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The Impact of Commercial Sectors on Environmental Quality: A Case Study of Tabriz's Ecosystem and Financial Landscape

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Abstract

Commercial sectors play a crucial role in the national economy by facilitating resource accumulation through both small and large savings, optimizing the distribution of financial resources, and directing them towards the costs and investment requirements of productive sectors. Most research exploring the link between economic growth and environmental factors is grounded in the Kuznets hypothesis. The findings indicate a unidirectional relationship between financial development and gas emissions. Specifically, the ratio of domestic credit to the private sector, expressed as a percentage of GDP, positively influences financial markets and significantly impacts biogas emissions in selected middle-income nations. Consequently, the hypothesis asserting a significant relationship between domestic credit to the private sector (as a percentage of GDP) and environmental gas emissions cannot be dismissed. Additionally, the ratio of traded stocks to the volume of stock market transactions, serving as a capital market indicator, has a positive and significant effect on emissions, reinforcing its role as an environmental quality indicator in the co-gas group of the two selected middle-income countries. Thus, the hypothesis regarding the significant relationship between the ratio of traded stocks and gas emissions as an environmental quality indicator remains valid. Based on the findings of this study, several recommendations are proposed: Reducing government size to foster greater non-governmental sector participation, enhancing public awareness across various demographics through media to mitigate environmental pollution, discouraging foreign investment in polluting industries, and promoting the establishment and development of environmental protection organizations through training and resource allocation.

Keywords: Commercial Sectors, Environmental Quality, Panel Models, Tabriz

1. Introduction

Commercial sectors serve as a crucial conduit for attracting, accumulating, and reallocating capital, as well as providing the long-term financial resources essential for the production of goods and the delivery of services. Some economists regard these sectors as the driving force behind economic growth (Karimimansoob *et al*., 2024) [24]. Their significance lies in their ability to gather resources through both small and large savings within the national economy, thereby optimizing the flow of financial resources and directing them towards the costs and investment requirements of productive sectors (Dinda, 2004; Khanian *et al*., 2013) [8, 27]. The beneficial impacts of commercial sectors on economic development are substantial, including the enhancement of investment incentives through risk reduction, risk pricing, and the facilitation of liquidity management, as well as the mobilization of deposits (Aghazadeh *et al*., 2018) [3]. The importance of these sectors is so pronounced that some economists argue that the disparity between developed and developing economies is not primarily due to the advanced technologies of the former, but rather the presence of well-integrated commercial sectors (Gheitarani *et al*., 2013) [18].

Research indicates that the advancement of commercial sectors, particularly the stock market, significantly influences corporate financing and the selection of financing methods, ultimately leading to substantial effects on economic growth. The banking and capital markets are identified as the primary commercial sectors (Rajabi *et al*., 2022) [36]. These sectors serve as

the core of the economic system and are pivotal in decision-making processes. A failure in these markets can adversely impact the entire economic framework (Norouzian & Sarabi, 2023) [31]. Consequently, the enhancement of commercial sectors is a crucial element that can facilitate rapid and sustained economic growth (Eılaeı & Aksulu, 2023) [10]. The significance of developing a robust financial sector is evident in its ability to mobilize financial resources for investment, attract foreign capital, and improve the efficiency of resource allocation mechanisms (Karimimansoob *et al*., 2024-a; Karimimansoob *et al*., 2024-b) [23, 25].

The clarity of financial market regulations, including adherence to accounting standards and reporting mechanisms, enhances investor confidence. This boost in confidence is crucial for attracting potential investors. Furthermore, the efficiency effect indicates that as commercial sectors evolve, there is an increase in diversity and liquidity, which in turn channels resources toward high-yield projects (Alevy *et al*., 2007) [5].

2. Theoretical

Commercial sectors serve as a crucial conduit for the attraction, accumulation, and allocation of capital, as well as for supplying the long-term financial resources essential for the production of goods and the provision of services (Zaker Haghighi *et al*., 2014; Aghazadeh, *et al*., 2019) [39, 1]. Some economists regard these sectors as the driving force behind economic growth. Their significance lies in their ability to mobilize resources through both small and large savings within the national economy, thereby optimizing the distribution of financial resources and directing them toward the costs and investment requirements of the productive sectors (Ferland *et al*., 2017) [12].

The beneficial influence of commercial sectors on economic development is significant and profound. This includes enhancing investment incentives through risk reduction, effective risk pricing, and the facilitation of liquidity management, as well as the mobilization of deposits. Some economists argue that the disparity between developed and developing economies lies not in the advanced technologies of the former, but rather in the presence of well-integrated commercial sectors. Research indicates that the development level of commercial sectors, particularly the stock market, plays a crucial role in corporate financing and the selection of financing methods, ultimately exerting a substantial impact on economic growth. Bank and capital markets are identified as the primary commercial sectors in this context (Friedman, 1993; Kazemi Andaryan *et al*., 2021) [13, 26].

Transparency in financial market regulations, including adherence to accounting standards and reporting systems, enhances investor confidence. This boost in confidence is crucial for attracting potential investors (Naghibi Iravani *et al*., 2024-a) [34]. Research into the determinants of environmental pollution commenced when the issue was recognized as both an economic and social concern (Ghadarjani & Gheitarani, 2013) [14]. A majority of scholars contend that elements such as economic growth, energy consumption, international trade, and population increase significantly contribute to the proliferation of pollution. Among these, economic growth is particularly critical regarding its origins and impacts on the environment. The rise in economic growth (Kahvand *et al*., 2015) [22] not only results in the extraction of greater natural resources but also leads to an escalation in the emission of harmful pollutants, thereby causing environmental degradation (Amani-Beni *et al*., 2021) [6]. Attaining the desired level of economic growth is unfeasible without effective financial institutions and the appropriate allocation of financial resources (Zakerhaghighi *et al*., 2015) [40].

Numerous studies investigating the connection between economic growth and environmental quality are grounded in the Kuznets hypothesis. In 1955, Simon Kuznets introduced the concept of an inverse relationship between environmental quality and per capita income levels, which subsequently formed the foundation of the Kuznets environmental hypothesis (Dinda, 2004; Dizaji *et al*., 2023) [8, 9]. This relationship bears resemblance to the assertion that as per capita income rises, the environmental consequences of economic activities initially increase, reach a peak, and then decline thereafter (Farrokhirad & Gheitarani, 2024) [11]. Advocates of the Kuznets environmental hypothesis contend that at elevated levels of financial and economic advancement, the economic framework transitions towards new industries, technologies, and services, leading to alterations in the types of polluting inputs and energy sources utilized (Gheitarany *et al*., 2013) [19].

Environmental awareness is steadily increasing, leading to the enactment and enforcement of more effective environmental regulations, which in turn enhances the quality of the environment (Ghadarjani *et al*., 2013) [14, 15]. In this context, commercial sectors can motivate investors to purchase shares in companies that prioritize environmental protection by enhancing the valuation of such companies' shares. This, in turn, fosters financial development aimed at safeguarding and improving environmental quality (Yadollahi, 2020) [38]. Financial development facilitates the allocation of necessary resources to establish more advanced and well-equipped research and development units, as well as to access more efficient and eco-friendly technologies that require substantial financial investment (Norouzian & Sarabi 2023) [31]. This approach also increases the potential for attracting foreign direct investment while simultaneously reducing pollution levels (Gheitarani *et al*., 2024; Maleki *et al*., 2024) [16, 29]. Consequently, a certain level of economic growth can be achieved with reduced pollution.

Financial development plays a crucial role in enhancing economic growth while simultaneously mitigating pollution. Providing access to financial resources and facilitating the adoption of more efficient energy technologies, contributes to a reduction in energy consumption intensity and an increase in energy efficiency (Gheitarani *et al*., 2020) [17]. Consequently, financial development not only fosters economic expansion through direct foreign investment but also curtails environmental degradation. Given that a significant portion of environmental initiatives is managed by the public sector, the capacity to boost such investments is vital for governments at national, regional, and global levels (Naghibi Iravani *et al*., 2024-b; Aydin *et al*., 2020) [35, 7].

The advancement of the financial sector has the potential to enhance technological innovations, thereby leading to a significant decrease in pollutant emissions (Samami *et al*., 2024) [37]. The commercial sector plays a crucial role in emission reduction by enabling the financing of environmentally sustainable investment initiatives. Developed nations, particularly those engaged in industries that contribute to pollution, tend to relocate their polluting

operations to countries with less stringent environmental regulations (Herman, 2010) [20]. This practice frequently occurs through mechanisms such as foreign trade and direct investment. Consequently, the influx of foreign direct investment into host countries characterized by lower environmental standards, often accompanied by lower income levels, increases pollution levels (Gheitarani *et al*., 2013) [18].

Rybinski's theory posits that the accumulation of human capital fosters the growth of clean industries, thereby mitigating pollution. In contrast, the accumulation of physical capital tends to promote polluting industries, resulting in heightened pollution levels (Herman, 2010) [20]. Consequently, during the initial phases of economic development, countries primarily expand through the accumulation of physical capital (Sarabi *et al*., 2023) [32]. As development progresses, growth shifts towards the enhancement of skilled labor (Menkhoff & Tolksdorf, 2000) [30]. This transition indicates that while early capital accumulation correlates with increased pollution, the subsequent growth in per capita income, along with a shift from industrial to service-oriented economies and a greater reliance on labor over capital, leads to a reduction in pollution (Sarabi & Norouzian, 2023) [32]. Supporting this, a study by Meter and colleagues on the Gulf Cooperation Council (GCC) countries from 1980 to 2011 revealed a long-term relationship between domestic gas emissions and financial development. Additionally, in Oman, the UAE, and Kuwait, a long-term causal link was identified between financial development and gas emissions, while in the UAE, Saudi Arabia, and Kuwait, a long-term one-way causal relationship was observed between energy consumption and emissions (Ferland *et al*., 2017) [12].

3. Methodology

The CO2METRIC emissions in this equation represent the ratio of private credits to the environmental quality index, which is allocated to the private sector domestically as a percentage of GDP. This ratio is further defined by the relationship between the stock exchange stocks, serving as a money market index, and the volume of stock market transactions relative to the real GDP market index, GDPCONS Capital. Additionally, the number of fixed telephone subscribers is measured per 100 inhabitants as an ICT index. Governance quality is assessed through a simple average of six indicators, including the right to comment and accountability, political stability, nonviolence, and government effectiveness (Jamshidirad *et al*., 2021; Naghibi Iravani *et al*., 2024) [21, 33]. The financial burden of regulation, rule of law, and corruption control are also calculated, reflecting the conditions of the country over time. To address the equation error and examine the potential mania or anonymity of variables in this study, the Dickey-Fuller root test is employed (Ahmadi *et al*., 2023) [4].

CO2 emissions (metric tons per)

$$CO2METRIC_{it} = \beta_0 + \beta_1 PRIVATE_{it} + \beta_2 STOCK_{it} + \beta_3 QG_{it} + \beta_4 GDPCON2011_{it} + \beta_5 TELEPHONE_{it+Uit}$$

The theoretical foundations and experimental studies related to model specification and estimation presented in this paper are illustrated in Table 1.

Table 1: Study of meaning and anonymity of variables in the group of selected countries

Result	P-value insignificant level (t value)- first comparison	P-value insignificant level (t value)	Single root test	Variable
I (0)- Stable	-	-1.69478 (0.0451)	m, Pesaran, Shin	CO2METRIC
I (1)- Stable	-5.22266 0.0000	1.83923 (0.9671)	m, Pesaran, Shin	PRIVATE
I (1)- Stable	-8.57677 (0.0000)	2.68563 (0.9964)	m, Pesaran, Shin	GDPCONS2011
I (1)- Stable	-5.59927 (0.0000)	1.45165 (0.9267)	m, Pesaran, Shin	TELEPHONE
I (0)- Stable	-	-3.96884 (0.0000)	m, Pesaran, Shin	STOCK
I (0)- Stable	-	-1.60782 (0.0539)	m, Pesaran, Shin	QG

As illustrated in Table 1, the statistics provided by Shin Sons indicate various factors, including gas emissions, environmental quality, the ratio of exchanged stocks to the volume of stock market transactions as a capital market index, and the governance quality index. Additionally, the number of fixed telephone subscribers per 100 individuals, real GDP, and the ratio of domestic credit extended to the private sector (as a percentage of GDP) serve as indicators for the money market, with a one-time margin difference considered. Consequently, the null hypothesis asserting the presence of a single root is dismissed. This leads to the confirmation of the stability of the data utilized in this study prior to model estimation. Furthermore, the co-integration test results presented in Table 2 indicate a long-term relationship among the variables incorporated in the model (Khanian *et al*., 2019) [28].

Table 2: Co-integration test results

P-value	t-Statistic	
0.0447	-1.698971	Kao test

To estimate equation (1), it is essential to first identify the appropriate estimation method for the specific type of panel data. The F-test hypothesis 0, as shown in Table 3, indicates that the statistics derived from the ordinary least squares method are rejected. Consequently, the use of constrained regression (ordinary least squares) is deemed invalid, necessitating the consideration of various sources of fixed or random effects within the model. Subsequently, the Hausman test was employed to evaluate the model using either the fixed or random effects approach. This test utilized software developed from the findings of Sarabi *et al*. (2023) [32]. The statistics from the two calculations for this regression, presented in Table 3, reveal that the null hypothesis based on the random method is rejected (Aghazadeh *et al*., 2017) [2]. This confirms the presence of constant effects for model estimation, with the results detailed in Table 3.

Table 3: Outcomes of assessing the influence of commercial sectors on environmental quality through the fixed effects approach within the selected countries group (CO), with gas emissions as the dependent variable

Fixed effects method	
Coefficient (t) statistics (p-value)	**Explanatory variables**
-2.469710- 25.51095 (0.0000)	C
0.022067- 19.57809 (0.0000)	PRIVATE
0.000637) 3.200322 (0.0015)	STOCK
0.000106- 34.46254 (0.0000)	GDPCONS2011
-2.345890 -16.30290 (0.0000)	QG
0.085760) 35.71770 (0.0000)	TELEPHONE
0.847158	R2
345.7561 (0.0000)	F Statistics
F- 29.277 = 165.189561 P-value = (0.0)	Limer F Statistics
CHISQ-5= 13.515515 P-value = (0.01)	Hausmann test statistics

The outcomes of the regression analysis indicate a unidirectional relationship between financial development and gas emissions. In a study conducted in 2011, Shahbaz *et al*. investigated the interplay between financial development and the determinants of carbon dioxide emissions in Pakistan. The findings revealed that financial development is interconnected with other variables influencing emissions, such as economic growth and foreign trade. Consequently, previous research that assessed the impact of these factors on Pakistan's environmental quality, while neglecting the role of financial development, may have overstated the estimation of coefficients. It was concluded that financial development has contributed to a decrease in environmental pollution.

Income, energy consumption, and trade liberalization are significant long-term contributors to carbon dioxide emissions. This study examines the relationship between environmental quality, financial development, and institutional quality across 24 emerging economies. Utilizing the generalized torque method for analysis, findings from 2004 support the Kuznets environmental hypothesis, highlighting the critical role of financial development and institutional quality in enhancing environmental quality.

The study indicates that without a robust institutional framework, financial liberalization can adversely affect environmental quality. The United States, Japan, Brazil, India, and Russia are identified as the countries with the highest levels of gas emissions. The findings suggest that increased economic growth and financial development in these nations have led to a decrease in environmental pollution. Furthermore, if appropriate policies are implemented to promote financial freedom, it is anticipated that attracting greater resources and foreign direct investment in research and development within these countries will contribute to a reduction in environmental pollution by 2009.

The findings of the 2005 study conducted by Halicioglu indicate that Turkey's revenue during the 1960s had a substantial impact on gas emissions observed in 2001-2002, as well as during the 1995 period (referencing Talukdar and Meissner, 1987). The involvement of the private sector in a developing economy tends to result in reduced environmental degradation. Furthermore, enhanced efficiency in capital markets and collaborations with developed economies in the realm of private sector growth are likely to further mitigate environmental harm. A study by Behboodi and Goladani (2014) analyzed the influence of economic growth on environmental pollution in 21 oil-rich nations, including Iran during the 1980s, confirming the Kuznets environmental hypothesis. Additionally, a 2007 study by Asgharpour *et al*. revealed a correlation between economic growth and emissions.

In the countries examined, particularly regarding gas emissions, the primary political recommendation derived from this study is to advance the financial sector to enhance environmental quality. Theoretical frameworks and empirical research across 44 developing nations demonstrated a greater focus on the impact of commercial sectors on environmental quality within the selected group of middle-income countries, utilizing adjusted models. In the selected middle-income countries, the fixed effects method illustrated in Table 3 reveals the following:

- The ratio of domestic credit to the private sector (as a percentage of GDP) serves as a monetary market indicator that positively influences and significantly affects biogas emissions in these countries.
- Consequently, the hypothesis asserting a significant relationship between domestic credit extended to the private sector (as a percentage of GDP), as a quality indicator and monetary market index, and environmental gas emissions cannot be dismissed.
- The ratio of exchanged stocks to the volume of stock market transactions, functioning as a capital market index, also exhibits a positive and significant impact on emissions.

The relationship between the ratio of domestic credits extended to the private sector (as a percentage of GDP) and biogas emissions in a selected group of middle-income countries is more pronounced than the relationship between the ratio of exchanged stocks and market volume. This suggests that the money market operates with greater inefficiency compared to the capital market, which benefits from more stringent oversight of domestic lending practices. In contrast, entities within the capital market are required to secure necessary permits from the Environmental Protection Agency for their industrial operations. Furthermore, real GDP serves as a positive and significant indicator of environmental quality, with CO2 emissions exhibiting a bio-release effect in the selected countries. Notably, lower levels of economic growth correlate with increased environmental degradation resulting from economic activities.

Agricultural practices, along with the intensity of resource extraction and subsequent industrialization, contribute to resource depletion and waste generation. The 17 indicators of governance quality demonstrate a negative and significant impact on dissemination. Effective governance is crucial for fostering a healthy environment for humans and nurturing a vibrant ecosystem. Enhancements in six governance indicators are positively associated with the performance of governments and nations in safeguarding environmental and ecosystem health. Specifically, improvements in the right to comment and accountability index create societal conditions that compel authorities to implement policies aimed at enhancing water quality, sewage systems, access to safe drinking water, and air quality, all of which are fundamental civil rights.

Moreover, advancements in indicators related to corruption control, government effectiveness, and the rule of law will

facilitate the enforcement of policies designed to protect wildlife and forests, particularly through measures against smuggling and poaching.

4. Discussion and Conclusion

Achieving optimal economic growth is unattainable without the presence of efficient financial institutions and the appropriate allocation of financial resources. The significance of the financial system in fostering economic growth and development across nations is profound, as disparities in the efficiency and effectiveness of financial systems can be observed between developed and developing countries. Financial systems encompass a diverse array of commercial sectors, instruments, and products, including various markets such as money and capital markets. Consequently, financial development is a complex concept that extends beyond the advancement of the banking sector to include aspects such as the growth of the non-bank financial sector, the development of the monetary sector, monetary policy, banking regulation and supervision, financial sector openness, and the institutional environment.

Commercial sectors can play a crucial role in mitigating emissions by facilitating financing for environmentally sustainable investment projects. A well-developed financial sector enhances environmental quality by incentivizing firms to adopt innovative technologies. Conversely, developed nations, particularly those engaged in polluting industries, often relocate their polluting activities to countries with less stringent environmental regulations. This transfer of foreign direct investment into host countries with lower environmental standards, which frequently have lower income levels, leads to increased pollution. This paper examines the influence of commercial sectors on environmental quality. The findings from a study conducted in selected middle-income countries in 2000 indicate that the ratio of credits granted to the private sector (% of GDP) as an indicator of the money market, along with the ratio of shares traded to the volume of stock market transactions as a capital market index, has a positive and significant impact on gas emissions.

A well-developed financial sector has the potential to enhance technological advancements within the energy sector, thereby leading to a significant reduction in emissions. The majority of the countries examined in this study have utilized the credits provided to extract greater quantities of their natural resources, a process that is inherently linked to increased pollution levels. Consequently, in their pursuit of higher profitability through resource extraction, these nations have inadvertently contributed to greater environmental degradation. Furthermore, the financial systems in these countries are characterized by inefficiency and a lack of stringent regulations aimed at curbing environmental pollution, resulting in a correlation between economic growth and heightened pollution levels.

The impact of the ratio of domestic credits extended to the private sector (as a percentage of GDP) on gas emissions, which serves as an indicator of environmental quality among the selected middle-income countries, is more pronounced than the ratio of traded shares to stock market volume, which reflects the capital market. This finding suggests that the money market has been less effective compared to the capital market and has lacked adequate oversight in the allocation of domestic credit. In contrast, companies operating within the capital market are required to secure the necessary approvals from the Environmental Protection Agency for their industrial operations. Based on the findings of this study, several recommendations are proposed: Reducing the size of government to foster greater involvement from the non-governmental sector; enhancing public awareness across various demographics through media campaigns to mitigate environmental pollution; discouraging foreign investment in environmentally harmful industries; and promoting the establishment and development of organizations dedicated to environmental protection.

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