The impact of economic factors on environmental degradation: price instability, monetary growth and renewable energy investments

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Abstract

Purpose – This study examines the complex relationship between price stability, monetary growth and renewable energy investments. The pursuit of environmentally sustainable economies is intertwined with the need to maintain price stability and poses a complex challenge for global policymakers.

Design/methodology/approach – Through a comprehensive review, this study seeks answers to how price stability affects pollution, particularly carbon emissions, through various economic channels. Employing panel data analysis for 84 countries between 1999 and 2020, we find a multifaceted effect of price instability on carbon emissions.

Findings – According to system-GMM estimation results, we find (1) price stability has no significant direct effect on carbon emissions. However, it emerges as a crucial environmental factor through consumption, investment and monetary policy channels. (2) Moreover, price stability reverses the positive effects of renewable energy investments on carbon emissions, and it slows down the carbon emissions-increasing effect of energy consumption. (3) Monetary expansion combined with price stability increases environmental pollution. These findings underscore the complexity of balancing economic stability and environmental sustainability and highlight the need for comprehensive policy approaches to address these global challenges effectively.

Originality/value – There is a significant gap in the existing literature examining the impact of price stability on carbon emissions. Most of the studies observe the impact of carbon emissions on inflation. However, the complex interaction between economic and environmental factors reveals inflation as a factor affecting pollution, particularly the amount of carbon emissions.

Keywords Price stability, Environmental sustainability, Climate change, Monetary economics

Paper type Research paper

1. Introduction

In recent years, the search for environmentally sustainable economies has been at the center of global attention. The United Nations Environment Programme has highlighted the importance of resilience economies, which requires an urgent adoption of renewable energy and reduction of emissions (UNEP, 2021). Furthermore, the European Commission underscores the urgent need for a green transition through the European Green Deal, which aims for a climate-neutral economy by 2050 and significant emissions cuts by 2030 (European Commission, 2020). It is clear that the existence of a resilient economy requires a comprehensive design in economy, and green transition is an important part of it. However, is it possible to achieve such a transition without price stability, *or* can an economy characterized by unpredictable price fluctuations effectively plan for decarbonization? Therefore, the motivation of this study is to investigate the relationship between environmental sustainability and varying degrees of price stability.

The emergence of the environmentally sustainable economies reflects promoting the adoption of renewable energy, resource efficiency, and emissions reduction strategies to promote long-term ecological resilience. At the same time, maintaining low and stable inflation rates to ensure economic predictability, investor confidence, and a sustainable growth trajectory puts price stability economies at the forefront of the global agenda (IMF, 2023b). At the heart of these two global issues, various countries' efforts against climate change's adverse effects reveal price stability as an essential factor that should be considered. Accordingly, understanding the complex dynamics between environmentally

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sustainable economies and price stability can provide valuable insights. Therefore, this article investigates the impact of price stability on pollution, especially the amount of carbon emissions from various channels.

Climate change is one of the most pressing problems of the 21st century. Since the industrial revolution, human-induced activities have been increasingly discharged significant amounts of greenhouse gases into the atmosphere. The IPCC makes a stern warning about the high probability of exceeding the 1.5 °C global warming threshold compared to the pre-industrial period. Accordingly, the world has a carbon budget of approximately 420 Gt CO_2 left for a two-thirds chance of limiting warming to 1.5 °C. That's why an urgent action is needed to mitigate carbon emissions and accelerate the transition to green energy. As the world grapples with the imperative to address climate-related concerns in global cooperation, the role of price stability, particularly its power to influence economic decisions, has emerged as an essential resource for dealing with its environmental consequences.

First of all, price stability is a critical factor for the overall health and stability of the economy. Decisions about investment, consumption, and related monetary policies made by economic actors are closely related to the uncertainty of the economic environment. Therefore, price stability is anticipated to influence carbon emissions through its effects on these economic activities. It can encourage consumption and investment by positively affecting consumers' purchasing power and investors' return expectations. Additionally, in the way of ensuring price stability, monetary expansion can be used as a monetary policy tool of central banks. Particularly central banks may stimulate economic activities by increasing the money supply. In this context, consumption, investment, and monetary expansion can be considered the impact channels of price stability on carbon emissions.

Moreover, the threat of price instability has been on the agenda of many central banks recently. Central banks globally are engaging in significant monetary tightening, marking the most comprehensive tightening in decades. The fact that core inflation remains high in many developed economies and declines are very slow shows that price stability is still a source of concern for most countries (IMF, 2023a Global Financial Stability Report). In addition, increasing interest rates and possible inflationary pressures pose a risk to economic activities, and this situation brings to the agenda the possibility of widening price instability.

Therefore, the urgency of transitioning to low-carbon economies on a global scale highlights the critical importance of understanding the effects of price stability on environmental outcomes.

The motivation of this study is to trace how environmental sustainability is shaped in environments where price stability can be achieved to different degrees. To what extent does price stability affect carbon emissions, and through what channels does this effect manifest itself? Hence, this study also aims to fill a significant gap in the literature by exploring the relationship between price instability and pollution. Our hypothesis is that price stability affects carbon emissions by activating economic decisions, consumption patterns, and monetary policy mechanisms. Hence, this research aims to contribute to a deeper understanding of the complex interplay between economic factors and environmental outcomes in the context of climate change.

The organization of the study is as follows. Section 1 provides a comprehensive review of the existing literature, focusing on previous researches examining the alternating impact between price stability and carbon emissions via various channels. Section 2 provides detailed information about the data and method techniques used for data analysis. Section 3 presents the findings from the empirical analysis. Furthermore, Section 4 is devoted to discussion; findings are critically examined, and resulting policy recommendations are evaluated. Finally, the last section concludes.

2. Literature

There is a significant gap in the existing literature examining the impact of price stability on carbon emissions. Most of the studies observe the impact of carbon emissions on inflation.

However, the complex interaction between economic and environmental factors reveals inflation as a factor affecting pollution, particularly the amount of carbon emissions. For instance, in countries struggling with high inflation, price uncertainty can negatively affect efforts to combat climate change. Initially, such instabilities hinder long-term economic growth, affecting environmental outcomes. At the same time, economic stability, characterized by low and stable inflation rates, allows continued economic growth and leads to better pollution control measures and environmental management practices (Bruno and Easterly, 1998).

Understanding the impact of price stability on pollution emissions requires a multifaceted approach that considers the complex interactions between economic growth, development, and environmental degradation.

2.1 Economic growth nexus pollution

The bidirectional relationship between the level of economic activities, economic growth, and environmental degradation, as explored in the environmental Kuznets curve (EKC) literature, initiates our understanding. Studies such as those by Grossman and Krueger (1991), Shafik (1992), and Baek and Kim (2013) investigate this relationship and find that economic growth at low-income levels tends to lead to increases in carbon emissions as energy. Although intensive industries are expanding, as economies reach higher income levels, there is a shift towards cleaner production methods and stricter environmental regulations, leading to reductions in carbon emissions. Hence, the existence of EKC has been validated through many studies. Atici (2009) investigates this relationship in Central and Eastern European Countries.

In contrast, Weili *et al*. (2022) extend this analysis to the BRICS economies. Moreover, Sinha and Shahbaz (2018), Rauf *et al*. (2018), and Balaguer and Cantavella (2016), and finally, all these studies verified the EKC by applying various methods. Most recently, the complex interaction between economic growth and various forms of industrial pollution has been analyzed through studies (He and Lin, 2019; Liu *et al*., 2019) suggesting that economic expansion can exacerbate environmental degradation.

The price stability affects economic growth. High and volatile inflation rates can disrupt long-term economic stability, hindering the transition to cleaner production technologies and environmental policies. This disruption could increase carbon emissions, especially in economies struggling with inflation-related economic instability. Empirical results illuminate the complex dynamics of economic growth that drive pollution emissions in modern economic regimes. Various studies confirm the positive correlation between price stability and economic growth (Thayaparan *et al*., 2018; Yelwa *et al*., 2015).

2.2 Price stability nexus pollution

Investigating the nexus between price stability and pollution emissions, Khan *et al*. (2019) empirically analyze the relationship for Pakistan and highlight the detrimental impact of inflation instability on environmental quality. Highlighting the distinction between negative and positive shocks, Ullah *et al*. (2020) offer valuable insights into the potential influence of shocks on CO_2 emissions. Adverse inflation shocks contribute to increased carbon and nitrous oxide emissions, pointing to the potential link between economic instability and environmental degradation. Furthermore, the different effects of GDP growth variability on emissions underline the complex nature of this relationship, emphasizing the importance of considering broader economic dynamics in pollution reduction strategies. Heidari *et al*. (2015) further explore this relationship by examining the environmental consequences of different economic growth regimes. Despite verifying fluctuations in economic conditions, their findings point to a consistent trend: Energy consumption remains a significant emission driver.

Similarly, Grolleau and Weber (2024) investigate to what extent core inflation plays a role in determining per capita carbon emissions. Their study finds a modest negative relationship between core inflation and emissions, falling short of meeting proposed emissions reduction targets. These findings point to the strong interaction between price stability, economic activity, and environmental outcomes, underscoring the need for comprehensive policy approaches to address challenging tasks such as climate change and pollution reduction.

2.3 The channels of price stability

To examine the direct and indirect effects of price stability on the environment, we scrutinized its impacts through three channels where price instability manifests itself: consumption and investment activities and monetary policies.

Consumption expenditures have the power to directly or indirectly affect carbon emissions. Households directly contribute to carbon emissions by using energy in each consumption. Since most energy use is based on fossil fuels, this consumption activity is expected to impact carbon emissions positively (Gardiner and Hajek, 2020; Danish *et al.*, 2019; Zhou *et al.*, 2020). Consumption also has an indirect effect in that it affects production and transportation preferences. The direction of this effect is expected to be positive since the fossil fuel-based production system is still dominant in the industry (IEA, 2020)

Lastly, investments in renewable energy sources, influenced by price stability perceptions and policies, may affect carbon emissions. Various studies theoretically and empirically verify the positive environmental impact resulting from this channel (Bernstein *et al.*, 2006; Lau *et al.*, 2014; Alam *et al.*, 2019; Opoku and Boachie, 2020). Moreover, it is estimated that climate mitigation investment needs in developing economies will reach approximately $2 trillion annually by 2030. At the same time, the share of private financing in climate mitigation investments is expected to increase to at least 80% by 2030.

The urgent need for investments in renewable energy sources again underlines the importance of private sector financing for climate-related projects, that is, monetary policies that determine interest rate decisions. However, the environmental impact of monetary policies is a novel topic in the literature. Studies examining that monetary policies are among the factors affecting carbon emissions have mostly found this effect positive (Jalil and Feridun, 2011; Kaushal and Pathak, 2015; Matikainen *et al.*, 2017). Although it is primarily examined in the literature on its indirect effects, recent studies reveal that the amount of money supply can directly affect environmental pollution (Bletsas *et al.*, 2022; Fan *et al.*, 2021). Hence, in light of all these studies, the interaction of monetary expansion implemented to support growth and price stability may increase carbon emissions.

3. Data and methodology

The study employs the dataset from 1999 to 2020 for 84 countries categorized into high-income and upper-middle-income groups based on the data availability.

Firstly, combining data from high-income and upper-middle-income countries can capture a broader range of economic conditions and policy contexts, thereby increasing the generalizability and robustness of findings. Additionally, including a dummy variable, the so-called development proxy allows for examining the various effects between countries with different levels of economic development.

The paper utilizes the SYS-GMM (System Generalized Method of Moments) methodology based on the dynamic characteristics of the panel data used. The System-GMM method, pioneered by Arellano and Bond (1991) and further developed by Blundell and Bond (1998), is commonly employed for estimating standard dynamic panel data models. This method addresses challenges inherent in dynamic panel estimation, such as endogeneity bias, heteroskedasticity, and autocorrelation within error terms. System-GMM is particularly advantageous as it considers the potential correlation between instrument variables and fixed effects, making it suitable for both small and large panel datasets with dynamic dependent variables and non-strictly exogenous independent variables (Roodman, 2020). Thus, following the SYS-GMM estimation steps, we can effectively mitigate these methodological challenges, ensuring robust estimation and inference in empirical analyses of dynamic panel data models. The dynamic specification is as follows:

$$ln\,CO_{2i,t} = \beta_0 ln\,CO_{2i,t-1} + \beta_1 PS_{i,t} + \beta_2 RWE + \beta_3 CE + \beta_4 EMP + \beta_5 X_{1\,i,t} + DevelopmentLevel_{i,t} + Year_{i,t} + \varnothing_i + \varepsilon_{i,t} \quad (1)$$

$$ln\,CO_{2i,t} = \omega_0 ln\,CO_{2i,t-1} + \omega_1 (PS{*}CE)_{i,t} + \omega_2 PS_{i,t} + \omega_3 RWE + \omega_4 CE + \omega_5 EMP + \omega_6 X_{2i,t} + DevelopmentLevel_{i,t} + Year_{i,t} + \varnothing_i + \varepsilon_{i,t} \quad (2)$$

$$ln\,CO_{2i,t} = \delta_0 ln\,CO_{2i,t-1} + \delta_1 (PS{*}RWE)_{i,t} + \delta_2 PS_{i,t} + \delta_3 EMP + \delta_4 CE + \delta_5 RWE + \delta_6 X_{2i,t} + DevelopmentLevel_{i,t} + Year_{i,t} + \varnothing_i + \varepsilon_{i,t} \quad (3)$$

$$ln\,CO_{2i,t} = \gamma_0 ln\,CO_{2i,t-1} + \gamma_1 (PS{*}EMP)_{i,t} + \gamma_2 PS_{i,t} + \gamma_3 RWE + \gamma_4 CE + \gamma_5 EMP + \gamma_6 X_{2i,t} + DevelopmentLevel_{i,t} + Year_{i,t} + \varnothing_i + \varepsilon_{i,t} \quad (4)$$

Here, the SYS-GMM (1) stands for the baseline function, whereas the SYS-GMM (2) includes the interaction term between price stability and energy consumption to capture the specific impact. Furthermore, SYS-GMM (3) shows the impact of renewable consumption channels. In this context, it is regarded as an independent variable denoting carbon emissions. Carbon emissions are frequently used to indicate greenhouse gas emission levels because, according to the Intergovernmental Panel on Climate Change's (IPCC) Sixth Assessment Report, the carbon emissions account for approximately 80% of total greenhouse gas emissions.

PS shows price instability, CE stands for energy use, EMP stands for broad money growth, and RWE stands for renewable energy investments. In order to capture the impacts of renewable energy usage channels, energy consumption, and expansionary monetary policy, we employ interaction terms reflected by and coefficients.

The degree of price instability is captured by the deviations of the GDP deflator from its long-term average. The GDP deflator captures comprehensive price changes in various economic activities. Unlike the CPI, it provides a broader perspective on general price movements by including export, investment, and public consumption prices. Additionally, it differs from the PPI by including subsidy-free tax, further increasing its suitability for analyzing inflationary pressures in an economy.

Renewable energy installed capacity, typically reflecting a country's total renewable energy production capacity, is commonly used as a proxy variable to represent renewable energy investments. Moreover, broad money growth, defined as the total amount of cash, deposits, and similar liquid assets circulating in an economy, is used as a proxy variable for expansionary monetary policy.

In order to strengthen the robustness of the analysis by including economic factors and sector-specific dynamics, we also employ control variables such as industrial value added, development proxy, and year dummy. Development proxy is constructed according to the World Bank classifications. To consider unobserved time variation, we use a year dummy variable to capture the time series trends.

All data is taken from World Development Indicators (WDI), and data sources and units are summarized in Table 1.

Table 1. Data summary

Variable	Unit	Source
CO_2/carbon emissions	metric tons per capita	WDI
RWE/Renewable energy installed capacity	Gigawatt-hours	IMF Climate Dashboard
EMP/Broad money growth	Annual, %	WDI
Inflation, GDP deflator	annual %	WDI
Industry (including construction), value added	annual % growth	WDI

Source(s): Author's own work

We employ panel unit root test in order to check the stationarity properties of dynamic panel data. Panel unit root tests take into consideration of an asymptotic behavior of the time-series dimension (T) and the cross-sectional dimension (N). We use the Fisher-PP test, which represents an initial iteration in the panel unit root test. The null hypothesis (H0) states that there exists a unit root. Table 2 shows all variables except CO_2 are stationary at levels and CO_2 is stationary at first differences.

4. Results

System-GMM estimation results are summarized in Table 3. The overall findings indicate that the impact of price instability on carbon emissions through various channels is complex. Firstly, the results show a negative and significant relationship between price instability and carbon emissions. This sheds light on the uncertainty in economic decisions resulting from price variations, which may lead to lower levels of economic activity and potentially contribute to environmental degradation.

In line with conventional expectations, the coefficient for *renewable energy investment* is negative and significant. This result also highlights that higher levels of renewable energy investment are associated with decreased carbon emissions. In the context of price stability, countries with renewable energy investments may minimize the environmental impacts of economic instability through cleaner energy production and consumption. Moreover, the positive and significant interaction coefficient between renewable energy investment and price instability *(RWE* $\times$ *PS)* suggests that with price instability, the positive impact solely resulting from renewable energy investments turns into an adverse environmental impact. In other words, price instability can weaken or reverse the positive effects of renewable energy investments. However, a very low coefficient implies that the interaction variable nullifies the positive environmental effects of renewable investments on price instability.

Table 2. Panel unit test results

For levels	PP-Fisher chi-square Stat	Prob	Conclusion
lnCO_2	143.5919	0.914	
lnRWE	593.5095	0.000	H0 rejected
lnCE	220.9334	0.002	H0 rejected
lnEMP	696.213	0.000	H0 rejected
lnPS	1231.8976	0.000	H0 rejected
lnVA	682.6251	0.000	H0 rejected
lngdp	825.9871	0.000	H0 rejected
First differences			
lnCO_2	1584.4058	0.000	H0 rejected

Source(s): Author's own work

Table 3. SYS-GMM estimations for CO_2 emissions (metric tons per capita, in logs)

	SYS-GMM 1	SYS-GMM 2	SYS-GMM 3	SYS-GMM 4
L. $ln\,CO_2$	*−0.47067**	*−0.4757**	*−0.4636**	*−0.4756399**
	0.0555	0.0560	(0.0552)	0.0567871
Money growth × Price instability (in logs)				0.0002*
				0.0000846
Renewable energy × Price instability (in logs)			*0.0001718****	
			0.0001148	
Energy use × Price instability (in logs)		*0.000092**		
		0.0000379		
Energy use (kg of oil equivalent per capita, in logs)	*0.4450**	*0.4422*	*0.440945**	*0.4433658**
	0.0612	0.0613	(0.0619695)	(0.0619695)
Money growth (broad, annual %, in logs)	*−0.0724*	*−0.0879*	−0.0790182	−0.0926383
	0.0674	0.0684	(0.06746)	0.0686316
Renewable energy installed capacity, (Gigawatt-hours, in logs)	*−0.0014*	−0.0073	−0.0095205	−0.0072544
	0.0340	0.0341	(0.0346381)	0.0340718
Price instability (variation from mean of Inflation, deflator annual %, in logs)	*0.0396**	0.0210	0.0319476***	0.0220995
	0.0244	0.0249	(0.024066)	0.0248971
GDP per capita growth (annual % in logs)	0.0600	0.0670	0.0647179	0.0660163***
	0.0512	0.0505***	0.0515772	0.0504787
Industry (including construction), value added (annual % growth, in logs)	*−0.4217**	−0.4100*	*−0.4129357**	*−0.4083249**
	0.1286	0.1277	0.1279812	0.1275557
Development proxy	*−0.0920*	*−0.0502*	−0.0691195	−0.0490714
	0.3858	0.3944	(0.3901117)	0.3944372
Hansen test	0.692	0.614	0.657	0.597

Note(s): Robust standard errors in parentheses, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source(s): Author's own work

Moreover, *energy consumption* displays a positive and significant impact on carbon emissions. The consumption channel's environmental effect is more substantial than other independent variables. This positive correlation can be explained by stating that the rise in energy consumption leads to an increase in carbon emissions due to the overall increase in energy demand and the fulfillment of this demand with carbon-intensive resources. Also, the *interaction variable (CExPS)* results show that price instability reduces the negative impact of the increase in energy consumption on the environment. This can be explained similarly to the impact of other variables in that the negative effect of price instability on economic activities stemming from uncertainty can be associated with consumption outcomes.

On the other hand, according to the empirical findings, *monetary expansion does not directly affect carbon emissions*. However, the interaction term *(PSxMG)*, which captures the joint effect of price instability and monetary growth, is positive and significant. This suggests that monetary expansion can only affect carbon emissions through production, consumption, and investment channels, and its direct effect cannot be observed.

Additionally, industry value added is controlled as a control value, and its impact is positive and significant. The fact that value-added increases carbon emissions may stem from the inherent carbon intensity of industrial production processes. Therefore, increased industrial activities may increase carbon emissions through factors such as energy consumption and emissions of by-products.

4.1 Robustness check

At this stage, additional estimates are conducted to verify the consistency of the results obtained from the SYS-GMM estimation and the validity of the model. Therefore, Pooled OLS and following the Hausman test results Random Effects (RE) estimates are reported.

Key coefficients, such as those price instability (lnPS), energy use (lnCE) and broad money growth (lnEMP) exhibits consistency according to the SYS-GMM 1 results lying between OLS and RE results (Table 4).

Checking the robustness of estimations (Table 5) SYS-GMM 2,3 and 4 indicating the interaction terms, the SYS-GMM (2) estimate (0.000092) is closer to the RE value (0.0000311) than the OLS (0.0002123). This demonstrates the SYS-GMM estimation's power to minimize potential bias.

Hence, OLS and RE serve as benchmarks to evaluate the reliability of the SYS-GMM estimates by comparing the consistency of key coefficients. Moreover, The Hansen test confirms the validity of the instrumental variables in SYS-GMM, and no second-order serial correlation was detected in the AR(2) test. While OLS tends to overestimate coefficients due to endogeneity, and RE fails to capture some significant interactions, the SYS-GMM results remain robust, providing more reliable and consistent estimates compared to the alternative models.

5. Discussion

Dynamic estimation results confirm that the environmental effects of price stability are multifaceted and complex. Uncertainty has a slowing effect on economic activities, which has a negative impact on environmental degradation. This result is compatible with the findings of Khan *et al*. (2019), highlighting the negative and significant relationship between price instability and carbon emissions.

The findings regarding renewable energy investment support studies such as Bernstein *et al*. (2006) and Lau *et al*. (2014), indicating that higher levels of renewable energy investment are associated with decreased carbon emissions. However, the positive and significant interaction coefficient between renewable energy investments and price instability indicates that only the positive effect of renewable energy investments can be reversed in the presence of price instability. Potential reasons for this can be explained as the uncertainty created by price instability in renewable energy investment decisions, financing difficulties, and lack of confidence in the economy's future.

Table 4. Robustness validation – comparing fixed and random effects for SYS-GMM 1

	OLS	SYS-GMM 1	RE
lnPS	0.0648	0.0396*	0.0004052
lnRWE	−0.0215	−0.0014	−0.0009
lnVA	−0.5120	−0.4217*	−0.0045
lnCE	0.9359	0.4450*	0.2993
lnEMP	−0.024364	−0.0724	−0.0176
Development proxy	−0.192073	−0.092	0.0197

Source(s): Author's own work

Table 5. Robustness validation – comparing fixed and random effects for SYS-GMM 2,3 and 4

	OLS	SYS-GMM (2)	SYS-GMM (3)	SYS-GMM (4)	RE
PS * CE	0.0002123	0.000092*	–	–	0.0000311
PS * RWE	0.0036965	–	0.0001718	–	0.0000524
PS * EMP	0.000817	–	–	0.0002	0.0000886

Source(s): Author's own work

Moreover, the results confirm that consumption decisions have the most decisive impact on carbon emissions. This result of the study is consistent with previous studies, such as Gardiner and Hajek (2020) and Danish *et al*. (2019), that reveal the increase in energy consumption leads to an increase in overall energy demand and, thus, an increase in carbon emissions resulting from meeting the demand with carbon-intensive sources. Additionally, the interaction variable between energy consumption and price instability shows that price instability reduces the negative impact of increased energy consumption on the environment, probably due to the reducing effect of economic uncertainty on consumption outcomes. This result is also consistent with the dampening effect of economic uncertainty on consumption outcomes, as discussed by Zhou *et al*. (2020).

Unlike other direct effects, monetary expansion does not have a significant direct impact on carbon emissions. However, this, combined with the positive and significant interaction term (PSxMG), supports the idea that monetary expansion may have an indirect effect on carbon emissions, as suggested by Jalil and Feridun (2011) and Matikainen *et al*. (2017). The positive effect of the combination of price instability and monetary growth on environmental pollution can be explained by several factors. Firstly, a resource allocation through monetary expansion becomes inefficient in the presence of price instability and may cause businesses to be indecisive when choosing the sectors and technologies in which to invest. Secondly, price instability can cause fluctuations in financial markets, increase investors' perception of risk, and impede the ease of financing provided by an expansionary monetary policy.

6. Conclusion and policy implications

This study investigates the effects of price stability on environmental degradation. As a matter of fact, questioning the relationship between price instability, which continues to be a global problem today, and the same burning problem, climate change led by human activity is a new and emergent research question. The findings highlight several important insights:

Firstly, the study reveals that price instability is an essential factor in environmental degradation, specifically in carbon emissions. However, it is found that price instability does not have a direct effect but affects carbon emissions through investment, consumption, and monetary policy.

However, the findings indicate that price instability does not have a direct effect but affects carbon emissions through investment, consumption, and monetary policy. Investments in renewable energy slow down environmental degradation, while energy consumption accelerates it. The role of price instability as a vital actor here is monitored as a deterioration in these effects. The environment of uncertainty caused by price instability reverses the positive effect of green investments and slows down the negative effect of consumption. As discussed in detail in the discussion section, these findings can be explained by the slowing and regressive effect of the uncertain economic environment on economic activities.

Therefore, the findings also shed light on several alternative policy suggestions regarding the environmental consequences of price instability, which is a current and decisive factor for the economy in general. First of all, the measures taken by central banks to maintain price stability will also positively affect the environmental impacts. The findings of our study already reveal the negative environmental consequences of monetary expansion in the presence of price instability. In this regard, the importance of a monetary tightening and inflation targeting policies to combat inflation comes to the fore. Such a policy is expected to be effective in reducing uncertainty, which is a significant negative factor for economic activities as well, and to produce positive environmental results.

The study's findings also reveal the significant environmental contribution of renewable investments. Implementing policy sets that reduce economic uncertainty may also encourage renewable energy investments. Furthermore, the findings highlighting the severe effect of energy consumption underscore the urgent need to prioritize energy efficiency. In achieving this, green monetary instruments such as Quantitative Easing (QE) programs for renewable energy sector and green bonds may provide an effective financial support, incentivize investments.

Consequently, price stability is crucial for fostering an environmentally sustainable economy. Undoubtedly, alongside the policy frameworks explored in this research, there is clear emerging research opportunity regarding new green monetary instruments. Therefore, this study also aims to shed light on future research on expanding green financing mechanisms to support sustainability and energy efficiency investments.

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