frontiers | Frontiers in Environmental Science

TYPE Correction
PUBLISHED 23 February 2023
DOI 10.3389/fenvs.2023.1137402

OPEN ACCESS

EDITED AND REVIEWED BY
Ferda Halicioglu,
University of Lincoln, United Kingdom

*CORRESPONDENCE
Mohammad Javeed Akhter,
javedklasr@gmail.com

SPECIALTY SECTION
This article was submitted to Environmental Economics and Management, a section of the journal Frontiers in Environmental Science

RECEIVED 04 January 2023
ACCEPTED 06 February 2023
PUBLISHED 23 February 2023

CITATION
Li P, Akhter MJ, Aljarba A, Akeel H and Khoj H (2023), Corrigendum: G-20 economies and their environmental commitments: Fresh analysis based on energy consumption and economic growth.
Front. Environ. Sci. 11:1137402.
doi: 10.3389/fenvs.2023.1137402

RETRACTED: Corrigendum: G-20 economies and their environmental commitments: Fresh analysis based on energy consumption and economic growth

Puying Li[1], Mohammad Javeed Akhter[2]*, Ahmed Aljarba[3], Hatem Akeel[4] and Haitham Khoj[5]

[1]School of Accounting, Guizhou University of Commerce, Guiyang, China, [2]Department of Economics, Institute of Southern Punjab, Multan, Pakistan, [3]Department of Economics, California State University San Marcos, San Marcos, CA, United States, [4]Finance Department, College of Business and Administration (CBA), University of Business and Technology (UBT), Jeddah, Saudi Arabia, [5]Department of Economics, King Abdulaziz University, Jeddah, Saudi Arabia

KEYWORDS

environmental commitments, G-20, energy consumption, economic growth, EKC

A Corrigendum on
G-20 economies and their environmental commitments: Fresh analysis based on energy consumption and economic growth

by Li P, Akhter MJ, Aljarba A, Akeel H and Khoj H (2022). Front. Environ. Sci. 10:983136. doi: 10.3389/fenvs.2022.983136

In the published article, there was an error in the caption of **Table 2**, the full version of the acronym VIF was omitted. The corrected legend appears below:

"Table 2 | Variance inflation factor (VIF) matrix."

In the published article, there were errors in the figures as published. In Figure 1, the values on *Y*-axis were mistakenly mentioned in *Scientific (Exponential) Notation*, but now they have been converted into *General Format*. Furthermore, Axis titles are also provided now as they were missed in originally published article. The corrected Figure 1 and its caption, GDP of G-20 based on 2018, appear below.

In Figure 2, the values on *Y*-axis were mistakenly mentioned in *Scientific (Exponential) Notation*, but now they have been converted into *General Format*. Furthermore, Axis titles are also provided now as they were missed in originally published article. The corrected Figure 2 and its caption, Carbon emission status of G-20 based on 2018, appear below.

In Figure 3, the values on *Y*-axis were mistakenly mentioned in *Scientific (Exponential) Notation*, but now they have been converted into *General Format*. Furthermore, Axis titles are also provided now as they were originally missed in published article. The corrected Figure 3 and its caption Energy consumption status of G-20 based on 2018, appear below.

For Figure 4 values on *Y*-axis were mistakenly mentioned in *Scientific (Exponential) Notation*, but now they have been converted into *General Format*. The corrected Figure 4 and its caption Foreign direct investment status of G-20 based on 2018, appear below.

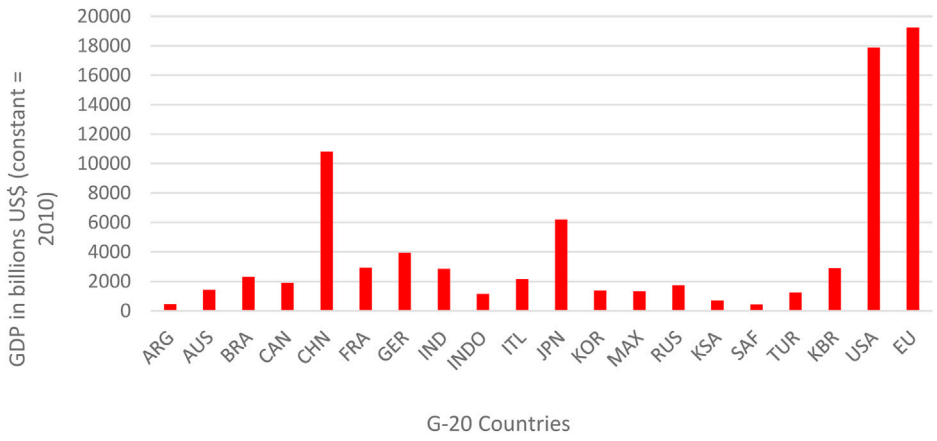

FIGURE 1
GDP of G-20 countries based on 2018 in billions of US$ (constant = 2010).

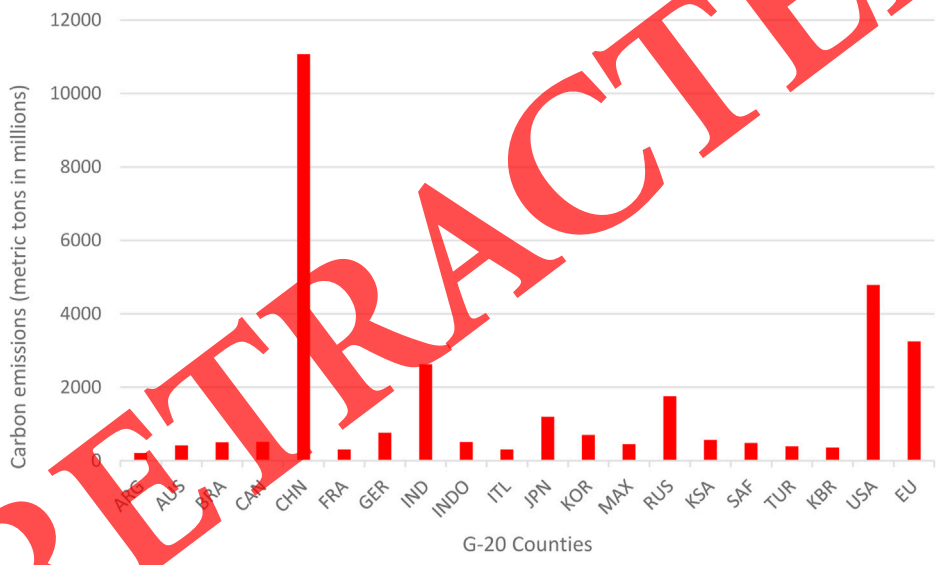

FIGURE 2
Carbon emissions status (metric tons in millions) of G-20 countries based on 2018.

In the published article, the following errors have been corrected:

A correction has been made to the **Abstract**, first paragraph as some abbreviations were missed and the sentence has been restructured for clarity. This sentence previously stated:

"The study used econometric methods including cross-sectional dependence, cointegration, Fully Modified Ordinary Least Square Dynamic Ordinary Least Square estimators, and the Pair-wise panel Granger causality test to view the latest picture of the relationship between dependent and independent factors."

The corrected sentence appears below:

"The study used econometric methods including cross-sectional dependence, cointegration, Fully Modified Ordinary Least Square (FMOLS), Dynamic Ordinary Least Square (DOLS) estimators, and the Pair-wise panel Granger causality test to examine the relationship between dependent and independent variables."

A correction has been made to the **Abstract**, first paragraph, where the sentence has been restructured for clarity. This sentence previously stated:

"Surprisingly, the outcome of electricity consumption showed a positive relationship with the growth of CO_2."

The corrected sentence appears below:

"The findings show a positive relationship between electricity consumption and CO_2 emissions."

A correction has been made to the **Abstract**, first paragraph as the abbreviation of EKC was omitted and the sentence has been restructured for clarity. This sentence previously stated:

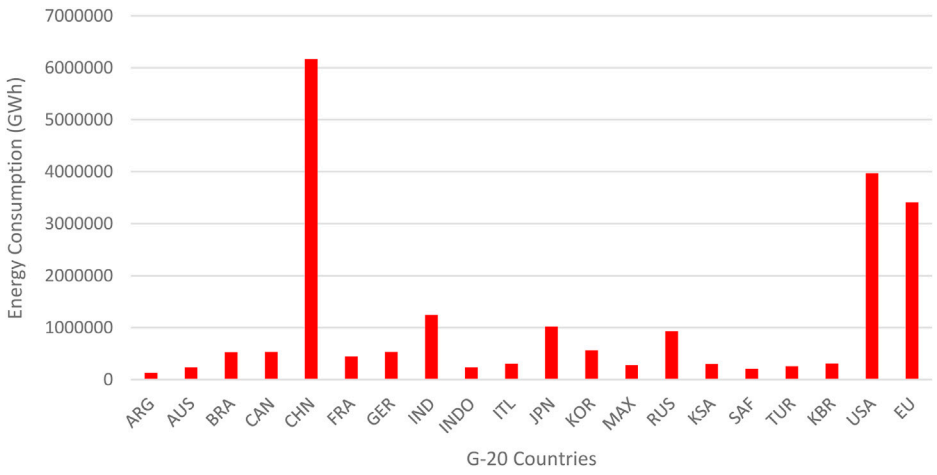

FIGURE 3
Energy consumption status [in Gigawatt hours (GWh)] of G-20 countries based on 2018.

FIGURE 4
FDI, net inflows (Constant US$ in billions) of G-20 based on 2018. (Note: The data of FDI, net inflows (*Current* US$ in billions) for each country were converted into *constant* values by dividing it from GDP deflator).

"Furthermore, the outcomes of gross domestic product and its square term confirm the notion of the Environmental Kuznets Curve for these economies."

The corrected sentence appears below:

"Furthermore, the results show that gross domestic product and its square term confirm the Environmental Kuznets Curve (EKC) theory for these economies."

A correction has been made to the **Introduction**, third paragraph, as **Figure 1** was described inaccurately. This sentence previously stated:

"**Figure 1** shows the gross domestic product (GDP) per capita in the selected countries of the G-20"

The corrected sentence appears below:

"**Figure 1** shows the gross domestic product (GDP) in the selected countries of the G-20."

A correction has been made to the **Introduction**, fifth paragraph, while explaining the level of energy consumption of China, the word '*electricity*' was omitted.

This sentence previously stated:

"**Figure 3** shows that China was ranked first for the fastest emerging economic growth from an energy consumption perspective."

The corrected sentence appears below:

"**Figure 3** shows that China was ranked first for the fastest emerging economic growth from electricity consumption perspective."

A correction has been made to the **Introduction**, sixth paragraph, where an additional explanation about China, United States and Germany was added for clarity. This sentence previously stated:

"Japan had the largest share of FDI, followed by the United States and Germany."

The corrected sentence appears below:

"Japan had the largest share of FDI, followed by the United States and Germany, while these countries have low CO_2 emissions which is possibly due to employing renewable and green (environment friendly) energy sources to produce electricity instead of using fossil fuel."

A correction has been made to the **Introduction**, sixth paragraph as an explanation about the EKC hypothesis was omitted. This sentence previously stated:

"The main goal was to examine the influence of economic growth on carbon emissions and verify the Environmental Kuznets Curve (EKC) hypothesis."

The corrected sentence appears below:

"The main goal was to examine the influence of economic growth on carbon emissions and to verify the Environmental Kuznets Curve (EKC) hypothesis presented by Kuznets (1955) which explains the quadratic relationship between economic growth and environmental degradation and can be expressed by inverted U-shape curve."

A correction has been made to the **Literature Review**, last paragraph, as some information regarding the literature was omitted. This sentence previously stated:

"The existing literature has a gap related to checking the quadratic effects of GDP per capita on CO_2 emissions, and an exceptional study exploring the connection between quadratic effects through economic growth, energy consumption, FDI, and the population at the panel level is required."

The corrected sentence appears below:

"The existing literature has a gap related to checking the quadratic effects of GDP on CO_2 emissions, therefore this study fills in this gap by exploring the impact of economic growth, energy consumption, FDI, and the population on carbon emissions using the panel data of G-20 economies over the period of 1995–2018."

A correction has been made to the **Data and methodology**, *Population (pop)*, fourth paragraph, The full name of the abbreviation (i.e., LM) was omitted. This sentence previously stated:

"This study also applied robustness using an LM CD check"

The corrected sentence appears below:

"This study also applied robustness using a Lagrange Multiplier (LM) CD check"

A correction has been made to the **Results Analysis**, second paragraph, as the maximum value of carbon was mistakenly written as 1.92 instead of 1.11. This sentence previously stated:

"Descriptive statistics show the lowest value for carbon was 1.25 and the largest was 1.92, which belong to Argentina and China, respectively."

The corrected sentence appears below:

"Descriptive statistics show the lowest value for carbon was 1.25 and the largest was 1.11, which belong to Argentina and China, respectively."

A correction has been made to the **Results analysis**, fourth paragraph, when explaining the LLC test, the authors forgot to mention IPS test along with the full names of the acronyms.

This sentence previously stated:

"The estimated values of the LLC stationary check are presented in **Table 3**."

The corrected sentence appears below:

"The estimated values of the Levin, Lin, and Chu (LLC) and Im-Pesaran (IPS) stationarity tests are presented in Table 3."

A correction has been made to the **Results analysis**, last paragraph, a minor change was made to clarify the discussion surrounding **Figure 5**. This sentence previously stated:

"The turning point of the EKC was 1.54 and is graphically presented, in **Figure 5** showing that when values move toward this position, the CO_2 starts to break down."

The corrected sentence appears below:

"The turning point of the EKC is 1.54 and the relationship between environment and economic growth is graphically presented in **Figure 5** showing that when values move toward this position, the CO_2 starts to break down."

A correction has been made to the **Results Analysis**, last paragraph, the following sentence and subsequent numerical calculation should be removed as per the direction of Associate Editor: Ferda Halicioglu. This sentence previously stated:

"The value of the ECM (−1) coefficient was −0.36 with a 5% significance level, which indicates the selected model can re-establish a stability level of approximately 3.85 years.

$$\text{speed of adjustment} = \frac{1}{\text{the coefficient of ECM}},$$

$$\text{speed of adjustment} = \frac{1}{0.26}$$

speed of adjustment = 3.85 year."

The following sentences have also been removed from their respective sections:

Discussion, first paragraph. This sentence previously stated:

"Population had a significantly negative impact on CO_2 emissions."

Conclusion and policy recommendations, first paragraph. This sentence previously stated:

"Population had a significant but negative impact on CO_2 emissions indicating that energy consumption substantially and positively impacted CO_2 emissions"

In the published article the following references were not cited in the article:

(Mace and Verheyen, 2016) and (Stern et al., 2022). The citation has now been inserted in the **Introduction**, First Paragraph and should read:

"The Paris Agreement (COP21) has launched a policy to prevent possibly calamitous climate change by reducing greenhouse gases to well beneath 2°C and ideally to reach 1.5°C (Mace and Verheyen, 2016). Furthermore, it wants to progress the economic abilities to manage the effects of climate change and encourage these nations in their attempts to do so. The Conference of the Parties 26 (COP26) came to a close in Glasgow, with over 200 nations striking a deal in the Glasgow Climate Pact to maintain the 1.5°C target temperature and approve the remaining aspects of the Paris Agreement. These 2 week-long rigorous climate change negotiations concluded unanimously on the critical need to accelerate decarbonization (Stern et al., 2022)"

(Radmehr et al., 2021) was not cited in the article. The citation has now been inserted in the **Introduction**, Second Paragraph and should read:

"In the COVID pandemic of 2019, the only positive thing that emerged was climate improvement; however, this change badly affected the world's economic growth. Energy consumption demand fell rapidly with quarantine measures during the pandemic periods. Although energy consumption gradually improved as the pandemic measures were steadily relaxed, it was below 10% in June 2020 compared with June 2019 in European economies (Radmehr et al., 2021). Therefore, the electricity demand was 5% down in the last week of July 2020 compared with July 2019 in European economies (Williamson et al., 2016). Observed economic growth, energy consumption, foreign direct investment, and population were the main factors affected during the Pandemic; however, the environmental quality improved significantly. Therefore, the current study focused on such aspects and attempts to estimate the impact of these factors on the environment. According to the International Energy Agency, the energy alteration in G-20 countries changed significantly. Numerous economies have managed their energy-changing plans based on global obligations, showing common but discriminated duties and abilities."

(Hanif et al., 2019) was not cited in the article. The citation has now been inserted in the **Data and Methodology**, **Population (pop)**, third paragraph and should read:

"The FDI increases the emission of CO2 and verifies the haven hypothesis. According to the haven hypothesis, economies with a high demand for FDI and trade, and lesser demand for climate quality, will take on lax environmental standards to draw the attention of big corporations and export pollution-intensive goods (Hanif et al., 2019). However, according to the halo theory, "the ecological friendly firms that enter a host nation, decrease emissions because of their structured focus on green equipment or technology." The current study used different estimation techniques such as FMOLS, DLOS, and panel Granger causality, which can be applied to long panels. The model is written as:"

Kuznets (1955) was not cited in the article. The citation has now been inserted in the **Introduction**, sixth paragraph and should read:

"Finally, the foreign direct investment (FDI) trend in G-20 economies is presented in **Figure 4**, which shows a nonlinear trend. Japan had the largest share of FDI, followed by the United States and Germany, while these countries have low CO_2 emissions which is possibly due to employing renewable and green (environment friendly) energy sources to produce electricity instead of using fossil fuel. These outcomes based on the dataset show how G-20 economies are essential regarding environmental commitments. Therefore, this study estimated the impact of the main economic determinants of climate disturbance using a panel dataset. In this regard, this study will also fill the literature gap. The main goal was to examine the influence of economic growth on carbon emissions and to verify the Environmental Kuznets Curve (EKC) hypothesis presented by Kuznets (1955) which explains the quadratic relationship between economic growth and environmental degradation and can be expressed by inverted U-shape curve. Furthermore, we attempted to observe the role of energy on carbon emissions and examine the impact of FDI on carbon emissions. Finally, this study aimed to examine the impact of the population on carbon emissions."

The corresponding references have been added to the reference list.

The authors apologize for these errors and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher's note

References

Hanif, I., Faraz Raza, S. M., Gago-de-Santos, P., and Abbas, Q. (2019). Fossil fuels, foreign direct investment, and economic growth have triggered CO2 emissions in emerging Asian economies: Some empirical evidence. *Energy* 171, 493–501. doi:10.1016/j.energy.2019.01.011

Kuznets, S. (1955). Economic growth and income inequality. *Am. Econ. Rev.* 45, 1–18.

Mace, M., and Verheyen, R. (2016). Loss, damage and responsibility after COP21: All options open for the Paris agreement. *RECIEL* 25, 197–214. doi:10.1111/reel.12172

Radmehr, R., Henneberry, S. R., and Shayanmehr, S. (2021). Renewable energy consumption, CO2 emissions, and economic growth nexus: A simultaneity spatial modeling analysis of EU countries. *Struct. Change Econ. Dyn.* 57, 13–27. doi:10.1016/j.strueco.2021.01.006

Stern, N., Taylor, J. S. C., and Taylor, C. (2022). The economics of immense risk, urgent action and radical change: Towards new approaches to the economics of climate change. *J. Econ. Methodol.* 29 (3), 181–216. doi:10.1080/1350178X.2022.2040740