and CO 2 emission : A comparative analysis for China and India. Renewable and Sustainable Energy Reviews, (November), 0–1. https://doi.org/10.1016/j.rser.2016.11.149.

Zandi, G., & Haseeb, M. (2019). The Role of Trade Liberalization in Carbon Dioxide Emission : Evidence From Heterogeneous Panel Estimations, 10(5). https://doi.org/10.5430/ijfr.v10n5p228.

Zhang, C., & Lin, Y. (2012). Panel estimation for urbanization, energy consumption and CO 2 emissions : A regional analysis in China. Energy Policy, 49, 488–498. https://doi.org/10.1016/j.enpol.2012.06.048.

Zhu, H., Yu, W., & Zeng, Z. (2012). Urbanization and CO 2 emissions : A semi-parametric panel data analysis. Economics Letters, 117(3), 848–850. https://doi.org/10.1016/j.econlet.2012.09.001.

Zi, C., Jie, W., & Hong-bo, C. (2015). CO2 emissions and urbanization correlation in China based on threshold analysis. Ecological Indicators. https://doi.org/10.1016/j.ecolind.2015.09.013.

Zubizarreta, E., Dyk, J. Van, & Lievens, Y. (2016). Analysis of Global Radiotherapy Needs and Costs by Geographic Region and Income Level Statement of Search Strategies Used and Sources of Information. Clinical Oncology, 1–9. https://doi.org/10.1016/j.clon.2016.11.011.