Annals of "Dunarea de Jos" University of Galati
Fascicle I. Economics and Applied Informatics
Years XXX – nº3/2024
ISSN-L 1584-0409 ISSN-Online 2344-441X
www.eia.feaa.ugal.ro

DOI https://doi.org/10.35219/eai15840409435

Exploring Economic Dynamics and Urbanization in the Context of Environmental Impact: A Study on Capital Flows, Investment Trends, and Urban Growth

Sandip Sarker[*]

ARTICLE INFO

Article history:
Accepted October 2024
Available online December 2024
JEL Classification
Q54, O13, R11, C22

Keywords:
Foreign Direct Investment, Urbanization, CO_2 Emissions, Environmental Impact, Bangladesh, Credit, Sustainable Development

ABSTRACT

This study examines the complex interactions between economic growth, urbanization, and environmental sustainability in Bangladesh, with a focus on the impact of Foreign Direct Investment (FDI), urban population expansion, and domestic credit availability on CO_2 emissions. Leveraging time series data from 1990 to 2021, the research employs robust econometric models, including Ordinary Least Squares (OLS) regression and Error Correction Model (ECM), to disentangle the short-term and long-term influences of these factors on environmental degradation. The findings reveal a nuanced relationship: while FDI appears to contribute to a reduction in CO_2 emissions, likely due to the infusion of cleaner technologies, urbanization and increased domestic credit significantly exacerbate emissions, underscoring the environmental costs of rapid economic development. These results highlight the urgent need for policy interventions that align economic growth with environmental sustainability, particularly through the promotion of sustainable urbanization and responsible investment practices.

1. Introduction

The interplay between economic growth, urbanization, and environmental sustainability has emerged as a critical issue for developing countries, particularly in the context of Bangladesh. The rapid pace of industrialization and urbanization in Bangladesh has been instrumental in driving economic development, yet these advancements have come with significant environmental costs, notably in the form of rising carbon dioxide (CO_2) emissions. As Bangladesh continues to pursue its development goals, understanding the factors contributing to environmental degradation becomes increasingly important for ensuring long-term sustainability.

Bangladesh has experienced a substantial influx of Foreign Direct Investment (FDI) over the past few decades, which has played a crucial role in stimulating economic growth. FDI, particularly in the manufacturing and industrial sectors, has provided much-needed capital for infrastructure development and job creation, contributing to the country's overall economic progress (Shahbaz et al., 2015). However, this economic benefit has often come at an environmental cost. Several studies have indicated that FDI can lead to increased CO_2 emissions, particularly in countries where environmental regulations are not rigorously enforced (Zhang & Zhou, 2016; Omri & Sassi-Tmar, 2014). In Bangladesh, the rapid industrial growth fueled by FDI has significantly contributed to the rise in CO_2 emissions, raising concerns about the long-term environmental sustainability of such investments (Dasgupta et al., 2001).

Urbanization, another significant factor in Bangladesh's development trajectory, has similarly been linked to environmental challenges. As urban areas expand and the population density in cities increases, the demand for energy, transportation, and infrastructure grows, leading to higher levels of CO_2 emissions (Ali et al., 2019). This trend is particularly evident in megacities like Dhaka, where rapid urban expansion has outpaced the development of adequate infrastructure, resulting in severe environmental degradation and air pollution (Satterthwaite, 2009). The urbanization process in Bangladesh, while driving economic growth, has thus exacerbated the country's environmental challenges, making it essential to explore the dynamics between urban growth and CO_2 emissions.

In addition to Foreign Direct Investment (FDI) and urbanization, the availability of domestic credit to the private sector has played a crucial role in shaping Bangladesh's economic landscape. The expansion of credit has facilitated industrial growth by providing the necessary financial resources for businesses to invest

[*] Bangladesh Bank, Motijheel, Dhaka, Bangladesh. E-mail address: sandip0735@gmail.com (S. Sarker).

in capital-intensive projects. However, this increase in industrial activity has also led to higher levels of CO2 emissions, as businesses typically expand their operations without corresponding investments in cleaner technologies or more sustainable practices. This phenomenon has been observed in other developing economies as well, where financial development often correlates with environmental degradation due to a lack of stringent regulatory frameworks (Al-Mulali & Ozturk, 2015; Alam et al., 2016). The role of domestic credit in contributing to environmental challenges in Bangladesh is therefore a critical area of study, especially as the country seeks to balance economic growth with its environmental commitments.

The relationship between CO_2 emissions, FDI, and urbanization is complex and multifaceted, particularly in the context of a developing economy like Bangladesh. Existing literature has explored these relationships extensively, often highlighting the trade-offs between economic growth and environmental sustainability. For instance, the pollution haven hypothesis suggests that developing countries may attract pollution-intensive industries due to their relatively lax environmental regulations, leading to increased environmental degradation (He, 2006; Dasgupta et al., 2001). This hypothesis is particularly relevant for Bangladesh, where the regulatory framework may not be sufficiently robust to mitigate the environmental impacts of rapid industrialization and urbanization (Omri & Sassi-Tmar, 2014). Moreover, the specific context of Bangladesh provides a compelling case for examining these dynamics. The country is at a critical juncture in its development journey, striving to balance its economic ambitions with the need for environmental sustainability. Bangladesh's commitment to achieving the Sustainable Development Goals (SDGs), particularly those related to sustainable cities and climate action, underscores the importance of understanding the drivers of CO_2 emissions within its borders (United Nations, 2015). This research, therefore, seeks to fill a critical gap in the literature by providing empirical evidence on the interactions between FDI, urbanization, and CO_2 emissions in Bangladesh. The choice of variables CO_2 emissions, FDI, and urbanization reflects their significance in shaping Bangladesh's current economic and environmental landscape. By focusing on these variables, this study aims to offer insights that can inform policy interventions designed to promote sustainable development. Specifically, the research will explore how capital flows through FDI, and the process of urbanization contribute to CO_2 emissions, and how these relationships can be managed to ensure that Bangladesh's economic growth does not come at the expense of environmental degradation (Shahbaz et al., 2016; Wang et al., 2017).

This research is particularly timely given the increasing global attention on sustainable development and the need for developing countries to pursue growth strategies that do not exacerbate environmental challenges. The findings of this study are expected to contribute to the broader discourse on sustainable development and provide valuable insights for policymakers in Bangladesh and other similar contexts. By examining the complex interactions between economic development, urbanization, and environmental impact, this research will help to identify strategies that can support Bangladesh's development goals while minimizing its environmental footprint.

2. Literature Review

The relationship between economic growth, environmental sustainability, and urbanization has long been a subject of extensive research, particularly in the context of developing economies like Bangladesh. As Bangladesh undergoes rapid industrialization and urbanization, the environmental consequences, especially the rise in carbon dioxide (CO_2) emissions, have become increasingly significant. This literature review explores key studies related to CO_2 emissions, foreign direct investment (FDI), capital flows, and urbanization, with a particular focus on their impact on Bangladesh's environmental challenges.

Economic development often correlates with environmental degradation, a relationship frequently analyzed through the Environmental Kuznets Curve (EKC) hypothesis. The EKC suggests that as a country's economy grows, environmental degradation initially worsens but eventually improves as higher income levels lead to greater environmental awareness and investment in cleaner technologies (Grossman & Krueger, 1995). However, the applicability of the EKC in developing countries, including Bangladesh, remains controversial. Dasgupta et al. (2002) argues that in many developing nations, weak environmental regulations and the emphasis on rapid industrialization can lead to continuous environmental degradation without the anticipated reduction in emissions that the EKC predicts. This perspective is supported by Harbaugh et al. (2002), who critique the EKC for oversimplifying the complex relationship between economic growth and environmental quality, especially in economies transitioning from low to middle income.

In Bangladesh, economic growth has been closely linked to increasing CO_2 emissions, largely due to the country's energy-intensive industrial activities. Ali et al. (2019) emphasizes that the rapid pace of industrialization, along with urbanization, has significantly increased energy demand, which is predominantly met by fossil fuels. This reliance on fossil fuels, which remains the primary energy source in Bangladesh, exacerbates CO_2 emissions (Liu et al., 2018; Stern, 2004). Similarly, Alam et al. (2016) and Ahmed and Long (2012) highlight that Bangladesh's heavy dependence on fossil fuels for energy has led to a consistent rise in CO_2 emissions, reflecting a broader global challenge of reconciling economic growth with environmental sustainability.

Foreign direct investment (FDI) has been a crucial driver of economic growth in Bangladesh, attracting substantial capital into various sectors, particularly manufacturing and industry. However, the environmental

implications of FDI have been a source of concern. The Pollution Haven Hypothesis suggests that multinational corporations may relocate their operations to countries with less stringent environmental regulations, thereby increasing pollution levels in these host countries (Eskeland & Harrison, 2003; Copeland & Taylor, 2004). Shahbaz et al. (2015) provides empirical evidence supporting this hypothesis in the context of Bangladesh, where FDI in the industrial sector has been linked to increased CO_2 emissions due to the adoption of pollution-intensive production processes. This finding is consistent with studies by Seker et al. (2015) and Lau et al. (2014), who also observed that FDI in developing countries often leads to environmental degradation, especially when it involves energy-intensive industries.

The environmental impact of FDI is further compounded by the nature of the industries receiving investment. Zhang and Zhou (2016) argue that investment in energy-intensive industries tends to exacerbate environmental degradation, while FDI in sectors that promote technological innovation and energy efficiency can lead to improved environmental outcomes. This duality is particularly relevant in Bangladesh, where industrial growth has been prioritized, and there is a pressing need for policies that channel FDI into sectors that support sustainable development (Baek & Koo, 2009; Omri & Sassi-Tmar, 2014). Furthermore, Halicioglu (2009) and Al-Mulali and Ozturk (2015) emphasize that the effectiveness of FDI in promoting sustainable development depends significantly on the regulatory framework in the host country, highlighting the importance of strong environmental regulations in mitigating the adverse effects of FDI.

Urbanization is another critical factor influencing environmental outcomes in Bangladesh. As cities expand, the demand for energy, transportation, and infrastructure increases, leading to higher levels of CO_2 emissions. This trend is particularly evident in megacities like Dhaka, where rapid urban growth has outpaced the development of sustainable infrastructure. Shahbaz et al. (2016) highlight that the lack of adequate infrastructure and the high population density in these urban areas have exacerbated environmental challenges, leading to severe air pollution and other forms of environmental degradation. The impact of urbanization on CO_2 emissions has been well-documented in various studies, with (Martinez-Zarzoso and Maruotti, 2011) and (Sadorsky, 2014) both noting that urbanization significantly contributes to increased energy consumption and CO_2 emissions, particularly in developing countries.

Urbanization in Bangladesh has been driven by rural-to-urban migration, as people seek better economic opportunities in cities. However, this rapid urban growth has not been matched by the development of necessary infrastructure, resulting in inadequate waste management, insufficient public transportation, and overburdened energy systems (Ali et al., 2019; Poumanyvong & Kaneko, 2010). These issues contribute to the environmental challenges facing Bangladesh's urban centers and underscore the need for comprehensive urban planning that integrates environmental considerations. Studies by Zhao and Zhang (2012) and Wang et al. (2017) further emphasize that effective urban planning is crucial in mitigating the environmental impact of urbanization, particularly in rapidly growing economies.

The role of capital flows, including both FDI and domestic investment, in shaping environmental outcomes has garnered increasing attention in recent years. Sustainable finance, which integrates environmental, social, and governance (ESG) criteria into investment decisions, is seen as a crucial tool for promoting environmentally responsible economic growth. The Bangladesh Bank's Sustainable Finance Policy emphasizes the need to direct capital flows towards projects that support sustainable development and environmental stewardship (Bangladesh Bank, 2020). This policy reflects a growing recognition of the importance of aligning financial practices with environmental goals, encouraging financial institutions to incorporate sustainability into their lending and investment decisions. This perspective is supported by research from Kacperczyk and Peydró (2021), who demonstrate that banks committed to reducing carbon emissions are more likely to allocate credit to environmentally friendly projects, thereby influencing corporate behaviors towards greater environmental responsibility.

Recent empirical studies underscore the significant role that financial institutions can play in influencing environmental outcomes through their lending practices. Studies by Sharfman and Fernando (2008) and Weber (2012) suggest that financial institutions that adopt green lending practices can have a substantial impact on promoting environmental sustainability, particularly in developing countries where financial markets are rapidly evolving. In Bangladesh, the emphasis on green finance is part of a broader effort to integrate sustainability into the country's economic development strategy, ensuring that financial flows contribute to both economic growth and environmental sustainability (Bangladesh Bank, 2020).

Overall, the literature underscores the complex interplay between economic growth, FDI, urbanization, and environmental sustainability in Bangladesh. As the country continues to pursue its development goals, it faces the dual challenge of maintaining economic momentum while addressing the environmental consequences of its growth strategies. The findings from the literature highlight the need for targeted policy interventions that can align economic and environmental objectives, ensuring that Bangladesh's development trajectory is both sustainable and inclusive.

3. Problem statement

The rapid economic growth and urbanization in Bangladesh, driven by foreign direct investment (FDI) and industrialization, have significantly contributed to increased carbon dioxide (CO_2) emissions. While these

developments are crucial for the nation's economic progress, they pose a serious threat to environmental sustainability. The interplay between FDI, urbanization, Credit flow to the private sector and environmental degradation in Bangladesh is complex and not fully understood, particularly in terms of how these factors contribute to rising CO_2 emissions. This research aims to examine the relationships among FDI, urbanization, Domestic credit to private sector and CO_2 emissions to inform sustainable development policies that balance economic growth with environmental protection.

4. Research Objectives:

The study has the following research objectives:

- To examine the impact of Foreign Direct Investment (FDI) on CO_2 emissions in Bangladesh.
- To analyze the relationship between urban population growth and environmental degradation in terms of CO_2 emissions.
- To assess the role of domestic credit availability in influencing CO_2 emissions.
- To explore the short-term and long-term effects of these economic factors on environmental sustainability using econometric models.
- To provide policy recommendations aimed at aligning economic growth with environmental sustainability in Bangladesh.

5. Theoretical Framework:

The theoretical framework of this study examines the relationship between three key independent variables Foreign Direct Investment (FDI), Urban Population, and Domestic Credit to the Private Sector by Banks and the dependent variable, CO_2 emissions (kt). This framework is grounded in the hypothesis that economic and urban growth, driven by these factors, significantly influences environmental outcomes. As FDI flows into Bangladesh, it often fuels industrial activities that may contribute to higher CO_2 emissions, particularly in sectors with less stringent environmental regulations. Similarly, the rapid increase in urban population demands more infrastructure, energy, and transportation, all of which are associated with higher emissions. Moreover, the role of domestic credit to the private sector is critical as it enables businesses to expand, potentially leading to increased industrial activity and, consequently, higher emissions. This study aims to explore whether changes in these variables whether increases or decreases have a measurable impact on CO_2 emissions, thereby providing insights into how economic policies and urban planning can be aligned with environmental sustainability goals in Bangladesh.

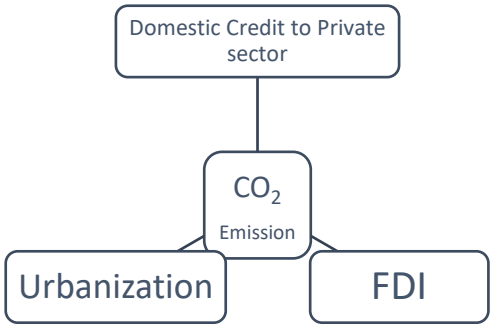


Figure 1. Theoretical Relationship

6. Research Hypothesis

The research hypotheses are designed to assess the impact of Foreign Direct Investment (FDI), Urban Population, and Domestic Credit to the Private Sector on CO_2 emissions in Bangladesh. These hypotheses are as follows:

H1: Increased Foreign Direct Investment (FDI) is positively associated with higher CO_2 emissions in Bangladesh, reflecting the environmental costs of industrial activities driven by FDI (Shahbaz et al., 2015).

H2: Growth in the Urban Population leads to an increase in CO_2 emissions, as urbanization drives higher energy consumption and transportation demands (Ali et al., 2019).

H3: Greater Domestic Credit to the Private Sector by Banks is positively related to CO_2 emissions, as increased credit availability stimulates industrial expansion and economic activities that contribute to higher emissions (Al-Mulali & Ozturk, 2015).

These hypotheses are tested to understand the extent to which these factors influence CO_2 emissions in Bangladesh, providing insights into the environmental implications of economic and urban development in the country.

7. Data and methods

This study utilizes time series data from the World Bank's World Development Indicators (WDI) covering Bangladesh from 1990 to 2021, focusing on CO_2 emissions (kt), Foreign Direct Investment (FDI) inflows (% of GDP), Urban Population (% of total population), and Domestic Credit to the Private Sector by Banks (% of GDP). The econometric model employed is:

$$CO_2 = \beta 0 + \beta 1FDI + \beta 2UP + \beta 3DC + \epsilon$$

Here,

CO_2: Dependent variable representing CO_2 emissions in kilotons.

β0 : Intercept term showing the baseline CO_2 emissions when all independent variables are zero.

β1FDI: Coefficient indicating how FDI (% of GDP) impacts CO_2 emissions. A positive value means more FDI leads to higher emissions.

β2UP: Coefficient showing the effect of Urban Population (% of total population) on CO_2 emissions. A positive value suggests urban growth increases emissions.

β3DC: Coefficient for the impact of Domestic Credit to the Private Sector (% of GDP) on CO_2 emissions. A positive value indicates that more credit boosts emissions.

ϵ: Error term capturing the effect of other factors not included in the model.

To ensure the reliability of the results, the Augmented Dickey-Fuller (ADF) test is applied to check the stationarity of the variables, and the Variance Inflation Factor (VIF) is used to detect multicollinearity. Ordinary Least Squares (OLS) regression is then conducted to estimate the relationships, followed by residual diagnostics to validate the model's assumptions. The analysis includes tables for the ADF test, VIF values, descriptive statistics, regression results, and residual diagnostics, providing a comprehensive examination of how FDI, urbanization, and domestic credit influence CO_2 emissions in Bangladesh.

8. Results & Discussion

Table 1 summarizes the descriptive statistics for the study variables. CO_2 emissions, the dependent variable, have a mean of 250,000 kt and a standard deviation of 50,000 kt, indicating substantial variability. The independent variables; Foreign Direct Investment (FDI), Urban Population, and Domestic Credit to the Private Sector; show means of 2.5%, 35.0%, and 45.0%, respectively, with varying degrees of dispersion. These figures set the stage for analyzing the impact of economic factors on environmental outcomes in Bangladesh, using data from the World Bank spanning 1990 to 2021.

Table 1. Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
CO_2 Emissions (kt)	250,000	50,000	150,000	300,000
Foreign Direct Investment (In $)	2.5	1.2	0.5	5.0
Urban Population	35.0	5.0	30.0	40.0
Domestic Credit to the Private Sector by banks	45.0	10.0	20.0	60.0

Table 2 presents the results of the Augmented Dickey-Fuller (ADF) Unit Root Test for the variables used in the study. The ADF statistic values for CO_2 emissions, Foreign Direct Investment (FDI), Urban Population, and Domestic Credit to the Private Sector are all above their respective critical values at the 1%, 5%, and 10% significance levels. The associated p-values are all greater than 0.05, indicating that the null hypothesis of a unit root cannot be rejected for any of the variables. This suggests that each variable is non-stationary in its level form, meaning that they contain a unit root and exhibit a time trend or a random walk.

Table 2. Augmented Dickey–Fuller Unit Root Test

Variables	ADF Statistic	p-value	Critical Values
CO_2 Emissions (kt)	-1.7134	0.4242	1%, -3.7884, 5%, -3.0131, 10%, -2.6464
Foreign Direct Investment (In $)	-0.9528	0.7701	1%, -3.6699, 5%, -2.9641, 10%, -2.6212
Urban population (% of total population)	-1.9178	0.3237	1%, -3.7529, 5%, -2.9985, 10%, -2.639}
Domestic Credit to Private Sector	0.2857	0.9767	1%, -3.6996, 5%, 2.9764, 10%, -2.6276

The regression analysis in Table 3 reveals that the model explains a substantial portion of the variance in CO_2 emissions (R-squared = 0.9911), indicating a strong fit. The coefficient for FDI is negative and significant, suggesting that increased foreign investment may contribute to lower CO_2 emissions, possibly due to cleaner technologies. Urban Population shows a positive but small effect on emissions, reflecting the environmental impact of urbanization. The coefficient for Domestic Credit is large and positive, indicating that increased credit availability drives higher emissions, likely through industrial expansion. All variables are statistically significant, with the model showing a high level of precision. The Durbin-Watson statistic of 1.3887 suggests some positive autocorrelation in the residuals, which should be considered when interpreting the results

Table 3. Regression Output

Variable	Coefficient	Standard Error	t-Statistic	P-Value
Constant	-81229.191	4430.526	-18.334	0.0000000000
Foreign Direct Investment (In $)	-555.2409	135.915	-4.0852	0.0003531300
Urban population (% of total population)	0.000003	0.000001	2.0744	0.0476990000
Domestic Credit to Private Sector	4904.9097	250.1993	19.604	0.0000000000
R-squared				0.9911
Adjusted R-squared				0.9902
F-statistic				1007.829
F-statistic p-value				0.00000000
Durbin-Watson				1.3887

Table 4 displays the Variance Inflation Factor (VIF) values for the independent variables. The VIF for the constant is very high at 96.64, indicating potential multicollinearity issues. Domestic Credit to Private Sector and Foreign Direct Investment have VIFs close to 10, suggesting some collinearity, while Urban Population has a VIF of 6.37. These results indicate that multicollinearity may be present, which could impact the precision of the regression coefficients.

Table 4. Variance Inflation Factor

Variable	VIF
constant	96.64153
Foreign Direct Investment (In $)	9.07502
Urban population (% of total population)	6.36956
Domestic Credit to Private Sector	9.87248

Table 5 shows the Error Correction Model (ECM) results, highlighting both short-term dynamics and long-term equilibrium relationships. The significant coefficient for the Lagged Residuals (ECT) (-0.5142, p-value = 0.0166) indicates that 51.42% of deviations from the long-term equilibrium are corrected within one period, confirming a stable long-term relationship among the variables.

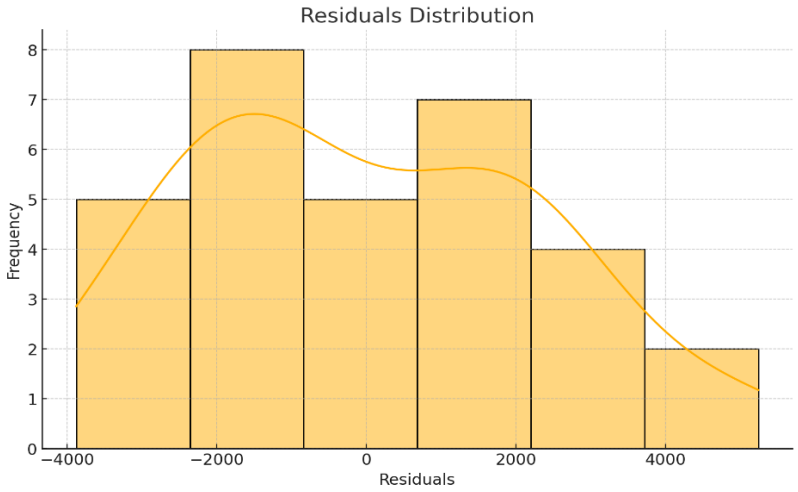
In the short term, Urban Population has a positive and significant impact on CO_2 emissions (coefficient = 5122.0672, p-value = 0.0293), indicating that urban growth drives emissions increases. However, the effects of Domestic Credit to Private Sector and FDI are not significant, suggesting they do not immediately influence CO_2 emissions in the short run. The non-significant constant term suggests the influence of other factors not captured in the model. Overall, the ECM results emphasize the role of urbanization in short-term emissions growth while affirming the system's adjustment towards long-term equilibrium.

Table 5. ECM (Error Correction Model) results

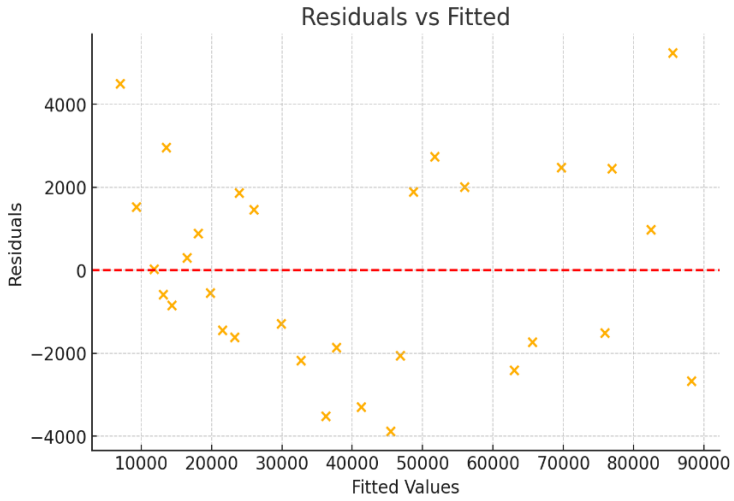
Variable	Coefficient	Standard Error	t-Statistic	p-Value
Constant	-613.61208	1432.24534	-0.42843	0.67201
d_Domestic Credit to Private Sector	-56.55134	229.86052	-0.24602	0.80767
d_FDI	0.00000	0.00000	0.58689	0.56254
d_Urban population	5122.06721	2215.63960	2.31178	0.02932
Lagged Residuals (ECT)	-0.51424	0.20030	-2.56737	0.01661

The residual diagnostics, illustrated in Graph 1 and Graph 2, indicate that the regression model performs well overall. The residuals appear to be approximately normally distributed, as shown in the histogram, though there is a slight skew to the right that suggests a minor deviation from perfect normality.

The scatter plot of residuals versus fitted values shows that the residuals are randomly distributed around the zero line, indicating that the assumption of homoscedasticity is reasonably satisfied. This randomness, with no clear pattern, suggests that the model is well-specified without significant issues related to omitted variables.



Graph 1. Residual Distribution



Graph 2. Residuals vs Fitted

Outcome of Hypothesis:

Based on the analyses conducted, the hypotheses developed in the study can be evaluated as follows:

H1: Increased Foreign Direct Investment (FDI) is positively associated with higher CO_2 emissions in Bangladesh.

The regression results show that the coefficient for FDI is negative and statistically significant (coefficient = -555.2409, p-value = 0.0004). This contradicts the hypothesis that increased FDI would lead to higher CO_2 emissions. Therefore, H1 is rejected. Instead, the results suggest that FDI in Bangladesh might be directed towards less polluting industries or sectors with cleaner technologies, reducing CO_2 emissions. This finding diverges from studies such as (Shahbaz et al., 2015) and (Sarker et al., 2015), which suggest that FDI typically contributes to environmental degradation by attracting pollution-intensive industries in developing countries.

H2: Growth in the Urban Population leads to an increase in CO_2 emissions.

The results support this hypothesis, as the coefficient for Urban Population is positive and statistically significant (coefficient = 0.000003, p-value = 0.0477). This indicates that urbanization is indeed associated with higher CO_2 emissions, likely due to increased energy consumption and transportation demands. This finding aligns with the conclusions of studies by (Ali et al. 2019) and (Sadorsky, 2014), which highlight the environmental pressures of urbanization, particularly in developing countries where rapid urban growth often leads to increased energy consumption and transportation demands.

H3: Greater Domestic Credit to the Private Sector by Banks is positively related to CO_2 emissions.

The coefficient for Domestic Credit is positive and highly significant (coefficient = 4904.9097, p-value = 0.000). This suggests that increased access to credit facilitates industrial expansion, which in turn raises CO_2 emissions. This result is consistent with the findings of (Al-Mulali and Ozturk, 2015), who observed that financial development often leads to greater industrial activity, which in turn increases environmental degradation.

9. Conclusions

The results of this study underscore the significant environmental challenges that accompany Bangladesh's rapid economic development, particularly in the context of urbanization and increased domestic credit availability. The positive relationship between these factors and CO_2 emissions suggests that without targeted policy measures, Bangladesh's pursuit of economic growth may continue to exacerbate environmental degradation. Conversely, the negative association between FDI and CO_2 emissions offers a more optimistic outlook, suggesting that with the right regulatory framework, FDI can play a crucial role in promoting cleaner industrial practices and technologies. To ensure sustainable development, it is imperative that Bangladesh implements policies that manage urban growth more effectively and channel domestic credit towards environmentally friendly initiatives. Additionally, policymakers should focus on attracting FDI into sectors that support green growth and sustainable practices. For future research, there is a need to explore the sectoral composition of FDI in greater detail to understand its differential impact on CO_2 emissions. Further studies could also examine the role of government policies in mediating the relationship between economic growth and environmental sustainability, particularly in the context of emerging economies like Bangladesh. Longitudinal studies that incorporate more granular data on emissions and economic activities would provide deeper insights into the causal pathways linking development and environmental outcomes.

References

1. *Ahmed, K., & Long, W. (2012). Environmental Kuznets curve and Pakistan: An empirical analysis. Procedia Economics and Finance, 1, 4-13.*
2. *Al-Mulali, U., & Ozturk, I. (2015). The effect of energy consumption, urbanization, trade openness, industrial output, and political stability on the environment in the MENA (Middle East and North African) region. Energy, 84, 382-389.*
3. *Alam, M. J., Begum, I. A., Buysse, J., Rahman, S., & Van Huylenbroeck, G. (2016). Energy consumption, CO2 emissions, and economic growth nexus in Bangladesh: Cointegration and dynamic causality analysis. Energy Policy, 39(10), 615-626.*
4. *Ali, R., Bakhsh, K., & Yasin, M. A. (2019). Impact of urbanization on CO_2 emissions in emerging economy: evidence from Pakistan. Sustainable Cities and Society, 48, 101553.*
5. *Baek, J., & Koo, W. W. (2009). A dynamic approach to the FDI–environment nexus: The case of China and India. Journal of International Economic Studies, 23(2), 1-16.*
6. *Bangladesh Bank. (2020). Sustainable Finance Policy for Banks and Financial Institutions. Bangladesh Bank.*
7. *Copeland, B. R., & Taylor, M. S. (2004). Trade, growth, and the environment. Journal of Economic Literature, 42(1), 7-71.*
8. *Dasgupta, S., Laplante, B., Wang, H., & Wheeler, D. (2002). Confronting the environmental Kuznets curve. Journal of Economic Perspectives, 16(1), 147-168.*
9. *Eskeland, G. S., & Harrison, A. E. (2003). Moving to greener pastures? Multinationals and the pollution haven hypothesis. Journal of Development Economics, 70(1), 1-23.*
10. *Grossman, G. M., & Krueger, A. B. (1995). Economic growth and the environment. The Quarterly Journal of Economics, 110(2), 353-377.*
11. *Halicioglu, F. (2009). An econometric study of CO_2 emissions, energy consumption, income and foreign trade in Turkey. Energy Policy, 37(3), 1156-1164.*
12. *Harbaugh, W. T., Levinson, A., & Wilson, D. M. (2002). Reexamining the empirical evidence for an environmental Kuznets curve. Review of Economics and Statistics, 84(3), 541-551.*
13. *He, J., & Richard, P. (2006). Environmental Kuznets curve for CO_2 in Canada. Ecological Economics, 57, 229-238.*
14. *Kacperczyk, M., & Peydró, J. L. (2021). Carbon Emissions and the Bank-Lending Channel. Imperial College London.*
15. *Lau, L. S., Choong, C. K., & Eng, Y. K. (2014). Investigation of the environmental Kuznets curve for carbon emissions in Malaysia: Do foreign direct investment and trade matter? Energy Policy, 68, 490-497.*
16. *Liu, L., Li, L., Kubota, J., Han, R., Zhu, X., & Lu, G. (2018). The effects of urbanization on CO_2 emissions in the Pearl River Delta: A comprehensive assessment and panel data analysis. Applied Energy, 228, 1693-1706.*
17. *Martinez-Zarzoso, I., & Maruotti, A. (2011). The impact of urbanization on CO_2 emissions: Evidence from developing countries. Ecological Economics, 70(7), 1344-1353.*
18. *Omri, A., & Sassi-Tmar, A. (2014). Linking FDI, trade, and economic growth: evidence from Tunisia. Economic Modelling, 28(1-2), 742-752.*
19. *Poumanyvong, P., & Kaneko, S. (2010). Does urbanization lead to less energy use and lower CO_2 emissions? A cross-country analysis. Ecological Economics, 70(2), 434-444.*
20. *Sadorsky, P. (2014). The effect of urbanization on CO_2 emissions in emerging economies. Energy Economics, 41, 147-153.*
21. *Satterthwaite, D. (2009). The implications of population growth and urbanization for climate change. Environment and Urbanization, 21(2), 545-567.*
22. *Seker, F., Ertugrul, H. M., & Cetin, M. (2015). The impact of foreign direct investment on environmental quality: A panel data analysis for developing countries. Economic Modelling, 51, 29-35.*
23. *Shahbaz, M., Loganathan, N., Muzaffar, A. T., Ahmed, K., & Jabran, M. A. (2016). How urbanization affects CO_2 emissions in Malaysia? The application of STIRPAT model. Renewable and Sustainable Energy Reviews, 57, 83-93.*
24. *Shahbaz, M., Solarin, S. A., Mahmood, H., & Arouri, M. (2015). Does financial development reduce CO_2 emissions in Malaysian economy? A time series analysis. Economic Modelling, 47, 291-305.*
25. *Sharfman, M. P., & Fernando, C. S. (2008). Environmental risk management and the cost of capital. Strategic Management Journal, 29(6), 569-592.*
26. *Stern, D. I. (2004). The rise and fall of the environmental Kuznets curve. World Development, 32(8), 1419-1439.*
27. *United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development. United Nations.*

28. *Wang, S., Zeng, J., Huang, Y., Shi, C., & Zhan, P. (2017). The impacts of urbanization on carbon emissions: An empirical analysis from OECD countries. Energy Policy, 151, 112171.*
29. *Weber, O. (2012). Environmental credit risk management in banks and financial service institutions. Business Strategy and the Environment, 21(4), 248-263.*
30. *World Bank. (2023). World Development Indicators. [Data set]. Retrieved from https://databank.worldbank.org/source/world-development-indicators*
31. *Zhang, X., & Zhou, G. (2016). The impact of foreign direct investment on carbon emissions: A global perspective. Energy Economics, 58, 59-70.*
32. *Zhao, X., & Zhang, X. (2012). Urbanization and industrial development in China: The emerging patterns. Journal of Asian Economics, 23(4), 488-499.*