

Review

Macroeconomic and Uncertainty Shocks' Effects on Energy Prices: A Comprehensive Literature Review

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Abstract: GDP, monetary variables, corruption, and uncertainty are crucial to energy policy decisions in today's interrelated world. The global energy crisis, aggravated by rising energy prices, has sparked a thorough analysis of its causes. We demonstrate the significance of categorizing research by influence channels while focusing on their implications for energy policy decisions. We investigate the growing number of studies that use GDP, inflation, central banks' characteristics, corruption, and uncertainty as critical factors in determining energy policies. Energy prices fluctuate because energy policies shift the supply–demand equilibrium. We categorise the effects and show that GDP, economic policy uncertainty, and, most notably, specific economic conditions and extreme events play a significant role in determining energy prices. We observed that energy consumption, GDP growth, and energy prices have a bidirectional, causal relationship. Still, the literature has not established which causative direction is the most significant. Taxes, interest rates, and corruption also significantly determine energy prices, although the origins of corruption have not been adequately examined. Lastly, uncertainty generally increases energy costs, but this relationship requires additional research in terms of the features of countries, conditions, and, most importantly, the theoretical backgrounds used.

Keywords: energy prices; GDP; monetary variables; uncertainty; corruption

JEL Classification: O20; Q40; Q41; Q43; Q48; Q49



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1. Introduction

The COVID-19 pandemic and the lockdown measures that were implemented to limit the virus's spread caused a supply-side economic shock. Its initial occurrence precipitated a precipitous and quick decrease in energy costs. Before the global economy could even begin to recover, the conflict in Ukraine caused another significant shock. Moreover, the conflict also resulted in a quick increase in all energy prices due to EU sanctions against Russia and Russia's response of restricting natural gas supplies to EU members. These two independent events had a similarly rapid and intense energy price response. However, their final price equilibrium was vastly different, raising a significant question: What are the overall forces that drive energy prices and in what direction; and how should empirical models be developed in our increasingly globalised world in which spillover effects are increasing?

According to a substantial part of the international literature, one of the most important factors influencing energy costs is the rhythm of economic growth. However, according to economic theory, rising consumption (equal to rising demand) will result in higher prices, at least in the short term. Numerous empirical studies presented by Omri [1] show that GDP growth is directly related to energy consumption growth.

On the other hand, a country's economic growth level is determined by its monetary and fiscal policy outcomes. Specifically, the macroeconomic equilibrium is determined by the aggregate demand (AD) and the aggregate supply (AS) equilibrium. Under this Keynesian economic perspective, monetary policy, which is conducted through changes in interest rates, is responsible for influencing major macroeconomic indicators (such as

the foreign exchange rate, asset value, and unemployment rate) with its ultimate target to influence GDP and the inflation rate [2–5]. Furthermore, fiscal policy, which the government implements through taxes and spending, has the potential to influence both GDP and inflation. Given everything discussed about the relationship between energy and economic growth, as well as the effects of economic policies, it is abundantly clear that monetary and fiscal policies can indirectly impact energy prices. However, further factors that influence policies' outcomes and equilibria should be taken into account.

A key factor that interacts (usually negatively) with fiscal and monetary policies is corruption [6–8]. To fully analyse the former's effect on energy prices, we must also present the path of research into the effect of corruption on energy policies and energy product prices. We aim to demonstrate which direction research has taken to date and its basic conclusions through the presentation and grouping of scientific works. At the same time, we will exemplify what still needs to be sufficiently researched through these and current energy conditions by proposing new research considerations, as well as research procedures and econometric approaches. Greater policymaker corruption diminishes energy policy stringency and increases energy prices; increasing lobby group coordination expenses result in stricter energy policies [9]; and workers' and capital owners' energy policy lobbying efforts are negatively associated [10]. Furthermore, numerous authors contend that corruption raises energy prices [10–12]. Overall social welfare and bribes are governmental concerns. Governments accept bribes from labour and lobbying groups to allow increased energy use in production and more significant pollution emissions. Government leaders' willingness to depart from optimal policymaking enables corruption [13]. Coordination expenses make bribery costly [14]. In many developing countries, the launch of new power plants to address the energy supply–demand imbalance and the issuance of renewable energy permits have been delayed. Inherently, bureaucratic and corrupt organisations raise energy costs [15].

According to the findings of the presented research, it appears that corruption not only has a direct influence on energy policies (reducing their stringency) but also an indirect influence on the behaviour of businesses (resource misallocation and a reduction in investments). Although the literature has extensively analysed the first and third axes of these effects [16–21], analyses of resource inequality are lacking and further investigation on a more in-depth level is required [22,23]. The decrease in competition, the emergence of oligopolies, and the accompanying rise in prices for energy producers and importers are all caused by the three categories of effects described above. As a consequence of the above factors, the supply of energy products is reduced, leading to an increase in the prices of associated goods. Although there is a substantial body of literature on corruption's impact on energy policies and prices [24–27], there seems to be a paucity of research on the topic of how corruption interacts with the entities (whether public or private) involved in decisions on the production, import, and disposal of energy products [28]. There is a lack of consistency in the presentation of research and precisely how corruption influences environmental policies and energy pricing, even though numerous studies have been published in the literature. In this paper, we attempt to fill that gap.

Economic uncertainty is a significant factor causing the growth and volatility of energy costs. The factors at play in the energy sector are diverse and intricate. As a result, in order to completely understand energy prices, the concept of supply and demand needs to be updated. The price dynamics have become even more complex due to the energy market's growing unpredictability. As a result, uncertainty has emerged as a key element influencing price changes and macroeconomic variables. Several studies have examined the most effective techniques for calculating the effects of uncertainty [29–31].

Uncertainty has increased since globalization and technology have altered our way of life. Political turmoil, inequality, and the increasing significance of government intervention in the economy are the primary causes of the current rise in uncertainty [29,32]. As a result, things that happen anywhere in the world can affect things elsewhere. The current state of the world is substantially more complex, which by itself increases uncertainty. This review assists in determining how uncertainty impacts energy policies generally

and energy prices specifically in light of these recent developments. Many studies have emphasised how uncertainty affects energy policy [33–41]. However, a broader viewpoint is required because there are so many comparable studies in the literature. Even though the impact of uncertainty on policy decisions is important and frequently explored, a deeper understanding of how uncertainty influences energy policy decisions is necessary. Further investigation is therefore required to examine and validate the findings of earlier studies. Due to the availability of indices for numerous nations, researchers can assess if the results can be generalised to other countries or if additional research and replication are required.

This study aims to pave the way for additional research in this area. Thus, we emphasise the link between uncertainty indices and global strategies of energy prices. In particular, we analyse how organisations respond to ambiguity and suggest additional steps to implement. The objective is to demonstrate what is currently known and what can be done to address these issues. It is necessary first to organise the research on each attempt to quantify uncertainty because there is a significant amount of literature on uncertainty and its relationships to energy policies and energy prices. This procedure will show the diverse approaches that have been taken for this issue as well as study directions. A number of indices have been made: (1) indices that measure uncertainty from the frequency of publication in newspapers, magazines, and reports, such as the World Uncertainty Index (WUI) of the Economist Intelligence Unit (1996), the Economic Policy Uncertainty (EPU) [29], and Monetary Policy Uncertainty (MPU) [29,42]; (2) indices that estimate uncertainty from stock price fluctuations, such as the Implied Volatility Index (VIX) and the Oil Volatility Index (OVX) of the Chicago Board Options Exchange (1993), the Jurado, Ludvigson, and Serena Ng index (JLS) [30], and the Equity Market Volatility (EMV) [43]; and (3) indices that calculate uncertainty from the statistical documentation of related phenomena, such as the Global Fear Index (GFI) [37] and the COVID-19 Induced Uncertainty Index (CIU) [38] documenting the outbreaks of the recent pandemic, the Geopolitical Risk Index (GRI) [44] which is a measure of unfavourable geopolitical events and related risks, and the Climate Policy Uncertainty Index (CPU) [40] which records climate-related phenomena. We must investigate the differences between each category and examine how each category influences energy policy and pricing. Each type represents a distinct form of uncertainty.

Among the metrics indicated above, the EPU has been utilised more in energy-related research. In light of the above, research should concentrate on this specific index and the three determinants of energy prices as identified in economic theory: supply, local demand, and total demand. A sector's impact can cause prices to move differently. Simultaneously, it must be determined to what extent research has addressed several critical parallel issues concerning energy costs: (1) Does uncertainty have the same effect on energy prices in countries that import and export energy? (2) Does it have the same effect on oil, gas, and renewables? (3) Does the effect vary based on the type of uncertainty, notably when it pertains to extreme events, military conflicts, insurrections, fuel subsidies, or whether it is the consequence of natural or man-made causes? (4) Is there a distinction in terms of the research period (short-term or long-term)?

This study aims to organise and present the literature developed around concerns about macroeconomic factors that can affect energy prices to draw conclusions and identify research gaps. It also includes variables which, since they affect macroeconomic variables, can indirectly have a similar impact. This research aims to organise and summarise the literature on macroeconomic variables influencing energy prices. Section 2 analyses the methodology applied. The key topics covered in Section 3 of this paper are the energy–growth nexus and the long-term relationship between energy use, energy prices, and GDP growth. Section 4 analyses the effects of fiscal policy whereas Section 5 investigates the effects of monetary policies; both are examined in terms of energy costs. Section 6 focuses on the impact of corruption on energy costs. Section 7 examines how macroeconomic uncertainty affects energy prices. Section 8 presents discussions and suggestions for future research. Finally, Section 9 concludes the paper.

2. Materials and Methods

As previously stated, the research aims to identify the macroeconomic and uncertainty factors that influence global energy prices. In this context, the PRISMA approach is used, which provides clear step-by-step instructions for conducting a systematic review of the literature. A systematic literature review is a method for identifying, evaluating, and interpreting studies on a specific research question. We followed steps recommended by the literature when developing this systematic literature review, which are as follows: identification of relevant studies, evaluation of the quality of the articles, summary of the evidence, and interpretation of results (Figure 1). Because this paper discusses five different factors that influence energy prices, the relevant literature review included numerous keywords. To limit the potential outcomes, the papers included were related to energy, energy prices, energy consumption, and oil prices. Another limiting factor was the year of publication. Therefore, we used results in the period of 2000–2022. Finally, journals in energy, economics/econometrics/finance, and environmental science were used to identify relevant studies. The Scopus Database was the primary source of literature used. Using the approach outlined in the flowchart below, we identified 127 relevant studies.

The above flowchart presents the main methodology applied in order to retrieve literature. The initial records (130,494) were identified using 53 queries in total. The queries applied in the Scopus Search Engine were the following: [anti-corruption AND policy AND energy AND efficiency], [Climate AND tax], [conflicts AND oil AND prices], [corruption AND environmental AND policy], [crude AND oil AND monetary AND policy], [crude AND oil AND price], [Crude oil AND volatility], [electricity AND consumption AND nexus], [electricity AND economic AND development], [energy AND consumption AND economic AND growth], [energy AND consumption AND GDP], [energy AND economic AND activity], [energy AND fiscal AND tax], [energy AND growth AND consumption], [energy AND monetary AND policy], [energy AND price AND fiscal], [energy AND price AND risk], [energy AND prices AND consumption], [energy AND prices AND economic AND activity], [energy AND prices AND economic AND growth], [energy AND prices AND growth], [energy AND prices AND intensity], [energy AND prices AND monetary AND policy], [exchange AND rate AND oil AND price], [fuel AND subsidies], [GDP AND CO₂], [institutional AND quality AND energy], [institutions AND climate AND policy], [investor AND economic AND policy AND uncertainty], [investor AND flows AND oil AND prices], [oil AND energy AND price AND volatility], [oil AND Macroeconomy], [oil AND monetary AND policy], [oil AND price AND economy], [oil AND price AND elasticity], [oil AND price AND shocks AND economic AND uncertainty], [oil AND price AND shocks], [oil AND price AND Volatility], [oil AND shocks AND markets], [oil AND uncertainty AND indices], [oil AND volatility AND uncertainty], [political AND economy AND environmental AND climate], [political AND renewable AND energies], [renewable AND energy AND consumption AND determinants], [renewable AND energy AND consumption], [Uncertainty AND CO₂ AND growth], [uncertainty AND energy AND consumption], [uncertainty AND energy AND prices], [uncertainty AND oil AND prices], [Uncertainty AND oil AND shocks], [volatility AND market], [War AND Geopolitical AND Risk], and [wars AND oil AND prices]. Moreover, our literature review consisted of 20 related papers not indexed in Scopus, as well as 90 unrelated papers included to promote this review's consistency.

The 127 relevant studies exhibit specific characteristics, such as the year of publication and the journals in which they were published. More specifically, as illustrated in Figure 2 below, the number of papers is increasing on average over time. According to the aforementioned figure, from 2000 to 2006, an average of two papers were included each year. The number of papers per year significantly increases from 2007 to 2016, with a mean of 5.4 papers per year. Finally, the number of papers included in the research also significantly increased from 2017 onwards, reaching a mean of 10 articles per year. The relevant literature is published primarily in four journals, as shown in Figure 3, namely "Energy Economics", "Energy Policy",

“Energies”, and “Energy”, with 60 papers published in those journals overall. Table 1 shows the distribution of the number of papers published in each journal.

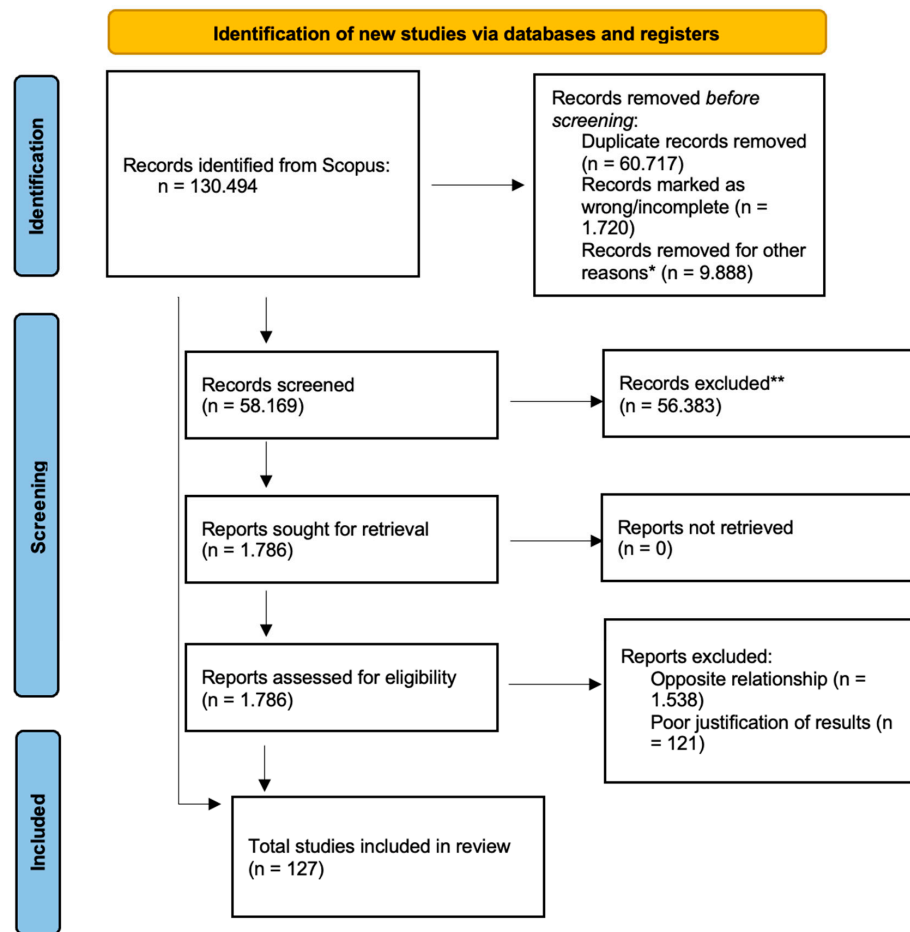


Figure 1. Flowchart of the literature-selection process based on the PRISMA approach. * Other exclusion criteria included entries that were not articles, letters, reviews, or surveys. ** Records excluded due to not being written in English, being of poor quality, and not having more than ten citations (for papers published up to 2020).

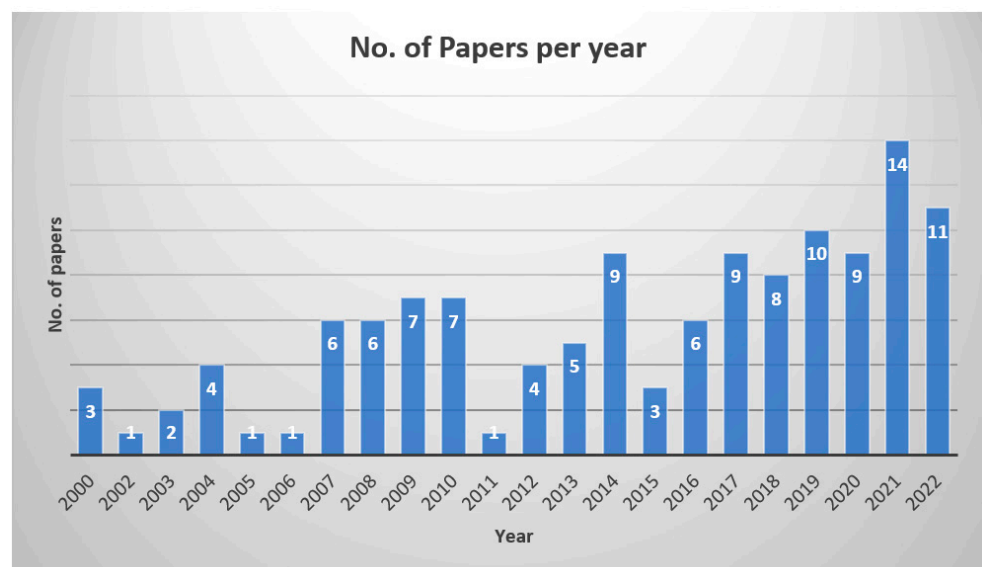


Figure 2. Number of Papers per Year.

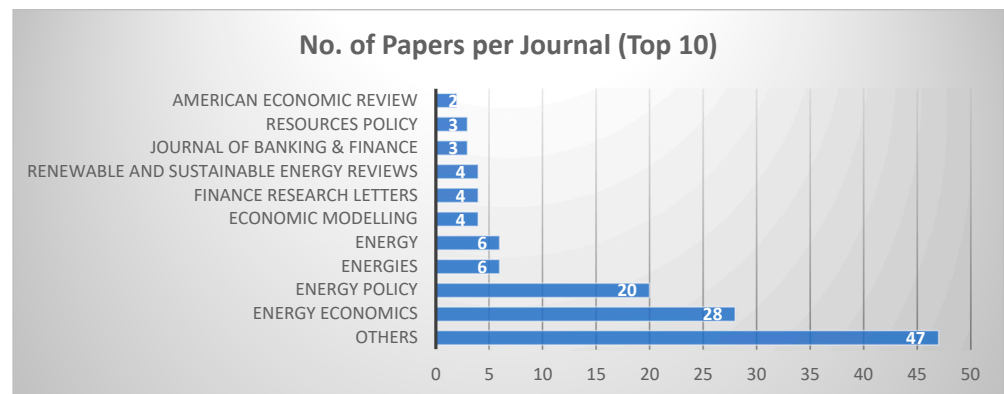


Figure 3. Number of Papers per Journal (Top 10 Included).

Table 1. Number of Papers per Journal.

Journal	No. of Papers	Journal	No. of Papers
Energy Economics	28	Frontiers in Energy Research	1
Energy Policy	20	Global Environmental Politics	1
Energies	6	International Journal of Energy Economics and Policy	1
Energy	6	International Journal of Energy Research	1
Economic Modelling	4	International Journal of Finance & Economics	1
Finance Research Letters	4	International Organization	1
Renewable and Sustainable Energy Reviews	4	International Review of Economics & Finance	1
Journal of Banking & Finance	3	Journal of Building Engineering	1
Resources Policy	3	Journal of Cleaner Production	1
American Economic Review	2	Journal of Cleaner Production	1
International Journal of Economic Perspectives	2	Journal of Economic Perspectives	1
Journal of Applied Econometrics	2	Journal of Futures Markets	1
Journal of Environmental Economics and Management	2	Journal of Money Credit & Banking	1
Journal of Environmental Management	2	Journal of Policy Modeling	1
Journal of International Money and Finance	2	Journal of Public Economics	1
Public Choice	2	Journal of the Knowledge Economy	1
Research in International Business and Finance	2	Management Science	1
Resource and Energy Economics	2	Renewable Energy	1
The Quarterly Review of Economics and Finance	2	Routledge	1
American Political Science Review	1	Science of the Total Environment	1
Annals of the Association of American Geographers	1	Sustainability	1
Econometrica	1	The Journal of Energy and Development	1
Energy Research & Social Sci	1	The Review of Economic Studies	1
Environmental Science and Pollution Research	1	World Development	1

3. Energy–Growth Nexus

As noted in the paper’s introduction, the factors influencing energy pricing and demand are directly related to GDP expansion. Specifically, under the microeconomic equilibrium, consumption is affected by supply and demand, in which shocks and elasticities cause different results. Then, the macroeconomic equilibrium is also affected by aggregate supply and demand (AD and AS, respectively). Each shift in monetary and fiscal policy causes changes in AD and, therefore, in prices and GDP. However, in the energy market, the link can be stated more simply as a triangle of interactions, with energy prices interacting directly with GDP and energy consumption. In contrast, energy consumption interacts directly with GDP growth. Whether these causal linkages are unidirectional or bidirectional is still being investigated. Numerous studies have been undertaken; however, conclusions about the relationship between energy cost and energy consumption remain debatable. Moreover, since

the definition of energy pricing differs from study to study, it is challenging to draw definitive conclusions from the literature.

Havranek et al. [45] studied and analysed gasoline demand's reported price elasticity in several countries. In conclusion, neither the long-term nor the short-term price elasticity of gasoline was statistically significant. Wang et al. [46] using data from 186 countries, stated that energy prices and energy consumption are cointegrated, while they are also influenced by the level of urbanization and economic growth.

Some empirical research studies have assessed the association between variables within a specific geographical unit. Fisher-Vanden et al. [47] and Hang and Tu [48] studied the effect of energy price on energy intensity, for instance. Both of these experiments were performed in China. Using China's national statistics from 1993 to 2007, Yuan et al. [49] confirmed that an increase in energy prices led to a decrease in long-term energy consumption and an increase in short-term energy use. Before and after market liberalisation, Ferreira et al. [50] observed a correlation between the price of energy and the amount of energy consumed in the United Kingdom. Using a variety of research approaches or a mix of these methods, a number of researchers have investigated the relationship between the cost of energy and the overall amount of energy used [51,52]. The statistical approaches used to investigate the relationship between energy cost and the amount of energy consumed vary depending on the type of data and the area being investigated. Numerous researchers have investigated the energy–growth nexus in terms of the association between energy consumption and economic expansion. Among them, Ozturk [53] distinguishes four types of causal interactions: the absence of causality; unidirectional causality from economic growth to energy consumption and energy prices; unidirectional causality from energy consumption to economic growth; and bidirectional causality from energy consumption and prices to economic growth. The first is also known as the neutrality hypothesis, which states that GDP and energy consumption are unrelated, and, consequently, economic expansion is free. The second is the conservation hypothesis, which asserts that a decrease in energy use will not reduce economic growth. The third is the growth hypothesis, which says that significant economic growth is inevitable without increasing energy use. Finally, the fourth category, known as the feedback hypothesis, states that energy use and economic growth are interdependent.

Fuinhas and Marques [54] studied the energy–growth nexus in Southern European nations (PIGS). From 1965 to 2009, their research revealed a bidirectional causal link between energy consumption and GDP. Yuan et al. [55] studied the energy–growth link with a neoclassical aggregate production model that incorporated total energy consumption in addition to three distinct energy sources (including oil, coal, and electricity consumption). They found a Granger causal association between total energy consumption and GDP growth, as well as a bidirectional Granger causal relationship between oil consumption and economic output.

Ferguson et al. [56] established a long-term equilibrium between economic growth and electric power consumption in the leading 100 nations. After analysing the relationship between electricity use, economic progress, and crude oil prices in 210 different economies, Sarwar et al. [57] obtained similar results.

However, outcomes are not invariably bilateral [58–60]. When Lee et al. [59] and Narayan and Prasad [60] examined the energy–growth curves of OECD countries using a panel vector error correction model and a bootstrapped causality test, respectively, they discovered that energy consumption (electricity consumption) accelerated the growth of income level (GDP). Chen et al. [58] employed a panel data model and eleven Asian countries as research subjects to validate the causal relationship between energy consumption and economic growth. The empirical evidence suggests that the causal orientations of these economies are inconsistent and change over time. Mehrara [61] also investigated eleven oil-producing nations and discovered a unidirectional causal relationship between economic development level and energy prices with no feedback. According to Lee et al. [62], 16 Asian countries exhibited a long-term positive cointegration between energy consumption and real GDP. Yoo and Kwak [63] found evidence that GDP and power consumption are mutually reinforcing in four

nations, with Venezuela's economic development status between 1975 and 2006 being caused by electricity consumption. Using data from 19 COMESA countries, Kahsai et al. [64] found a long-term bidirectional association between energy consumption and economic growth in less developed nations. Any change in energy consumption will affect the demand and possibly the supply of energy products and, thereby, their prices.

Narayan and Singh [65] established a long-term correlation between Fiji's energy use and economic performance in their country-specific research. Erdal et al. [66] found a two-way causal connection between energy resource consumption and GNP in Turkey between 1970 and 2006. Odhiambo [67] found a correlation between energy consumption and economic growth in several African nations, but the causality varies considerably between the countries investigated. Statistically significant data indicate that the relationship between energy consumption and economic growth in South Africa and Kenya is unidirectional. Moreover, Alam et al. [68] suggest that a bidirectional causality exists in Pakistan. In addition, Shahbaz et al. [69] demonstrated a bidirectional causal relationship between national economic development and electricity usage. In a more contemporary manner, Wasti and Zaidi [70] present the identification of energy consumption as an economic growth accelerator for the Kuwaiti economy from 1971 to 2017.

In an early study, Tatom [71] demonstrated a negative relationship between energy prices and economic growth. Their estimates indicated that GDP and expenditures decline following a significant energy (oil) increase, although these impacts are temporary. Finn [72] proposed that an increase in energy prices would lead to recessions and that these recessions can be described as a reverse technological shock. This argument is crucial, given that technical advancements strive to reduce production costs, and energy is a substantial expense. Using data spanning 22 years, including the global financial crisis, Chai et al. [73] concluded that China, Japan, and the United States do not exhibit asymmetric cointegration. In energy-source-specific research, Brown and Yucel [74] estimated that oil price shocks work through supply-side outcomes, although their estimates prove that an oil price shock reduces overall economic output. To the same extent, Kliesen [75] presented evidence that natural gas price shocks do not affect the real output. However, the author's findings are limited by Hamilton's specifications and country-specific research (USA).

Regarding the economies of India and Indonesia, the initial findings of Asafu-Adjaye [76] indicated a unidirectional Granger correlation between energy prices and income. The author also proposed a bidirectional Granger causality between energy prices and GDP for Thailand and the Philippines. In the case of bidirectional causalities, however, price impacts are less significant in terms of the causal chain created. Regarding African economies, Odhiambo [67] identified short-term unidirectional causal relationships between energy costs and economic growth for Kenya and the Congo but not for South Africa. Kirca et al. [77], investigating the Turkish economy and the effects of both oil and natural gas prices, concluded that both prices are essential in generating economic expansion or contraction; however, the findings are not robust across the two causation techniques utilised. The Granger causality test, for instance, found no connection between energy prices and economic growth, although the Toda-Yamamoto test found a connection.

Berk and Yetkiner [78] had useful insights regarding the causes and impacts of energy pricing, energy consumption, and economic growth in 16 industrialised economies using a panel ARDL technique. The results revealed that economic activity and energy use have a negative effect on energy prices. Then, a bidirectional causality was identified in which energy costs negatively impact the real GDP per capita and energy usage. Their paper's policy implications included a strict energy pricing strategy to sustain more robust long-term economic growth, while another policy implication suggested the subsidisation of renewable energy sources to prevent the inevitable increase in the price of non-renewable energy sources over time.

Ferdaus et al. [79], in a definitive work incorporating all three variables in the energy-growth nexus, demonstrated a positive influence of energy consumption on economic development and a negative effect of energy prices on economic growth, assuming unidirectional causality and a global estimation. However, the results varied significantly when discriminating between oil

importers and exporters. First, there were no causative links between energy costs and economic growth in oil-importing nations, whereas there was a unidirectional causal link between energy use and economic growth. Both factors have a negative effect on economic growth. Because a continuous rise in oil prices may impede economic growth, this consequence is present. On the other hand, energy consumption had a negative effect on the GDP growth of oil exporting nations. In addition, prices had a favourable long-term impact on economic production growth but a negative short-term impact.

The literature mentioned above can lead to a variety of conclusions. First, the vast bulk of the presented literature uses dynamic econometric models spanning 20 to 58 years. Second, the relationship between energy costs, energy use, and economic growth is murky, and the same holds for the effects as a whole. The primary conclusion is that the results rely on the researched countries' geographical regions, economic growth level, and, more recently, oil trade status (exporting or importing countries). The vast majority of studies on the developing world reveal a bidirectional causal relationship between energy prices and economic growth, as well as energy consumption and economic growth. Nevertheless, energy prices have a negative effect on energy consumption. Concerning developed countries, most published studies assert that energy consumption is a component that drives economic expansion, while the direction of causality is ambiguous. Ferdaus et al. [79] added another factor when investigating these causes and consequences: they showed a country's oil trading status substantially impacts the overall outcomes. In conclusion, the energy–growth nexus depends on the analysed country or region, as well as the level of development and oil commerce. Regarding the nexus investigation in a dataset encompassing countries of varying status, such an econometric finding has yet to be discovered.

Overall, besides the theoretical models and review papers, the aforementioned literature also covers many empirical methodologies. The majority of the econometric approaches employed in the correlations described above are dynamic (43) as opposed to static (2). The econometric procedures proposed by the above literature are presented in Figure 4 below.

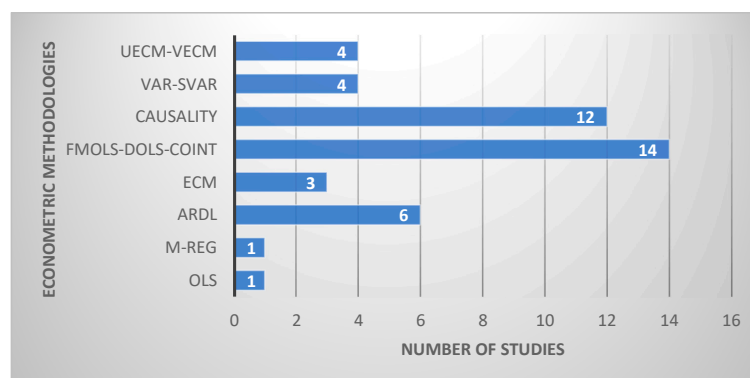


Figure 4. The econometric methodologies used in relation to the number of studies on the energy–growth nexus.

4. The Role of Fiscal Policy in Energy Prices

The above analysis regarding the energy–growth nexus has raised specific questions about the effect of fiscal and monetary policy actions on energy prices. The latter will be analysed in the next section, whereas this section analyses the effect of fiscal policies on energy prices. The international literature still needs to provide evidence of distinct fiscal policy effects on energy prices. On the contrary, a connection has been found between policies that boost energy use, increase household security against rapid price growth, and facilitate the transition to environmentally friendly energy consumption. In terms of taxation, it is common sense that prices are immediately affected by any changes in the tax rate applied. However, the elasticity of demand determines the overall effect. Since energy is considered an inelastic good and service, taxation is considered an essential determinant of energy prices. The above proposition is also supported by Grave et al. [80].

Regarding energy consumption, we argue that since renewable energy is not yet the primary source of consumption [81,82], increasing consumption contributes to increased carbon emissions and environmental deterioration [82]. As was also discussed in the second section of this review paper, we consider that energy consumption is positively correlated with higher incomes. As fiscal policies are a primary determinant of income growth, the connection between fiscal policies and economic growth will impact energy usage. According to Balcilar et al. [83], reducing fiscal deficits will likely enhance the capital accumulation rate, resulting in a faster economic growth rate. In this case, fiscal policies are anticipated to indirectly influence energy demand due to increased economic activity. Dongyan [84] contended that fiscal and tax policies encourage energy efficiency. According to Fischer and Fox [85], the level of taxation is directly related to the level of energy consumption and energy prices and, consequently, the level of carbon emissions; therefore, taxation plays a significant role not only in economic but also in environmental concerns. Fischer and Fox [85] also noted that the climate policies of economies must be carefully matched with governments' aggregate fiscal policies. Bletsas et al. [86] concluded that economic expansion is a significant contributor to environmental degradation, while fiscal policies in the form of government spending contribute to reducing carbon emissions.

According to Calbick and Gunton [87], policy difficulties are the most significant element in analysing variations in developed countries' environmental pollution levels. Studies by Lopez and Palacios [88], Lopez et al. [89], and Halkos and Paizanos [90] indicate that government spending is one of the most powerful factors affecting environmental quality. The theoretical studies of Heyes [91], Lawn [92], and Sim [93] provide support for these empirical findings. In the context of our argument stated at the beginning of this section, government expenditure, one of two primary fiscal policy instruments, determines energy use, energy demand, and consequently, energy prices.

As described previously, an increase in taxes has an immediate impact on the price of energy, while government spending is correlated with energy use. However, there is no general rule of thumb regarding the effects of government expenditure on energy prices. As thoroughly described in the second portion of this study, a plausible reason is that the impact of consumption on energy costs is ambiguous. Nevertheless, as was previously mentioned, this could be a matter of applying country-specific characteristics in an empirical study. Regarding the econometric methodologies used in the aforementioned literature, these can be categorised mainly as static and dynamic, incorporating OLS and ARDL methods.

While fiscal policies, namely taxation and government expenditure, aim at economic growth, they also influence energy use and energy prices. The two fiscal policy instruments create a certain macroeconomic environment and, eventually, at least a short-term market equilibrium. However, it is difficult to predict whether a government would impose restrictive or expansive regulations. To be more specific, it is normal for governments to raise taxes in times of economic crisis to reduce spending or finance state funds, despite the fact that, as stated earlier in this section, this policy would result in higher energy prices. Unknown to economic agents, this budgetary involvement raises macroeconomic uncertainty. In addition, it has become commonplace over the past year for governments to financially support citizens and SMEs in order to offset the astronomically high energy costs caused by the Russian–Ukrainian conflict. This type of intervention is called a subsidy scheme, and in the case of energy markets, there are several different patterns they can follow. The most common subsidies are the fuel subsidy (direct funding of producers and/or refineries), the electricity subsidy (direct funding of electricity producers and/or suppliers), and the direct funding of consumers. The rise in energy prices and this type of fiscal strategy are other sources of unpredictability. However, these indicated interactions are discussed in Section 7.

5. The Role of Monetary Policy in Energy Prices

In addition to their oversight of the banking system, central banks have the authority to conduct monetary policies. Through the effect of interest rates and money supply, they rebalance the economy of their native nation. They influence the macroeconomic environment in this manner. Nevertheless, monetary policy operations are frequently marked by uncertainty. A typical practice of central banks is forward-looking, indicating their potential future movements in advance. However, many banks have begun to forsake this practice. In addition, numerous studies demonstrate that money volatility and capital markets, as well as the energy market, increase before and during the announcement of a monetary policy decision [94,95]. In conclusion, the implementation of monetary policies generates expectations in the markets, including energy markets, but the policies are characterized by unpredictability and uncertainty. In this section, only the anticipated effects of monetary policy on the energy market are described, whereas the uncertainty situation is addressed in Section 7.

As for monetary policy, the link between central bank activities and energy prices is becoming more evident. Lower interest rates increase the demand for credit and the aggregate demand, which includes the demand for energy, such as oil and its derivatives, on energy prices. Keynes demonstrated the effect of a decline in interest rates on aggregate demand. When the interest rate is less than the marginal productivity of capital, expansionary monetary policies will increase investment demand. The multiplier effect of increased investment contributes to an increase in total demand. In the same way that aggregate demand increases commodity demand and exerts pressure on commodity prices, energy products and services experience the same effects. As an illustration, oil prices are also affected by this process. Most of the world's oil demand comes from countries that do not produce oil or produce less than is required. A devaluation of the US dollar would make oil imports cheaper in currencies other than the US dollar, thereby increasing oil imports and demand.

Because of the substantial trading of derivative contracts on the liberalised energy market, monetary policies can influence the pricing of various commodities, including energy. According to Barsky and Kilian [96] and Frankel [97], an expansionary monetary policy leads to higher price increases for various commodities through various channels. There is a stronger incentive to postpone commodity extraction and manufacture when interest rates are low. The cost of inventory carrying is therefore reduced due to lower interest rates, resulting in less supply and higher pricing. Typically, prediction is involved while investing in commodities to boost returns. Three key transmission routes for monetary policy in the energy market may be identified from the evidence presented. The inventory channel relates to the technique initially described. The second channel is the supply channel, which was discovered by Hotelling [98], who demonstrated that lower interest rates could postpone crude oil extraction. The third channel is the portfolio balance channel, which depicts a situation in which an investor who expects higher investment returns can be guided to buy commodities alongside traditional investments (stocks and bonds).

Despite this, researchers have discovered two more pathways via which monetary policy actions affect energy prices. These are the demand channel and the standard exchange rate channel. The first is linked to oil consumption. Here, monetary policies promote economic growth and, as a result, oil demand. Because expansionary monetary policies encourage sustained growth in economic activity, there is an increase in demand for all products, including commodities and oil, resulting in an increase in the price of oil, which in turn influences the price of all other energy sources. Finally, the fact that oil is priced in US dollars promotes a channel for monetary policies to be transmitted to energy costs via the exchange rates. This occurs because monetary policies affect the spot foreign exchange rate, influencing oil prices and, consequently, all energy prices [99].

Another critical factor to consider is the impact of unanticipated central bank activities on the energy markets. According to Rosa [100], both decreasing interest rates and announcing an asset purchase program are effective approaches for fostering economic growth. Oil and other

types of energy expenses have decreased as a result of the implementation of quantitative easing or generally of interest rate decreases. This indicates that lowering the policy rate will raise the price of oil and other energy sources. Basistha and Kurov [101] explored this issue over a wide range of time periods, from intraday to monthly findings. The interest rate futures were used to quantify the effects of monetary policy shocks. These prices reflect recent monetary policy actions, news, and expectations. It was discovered that these shocks were instantly transmitted to the energy futures market. However, after a few days, the first effect appears to have had little enduring effect.

Despite this, many academics believe that economic policies' effectiveness is tied in some manner to the qualitative characteristics of the institutions that implement them. It has been established that the central bank's transparency, independence, and credibility influence monetary policy decisions' efficiency and effectiveness [102–110]. Furthermore, according to Bletsas et al. [86], both transparent and independent central banks promote the reduction in CO₂ and greenhouse gas emissions. However, research has yet to be conducted that points at a specific effect of the characteristics of central banks on energy prices and consumption, indicating a considerable gap in the literature.

According to the research, monetary policy activities directly impact energy prices. Specifically, five distinct routes convey monetary policy actions and shocks to energy prices. An increase in the policy interest rate leads to a decrease in energy prices, whereas a reduction in the policy rate leads to a rise in energy prices. The interest rate policy determines all outcomes. Although studies have yet to be conducted to demonstrate the impact of monetary policy decisions on renewable energy's cost so far, this gap is critical for two reasons. Creating infrastructure for renewable energy sources necessitates a significant initial investment. Suppose a reduction in policy interest rates is mirrored by a decrease in money market interest rates (i.e., there is a functional and effective interest rate channel of monetary policy). In that case, the cost of financial investment will fall. Second, in terms of renewable energy, the literature frequently refers to electricity. It is difficult to maintain an inventory channel due to a lack of storage space and the high cost of storing electricity. The above literature presents mainly dynamic empirical methodologies using the VAR-family models.

6. Corruption

The macroeconomic environment is a crucial factor in a country's competitiveness and encompasses a number of measures, such as inflation, the government budget balance, GDP, and the country's credit rating. In addition, the production, import, and distribution of energy are crucial components of a nation's macroeconomic data. Taking into account that corruption is complex and multifaceted with deep roots in the system of public institutions, its negative impacts are felt in varying degrees across the entire macroeconomic environment [111]. Corruption deflects government action when it is necessary and facilitates the over-involvement of public institutions in the economy. An increase in the level of corruption will translate into a deterioration of macroeconomic indicators, leading to an economic slowdown, an increase in commodity prices, a reduction in the economy's productivity, a reduction in public revenues, and government inefficiency in distributing resources for public services. Energy policy is crucial from an environmental and geopolitical standpoint. At the same time, when corruption is high, it is a strong factor of uncertainty that alters energy policies and competition but also prevents substantial investments in a specific sector. Recent research reveals that government corruption plays a significant role in determining economic growth, investment, and environmental policies [6,13,19,27,112].

Due to the time-sensitive nature of energy supplies and the possibility of huge economic rents from power generation, transformation, and usage, the energy sector is a major target for corruption. In addition to the fundamental role of public institutions overseeing nearly all sectors of the energy sector, it is also essential that significant capital investments should be undertaken [113,114]. Corruption can take many different forms, dependent on the following: the characteristics of the energy source's supply chain; its importance to the regional and national economy; the sociopolitical and institutional context in which extraction, transformation, and

use take place; the number of people involved in decision-making; and the cultural setting in which decisions are made. Still, a systematic reporting of the research and findings on how the corruptibility of policymakers affects energy policy and energy prices are absent. We aim to close this gap in the literature in this work.

In addition to having negative consequences on the environment, public health, workplace safety, and energy pricing, corruption has been linked by many researchers to a less dependable energy supply [115,116]. Additionally, some researchers assert that corruption makes the issue of resource misallocation worse [117–119]. Rent-seeking by government regulatory authorities will lead to the failure of price and regulatory policies, the abuse of social resources, and a decline in government effectiveness [22,23]. These results showed that efforts by countries to improve various facets of governance did not always translate into a reduction in CO₂ emissions. In the context of regulatory changes to the European electricity market, Kaller et al. [18] assessed the effectiveness of supervision and the impact of corruption on the price of power. According to the findings, electricity rates might be decreased by reducing corruption and improving regulatory quality. The reforms, however, only served to restrict prices when they were put into place in an institutional structure plagued by serious corruption and poor regulatory quality [21].

In some circumstances, like in Ukraine, the matter is exceptionally pressing. International investors, notably those from the West, were prevented from entering Ukrainian oil-producing areas by corruption, complicated, unfriendly rules, and a lack of transparency, which could have assisted Ukraine in increasing domestic output and lowering energy prices [28] (Balmaceda, 2007). The implementation of proactive energy policies and effective corruption-fighting measures in the post-Soviet region depends on combating various forms of corruption. Sekrafi and Sghaier [19] discovered a noticeably unfavourable association between the fight against corruption and energy use in the Middle East and North Africa (MENA). As a proxy for energy use, economic growth was used to study this link. The data span the years 1984 to 2012 and are taken from WDI. Energy usage is closely related to both economic growth and energy pricing. Finally, Dokas et al. [15] found that increased corruption had a smaller impact on energy consumption in industrialized countries than in developing ones (0.25% vs. 1%). The direct effects of corruption surpass any indirect effects. Because industrialized nations have better fought corruption, they are less impacted [20]. According to research in the literature, Figure 5 shows how corruption indirectly impacts government effectiveness and energy product pricing through operational restrictions, investment, and resource misallocation.

The impact of corruption on federal systems has also been studied. The more political entities involved in deciding energy policies in a federal system, the more bribes are paid by lobbying organisations and the more expensive it is for these organisations to influence policies [16,17]. Each political unit receives a smaller bribe, and the energy policy tightens, raising the price of energy [120]. Weaker energy policy standards directly result from increased government corruption, although the impact depends on whether the nation has a federal system. In federal systems, corruption has less of an effect.

Evidence in the opposite direction has also been found in some studies. When relevant political and economic factors are controlled, institutional corruption negatively affects the strength of climate policies throughout industrialised democracies [121]. Corruption perception may be an independent cause of weak climate policies, contributing to the politics of resignation among environmentally engaged citizens [122]. Such perceptions are expected to strengthen the strategic influence and laissez-faire demands of indigenous, energy-intensive companies as opposed to climate restrictions [24,123]. This procedure can attract additional competitors in the energy production industry and reduce corresponding energy prices. In their theoretical analysis, Boamah et al. [27] showed that Africa's energy sector uses corruption to address energy injustices. In Kenya and Ghana, the unequal spatial distribution of electrical networks, bureaucracy, "unfair" power billing methods, and the poorer energy production of local solar photovoltaic systems have prompted energy customers to utilise corruption to speed up the grid connection. Their article shows that energy inequality and corruption are inherent in both countries' "power regimes" and can lower electricity prices.

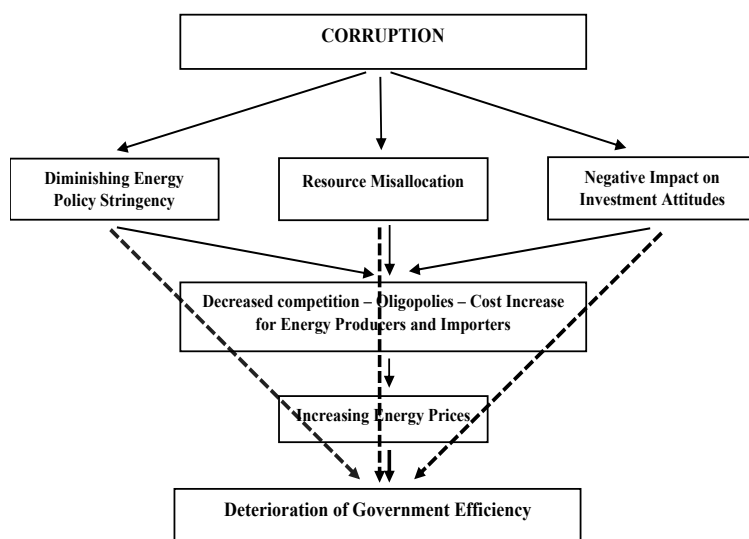


Figure 5. The indirect impact of corruption on energy prices and government efficiency.

In some instances, a limit has been identified in which the tendency reverses (U-shape). In order to evaluate the consequences of varying levels of corruption on China’s energy efficiency, a model with a threshold effect was developed. When levels of corruption fall below a present threshold, the effect on energy efficiency and pricing is negligible. However, when corruption exceeds this threshold, energy efficiency and pricing are substantially affected [21].

According to the studies described above, numerous empirical attempts have been made in addition to the theoretical models. Within those, corruption’s direct or primarily indirect impact on the supply of energy products—in which the usual outcome is an increase in prices—is ultimately underlined. The econometric approaches employed in the correlations described above are dynamic (17) and static (20). The econometric procedures proposed by the above literature are presented in Figure 6 below:

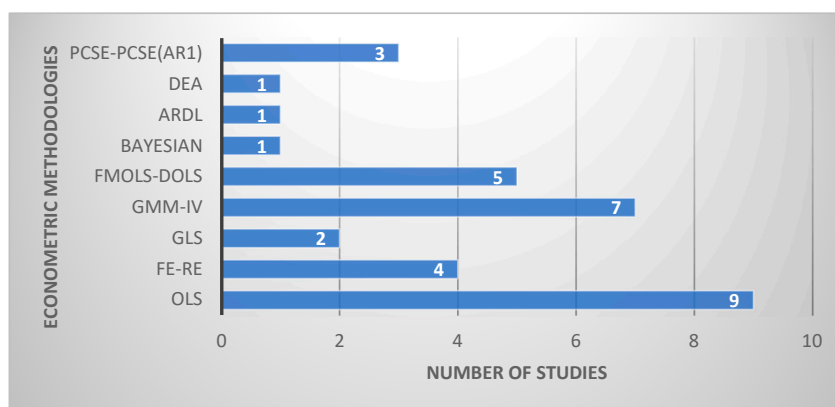


Figure 6. The econometric methodologies used in relation to the number of studies on the nexus between corruption and energy prices.

In addition, both direct and indirect methods have been used to explore how corruption affects consumption and, ultimately, how prices for renewable energy sources are determined. Most of the research has concluded that the fight against corruption fosters a more favourable environment for the growth of renewable energy sources and the deflation of their costs. In Table 2, we present key research considering the subject, as well as the data, methodology, objectives, and results.

Table 2. Selected literature on the relationship between corruption and renewable energy consumption and prices.

Author	Countries or Territories	Period	Main Objective	Method	Major Findings
Cadoret and Padovano [124]	26 EU countries	2004–2011	It investigates the impact of political factors and corruption on the use of renewable energy (RE) sources.	OLS regression, with LSDV estimators	The manufacturing industry's lobbying has a negative impact on RE deployment, but it has a positive impact on government quality standards.
Engelken et al. [125]			It examines renewable energy business models in developing and developed nations.	Review	Corruption and poor electricity grids hinder developing nations. Industrialised nations face stuck thought patterns and high energy storage costs.
Gennaioli and Tavoni [126]	34 Italian provinces	1990–2007	The correlation between renewable energy sector subsidies (wind power) and corruption.	OLS, difference-in-difference strategy	Criminal association activity increased in high-wind provinces (after the introduction of a favourable market-based regime of public incentives).
Rafaty [24]	20 Industrialised Countries	1990–2012	The impact of political corruption on the strength of national climate change mitigation policies and prices.	Theoretical	Lax market-based climate policies are significantly linked to greater corruption, but they are associated with the size of domestic energy industries, which have received substantial environmental tax exemptions.
Sekrafi and Sghaier [19]	13 MENA countries	1984–2012	The effect of corruption, economic growth, and environmental degradation on energy consumption and prices.	Fixed and Random effects, GMM	Corruption and economic growth positively affect CO2 emissions, energy consumption, and renewable energy prices.
Sinha et al. [25]	BRICS and the next 11 countries	1990–2017	The impact of public sector corruption on energy prices and carbon emissions in the presence of energy use segregation.	FMOLS, GMM.	Corruption enhances environmental degradation by reducing the positive impact of renewable energy consumption and prices on environmental quality.

Table 2. Cont.

Author	Countries or Territories	Period	Main Objective	Method	Major Findings
Vasylieva et al. [12]	28 European countries and Ukraine	1996–2007	The dynamic impact of renewable energy consumption, GDP, and corruption on gas emissions.	FMOLS, DOLS	Renewable energy consumption and corruption negatively affect GHG emissions.
Akintande et al. [127]	4 countries	1996–2016	The factors influencing renewable energy consumption in Africa’s five most populous countries.	Bayesian Model Averaging (BMA) procedures	Population growth, urbanisation, government effectiveness, political stability, GDP, and corruption control increase renewable energy consumption.
Uzar [26]	43 countries	2000–2015	The impact of income inequality and corruption on renewable energy consumption is examined.	Panel ARDL-PMG model, error correction model	Corruption will raise the prices, demand, and consumption of renewable energy.
Boamah et al. [27]	Kenya and Ghana	2017–2019	The relationship between corruption and the electricity sector.	Comparative Research	Energy injustice and corruption are inherent in both countries’ “power regimes;” corruption can also lead to increased electricity consumption and prices.
Ren et al. [128]	China provinces	2006–2017	The correlation between corruption, market segmentation, and the advancement of renewable energy technology.	GMM on VAR AND PVAR models	Regional renewable energy technology innovation is hampered by government corruption and market segmentation.
Amoah et al. [129]	32 African countries	1996–2019	The relationship between corruption and renewable energy consumption.	GMM and IV	Corruption is detrimental to Africa’s share of renewable energy consumption in total final energy consumption.
Dec and Wysocki [130]	EU countries, Norway, Un. Kingdom	2012–2019	The interactions between the emissions of greenhouse gases, the use of renewable energy, and perceptions of corruption.	Basic descriptive statistics and correlations	Emissions and climate change from greenhouse gas emissions are sufficient reasons to reduce corruption.

In terms of sustainability, corruption is a problem that affects all other economic, social, and environmental issues of sustainable energy development. Moreover, because of specific characteristics, corruption is one of the energy supply sector's biggest problems, making it particularly susceptible.

7. Uncertainty

A complex and diverse set of forces drives the energy industry. Consequently, more than the concept of supply and demand is needed to completely account for energy prices. The price dynamics have become even more convoluted due to the energy market's growing unpredictability [131]. As a result, uncertainty has emerged as a critical element influencing both price volatility and market risk. Many studies have been devoted to figuring out the best ways to measure the effects of uncertainty [29–31,132]. Uncertainty seems to have both a short-term and a long-term component in every economy. Barrero et al. [133] demonstrate that investment is far more sensitive to long-term uncertainty than short-term uncertainty, although employment is equally sensitive to both types of uncertainty. In addition, they discover that uncertainty regarding oil is mainly linked to the short term, but policy uncertainty is linked to the long term. So, both short-term and long-term measures of uncertainty should be used to find out how these kinds of uncertainty affect energy markets [134].

7.1. Types of Uncertainty

It has been shown in recent years that economic policy uncertainty and shocks can affect the volatility of energy markets. Extensive empirical research has been performed to evaluate the effect of energy markets on economic development and vice versa, but few studies have examined how economic policy uncertainty may influence the volatility of energy markets. This research is of the utmost importance because the supply and demand for energy commodities can fluctuate substantially over short periods, which can result in significant price fluctuations. At the same time, no systematic study presents all the research that has been conducted. Therefore, implications about the type of policy that should be applied in each case may be reached through a classification of the findings. We intend to fill this gap in this research by analysing the global volatility patterns of energy prices and systematically examining how they have changed due to economic policy uncertainty.

To examine the impact of economic policy uncertainty on monetary policy and financial markets, Baker et al. [29] developed an alternative measure of economic policy uncertainty (EPU) [135–138]. Economic policy uncertainty has been shown through research that builds on Bloom's [139] and Baker et al. [29]'s contributions to understanding how it affects economic and financial activity. Baker et al. [29] created an index of economic policy uncertainty and, based on three fundamental elements, showed how it affects the business cycle and corporate investment to evaluate the economic uncertainty brought on by public perceptions and economic policymaking. The first part measures how much economic uncertainty related to policy has been covered in the media. The second component measures the degree of uncertainty regarding the direction the federal tax code will take in the future by considering the number of provisions scheduled to expire in upcoming years. Finally, the third component assesses uncertainty in monetary and fiscal policies. EPU combines public opinion and economic policy uncertainty. Table 3 presents the most relevant economic and general uncertainty indicators that affect energy prices and the corresponding literature.

Table 3. Uncertainty Indices, Time span, Data and Literature.

Symbols	Uncertainty Index	Time	Data Sources	Literature
VIX	Implied Volatility Index. A real-time index that represents the market's expectations for the relative strength of price changes of the S&P 500 Index (SPX)	1993	Chicago Board Options Exchange (CBOE)	Whaley [140]; Giot [141]; Liu et al. [142]; Fernandes et al. [143]; Ji et al. [134],

Table 3. Cont.

Symbols	Uncertainty Index	Time	Data Sources	Literature
EPU GEPU	Economic Policy Uncertainty. (Global). Quantify press coverage of policy-related economic uncertainty, federal tax law expiration, and economic forecaster disputes about the CPI.	1985	Baker et al. [29]	Wisniewski and Lambe [135]; Aastveit et al. [136]; Demir and Ersan [137]; Li [138]; Adedoyin and Zakari [144],
MPU	Monetary Policy Uncertainty. It calculates the frequency of newspaper articles reporting uncertainty about the direction of monetary policy and its consequences on the economy.	1985 US 1987 JP	Baker et al. [29]; Arbatli et al. [42]	Stulz [145]; Bekaert et al. [146]; Creal et al. [147]; Kurov and Stan [148]; Husted et al. [149]; De Pooter et al. [150]; Bauer et al. [151];
EMV	Equity Market Volatility. A suite of more than 30 EMV trackers that quantify the importance of each category in the level of US stock market volatility.	1985	Baker et al. [43]	Baker et al. [132]; Bouri et al. [36]; Li et al. [152]; Bai et al. [153]; Dutta et al. [154]; Song et al. [155],
JLN	Jurado, Ludvigson, and Serena Ng index. A model-free index of macroeconomic uncertainty that can be tracked over time and used for evaluating any DSGE model with stochastic volatility shocks.	Over time	Jurado et al. [30]	Balcilar, et al. [156]; Bakas and Triantafyllou [34,157]; Mumtaz [158]; Shin et al. [159]; Shi and Shen [160]; Xu et al. [161].
OVX	Oil Volatility Index. The Cboe Crude Oil ETF Volatility Index SM (OVX) is an estimate of the expected 30-day volatility of crude oil as priced by the United States Oil Fund (USO)	2009	Chicago Board Options Exchange (CBOE)	Aboura and Chevallier [162]; Liu et al. [142]; Ji and Fan [35]; Ji et al. [134]; Dutta et al. [154],
GFI	Global Fear Index. The COVID-19 GFI assesses daily concerns about COVID-19 spread and severity. Excessive fear could affect investment decisions, as well as stock and oil prices.	2019	Salisu and Akanni [37]	Bouri et al. [36]; Sadiq et al. [163]; Subramaniam and Chakraborty [164]; Li et al. [41];
CIU	COVID-19 Induced Uncertainty Index. Empirically examines the vulnerability of energy prices amidst the COVID-19 pandemic.	2019	Olubusoye et al. [38]	Salisu et al. [165]; Kwilinski et al. [166]
WUI	World Uncertainty Index. Quarterly indices of economic uncertainty for 143 countries using frequency counts of “uncertainty” in the Economist Intelligence Unit country reports	1996	Ahir, Bloom and Furceri [39]	Altig et al. [167]; Bakas and Triantafyllou [157]; Baker et al. [132]; Adedoyin et al. [168];
GRI	Geopolitical Risk Index. Measures unfavourable geopolitical events and related risks and evaluates their development and economic implications.	1900	Caldara and Iacoviello [44]	Hassan et al. [169]; Bakas and Triantafyllou [157]; Bouri et al. [36]; Ahir et al. [39]; Wang et al. [170]
CPU	The Climate Policy Uncertainty Index flags important events related to climate policies, such as new emissions legislation, global strikes about climate change, and presidents’ statements about climate policies	2010–2018	Gavriilidis [40]	Bouri et al. [171]; Ding et al. [172]; Ye [173]

7.2. Economic Shocks

But what precisely is an economic shock? To account for changes in the real economy, a real economic shock is a vector of changes, specifically industrial production growth or decline, capital utilisation, and inflation [174]. There are also more specialised energy shocks, like the variables related to oil shocks. Utilising the framework created by Kilian [175] for oil, the energy shock is a vector of three price shocks (namely supply-side shocks, specific demand shocks, and aggregate demand shocks) [176]. Supply-side shocks are linked to shifts in global oil production, including overproduction, supply interruptions brought on by armed

conflicts, or the destruction of energy infrastructure. While aggregate demand shocks are linked to changes in global economic activity, specific demand shocks are related to worries about the future availability of energy [177,178].

It has been examined and is still being researched how uncertainty, especially economic uncertainty, affects energy product prices. A thorough study has been conducted particularly on the impact of uncertainty on oil and, more recently, natural gas prices. However, a study that systematically analyses these works and derives meta-conclusions based on the various classifications of the findings reached has yet to be conducted. The current study aims to fill this research gap. According to several research studies, uncertainty causes significant changes in energy prices and remarkably increasing trends [31,179–181]. Ozcan and Ozturk [182] discovered that worsening security conditions contribute to a rise in energy prices in their study of 17 rising nations from 1990 to 2016. Destek and Aslan [183] reached similar conclusions when they noticed an increase in energy prices during times of uncertainty.

Furthermore, economic policy uncertainty has the potential to stifle African energy development through price shocks and oil shortages. This is critical in many African countries, which rely heavily on imports, particularly for energy; the direct effects of economic policy uncertainties on African energy generation have been shown to lead to price rises [168]. Finally, price volatility was noted by da Silva et al. [184] as a significant factor influencing energy usage. Regular oil shocks put economies in danger, especially in SSA countries that depend heavily on imports. Due to the dependence of these nations' energy use and pricing on global market phenomena, there is a problem of low energy security.

7.3. Supply and Demand

We examine the research findings on the impact of macroeconomic uncertainty on energy prices. The investigated problem is complex and dynamic, as the costs of energy products, especially oil, are affected by supply, local and aggregated demand, elasticities, futures, and spot markets. The first issue investigated is that supply and demand elasticities are lower than expected due to the option value of waiting created by economic uncertainty. For example, oil producers prefer to delay changing their output until more information about the demand shock becomes available [139,185]. Given the imbalance in supply and demand, this delay has a significant impact on energy commodity prices. Oil futures markets may react quickly to economic uncertainty and transfer information to oil spot markets [186]. Alquist and Kilian [187] show that under plausible assumptions, increased uncertainty about future oil supply shortfalls causes the spread to narrow. Increased uncertainty causes an increase in precautionary demand for oil, resulting in an immediate rise in the actual spot price. Greater macroeconomic uncertainty would increase the use of futures contracts, lowering the elasticity of oil supply and demand [188]. However, during periods of high oil price volatility, economic uncertainty is typically very high.

Guo and Kliesen [189] discovered that standard macroeconomic variables do not predict realised oil price volatility, implying that crude oil supply and demand changes are likely to be stochastic disturbances. We distinguish research that examines uncertainty concerning the oil price or supply/demand [175,178,190] from that which examines macroeconomic uncertainty [168,181,182]. The reason is that the latter is dynamic due to diffusion between the oil market and uncertainty external to the oil market, namely economic policy-related uncertainty (EPU). As will be demonstrated below, the EPU includes many of the macroeconomic and geopolitical shocks that occur. Numerous studies have shown that the price elasticity of both oil supply and oil demand has decreased significantly [175,178,191], whereas others have shown that shocks in all aspects of the economy and politics have increased elasticities.

On the demand side, related studies have also been conducted. Radetzki [192] examined three significant commodity booms as part of his research. Demand shocks were the main drivers of the increases in commodity prices in all three cases. The first boom, which occurred in 1950–1951, was brought on by the significant increase in inventory following the Korean War [193]. The second, which occurred in 1973–1974, was made worse by widespread harvest failures and market manipulation by OPEC, which caused the price of oil to quadruple. The

third boom began in 2004 as demand for raw resources exploded in China and India. As the global economy entered a recession and excess stocks were depleted, all three booms ended [175]. More recent research on the financial crisis [194,195] and the COVID-19 pandemic [196] has reached similar results.

Antonakakis et al. [197] conducted research for Canada, China, India, Germany, France, Italy, Spain, the United Kingdom, and the United States from 1997 to 2013. For the pre-crisis era, the results showed that economic policy uncertainty (oil price shocks) responds negatively to aggregate demand oil price shocks (economic policy uncertainty shocks). Furthermore, total spillovers surged significantly during the Great Recession of 2007–2009, reaching previously unheard-of levels. Furthermore, between 1997 and 2009, economic policy uncertainty became the primary transmitter of shocks, while supply-side and oil-specific demand shocks played a key role as the net transmitters of spillover effects. From 1988 to 2018, Dash and Maitra [198] investigated the correlation between EPU and oil prices in 19 countries. The findings demonstrate that EPUs and energy prices fluctuate together, especially during times of crisis. Oil prices affect the EPUs of Australia, Canada, Italy, Singapore, and the UK, according to a time-frequency domain analysis. On the contrary, EPU determines the oil price trend in the US, Chile, Ireland, Japan, and the Netherlands.

7.4. The Impact of EPU on Energy Market Prices and Volatility

The impact of EPU on energy prices and volatility, particularly those of oil and natural gas, on uncertainty estimates has been the subject of several studies [197,199–201]. Additionally, current research has examined how uncertainty affects energy prices and volatility. Kang and Ratti [200] showed that the fluctuation of actual stock returns might be explained by economic policy uncertainty, and they observed that this result is highly statistically significant. As per Arouri et al. [202], the stock markets in the Gulf Cooperation Council were negatively impacted by rising economic policy uncertainty in large net oil importers. A recent study underlined the importance of equity market uncertainty (EMU) and news-based economic policy uncertainty (EPU) as drivers of changes in oil prices [156]. This examines whether EPU and EMU predict oil prices and volatility using a nonparametric quantile causality test. Based on data from 1986 to 2014, they discovered that EPU and EMU have strong predictive power for oil returns across the whole range of prices and volatility. More specifically, an increase in uncertainty causes prices and volatility to rise. Shahzad et al. [203] came to the same results.

In a related study, Gao et al. [204] examined the differing levels of economic policy uncertainty (EPU) in the Chinese oil, gold, and stock markets. They discovered that the EPU has moderate growth and volatility spillover effects on the oil market. The oil market has the most significant return spillover effect on EPU, whereas the gold market has the least. EPU is the net growth spillover transmitter to the gold market and the net growth spillover receiver from the oil market. Even if the recent financial crisis had a significant effect on the net spillovers of EPU on the three markets, its impact on oil prices is negligible. Ringim et al. [205]’s study of the correlations between crude oil price, natural gas price, and Russian economic policy uncertainty (EPU) over the period of 1994–2019 found that, despite Russia’s importance to both the natural gas and crude oil markets, the EPU corresponds closer to the gas price than the oil price. Additionally, an increase in the natural gas supply has a more significant impact on the cost of natural gas than a decrease in the supply. The short-term inelastic nature of natural gas demand provides a credible explanation for why the positive supply shock has a higher impact than the negative shock. On the other hand, an increase in supply results in a surplus, which lowers prices and boosts demand. Demanders for natural gas purchase more and store more for later use.

According to Scarcioffolo and Etienne [174] and Hailemariam et al. [206], the possibility of high-volatility environments for the oil and natural gas markets is generally positively and significantly impacted by EPU. These findings confirm Li et al. [152], who demonstrate that EPU has a significant role in predicting energy market price volatility and pricing, particularly during volatile market conditions. However, they showed that the impact of EPU has diminished,

given the presence of alternative energy sources and that the oil and gas markets have grown less susceptible to shocks associated with changes in economic policy. Compared to the pre-2010 period, the increased and more efficient output allow market participants to react quickly to exogenous shocks. A study that focused exclusively on natural gas discovered that macroeconomic uncertainty drives business cycle fluctuations in these economies and significantly impacts natural gas price variations [160]. Aloui et al. [207], using a copula approach to examine how economic policy uncertainty affects crude-oil returns, came to similar conclusions. Before the financial crisis and the Great Recession, they discovered a positive connection between greater levels of uncertainty and energy prices as evaluated by equity and economic policy uncertainty indices. They also found a poor relationship in the post-crisis era. Policymakers should anticipate the influence of EPU on energy markets through regulations as a strategy to mitigate tumultuous times in the energy market because EPU has a beneficial effect on the likelihood of agitated market circumstances [208]. At the same time, in another research study, it was found that energy market uncertainty (EPU) contributes 41.27% of the variations in oil prices in the long run, and oil prices can plunge by 9% due to unexpectedly high uncertainty for alternative energy sources demand [161]. Finally, Chu and Minh [209] examined the environmental effects of economic policy uncertainty, economic complexity, renewable energy, and energy intensity in G7 countries. According to their findings, economic policy uncertainty increases the environmental benefits of renewable energy and economic complexity but increases the adverse effects of energy intensity on the environment.

The predictive abilities of five newly created uncertainty indices—equity market volatility (EMV), global geopolitical risk (GPR), US monetary policy uncertainty (MPU), and worldwide and US economic policy uncertainty—were identified by Li et al. [41] in their study (GEPU and US EPU). They found that the EPU index highly influences oil price volatility. According to out-of-sample research, the US MPU, EMV, and EPU indices are more accurate predictors of crude oil volatility and costs than other predictors. Third, they found that the EPU and MPU indices can more accurately forecast significant swings in the price of crude oil. Using indications and taking into account the uncertainty surrounding the COVID-19 pandemic, the researchers similarly reached comparable results. In order to determine how vulnerable energy prices were to the COVID-19 pandemic, Olubusoye et al. [38] developed the COVID-19 Induced Uncertainty (CIU) index and applied it in a distributed lag model. The relationship between energy returns and the uncertainty index was examined using the daily price returns of eight energy sources, as well as four news- and information-based uncertainty proxies (CIU, EPU, Global Fear Index (GFI) [37], and VIX). They demonstrated how CIU outperformed various news uncertainty proxies in terms of its energy price prediction. It has been found that news in general and bad news significantly and negatively affect energy returns, whereas good news significantly and positively affects energy returns.

A recent study by Lin and Bai [210] indicated that the relationship between the price of oil and the global EPU has changed. While oil prices react negatively to uncertainty, irregular responses to oil price shocks are shown by uncertain economic policies. Based on economic policy uncertainty indices, it is demonstrated that the negative response to an oil price shock is more severe in oil-exporting countries than in oil-importing countries. Oil exporters are more impacted by oil price variations than oil importers are, in terms of economic policy uncertainty.

Various studies have discovered that the length of the effects impacts the causality results. According to Yin's [211] research, the mean spillover effect between uncertainty and oil returns is unidirectionally negative and occurs over the short term. Oil spot and futures returns will decline as political uncertainty rises. Political ambiguity and the oil markets under consideration are both informationally efficient over the long term. Oil market volatility is observed to have significant and favourable bidirectional spillovers simultaneously. Regarding the size and statistical significance of the coefficients, policy uncertainty dominates the process of spilling over its volatility to the oil markets. According to Bakas and Triantafyllou [34], a significant contributing element to the concurrent growth in commodity price volatility is the increasing degree of unpredictability regarding the

future health of the financial sector and the economy (JLN measures of Jurado et al.) [30]. The econometric analysis demonstrates that commodity market volatility increases during extremely unpredictable times. According to the study, the primary factor driving the increased volatility in the commodities markets is the unstable macroeconomic climate.

In contrast to agricultural markets, the data also show that the energy commodity markets' volatility responds quickly and persistently (a 1% macroeconomic uncertainty shock causes a 2.5% increase in crude oil prices' volatility and a 2.2% increase in heating oil prices' volatility). Additionally, a decrease in energy commodity price volatility lessens macroeconomic uncertainty. These findings suggest a bi-directional causal link between the markets for energy commodities and macroeconomic uncertainty [212].

7.5. Extreme Events, Armed Conflicts, Rebellion, Fuel Subsidies, and Energy Prices

In the past, conflicts and political turmoil have been closely correlated with oil prices [213]. The Arab–Israeli war in 1973 resulted in an OPEC oil embargo, which sharply increased the price of oil. Wars and political unrest that disrupt oil supplies have considerable explanatory power for changes in oil prices [214]. Wars and political tension in nations that export oil, such as those in the Persian Gulf, cause uncertainty in the oil supply, which is reflected in the development of oil prices both during active wartime and in the years that follow [175]. Studies have demonstrated that oil prices can influence economic activity through various routes, including monetary policy channels [215,216]. Wang and Sun [217] showed that economic activity is the most critical element in determining oil price dynamics. Wars and political tensions among the largest oil-producing countries and neighbouring countries have been found to have a considerable indirect effect on the oil price by affecting the oil supply.

The impacts of extreme events on the risk of rising energy prices have been the subject of some systematic research studies. Zhang et al. [218] looked into how extreme events affect the price of crude oil. They demonstrated that extreme occurrences are the main factors influencing medium-term variations in the price of crude oil and that the shocks of extreme events are more frequent and severe than those in the past during periods of high oil prices. Using data from the Persian Gulf War in 1991 and the Iraq War in 2003, Zhang et al. [219] connected severe events in crude oil markets using an EMD-based event analysis approach. They concluded that those events often significantly impacted crude oil price volatility. Using long-span daily data from 1983 to 2019, Wen et al. [220] addressed the effects of extreme occurrences by splitting them into natural and human extreme events. They discovered that both considerably raise the chance of rising oil and natural gas prices, that an epidemic has the most significant negative influence on oil price risk of all natural disasters, and that terrorism has no discernible effect.

In their research, Le Billon and Cervantes [221] found an association between higher oil prices and higher occurrences of conflicts in oil-rich countries compared to oil-poor countries in terms of oil prices, the number of conflicts, and the annual rate of conflicts between 1960 and 2006. At the same time, they did not find a correlation between oil prices and the proportion of conflicts that overlap with oil-producing areas. Any causal relationship's direction is also unclear. Between 1970 and 2006, the US Energy Information Administration identified seventy-five major events affecting oil prices, fifteen of which were conflicts, followed by price increases [222]. Because of the last causal relationship, we proceed with a literature review linking armed conflicts to energy price changes.

Despite the growing body of research on instability related to rising energy prices and changes in fuel subsidies, these studies are still in their infancy. Moreover, the mechanisms that could account for the link between shocks in the price of international oil and conflicts are also weakly supported by evidence [223]. Instead of looking at fuel prices as a cause of intra-state instability below the level of armed conflict, these studies focused on the relationship between oil and armed conflict and rebellion. More recently, in academic circles, "fuel riots" (also known as energy demonstrations) have come to be recognised as a unique sort of conflict [223,224]. Over the past 10 to 15 years, there has been evidence for several countries linking the reform of fuel subsidies and the potential for conflict

(including fuel riots), including Sudan in 2013, France and Jordan in 2018, Egypt, Iran, and Ecuador in 2019, and Kazakhstan as recently as January 2022.

Natalini et al. [224]’s recent research focuses on a potential connection between oil and armed conflict, rebellion, and fuel price subsidies. Strong evidence suggests that conflicts and instability may be connected to rising oil prices. According to Dube and Vargas [225], violence rises in Colombia’s oil-producing communities as the price of oil increases internationally. At the same time, Blair et al. [226] analysed 350 quantitative research studies and concluded that increasing oil and gas costs positively correlate with the likelihood of conflict. “The bulk of violent riots counted in the study happened in low-income nations, largely prompted by energy-price spikes in such countries,” Ortiz et al. [227] concluded in their examination of 843 protest incidents taking place between January 2006 and July 2013 in 84 countries. *World Protests: A Study of Key Protest Issues in the 21st Century*, an updated book by Ortiz et al. [228], examines 2809 protest incidents between 2006 and 2020 in 101 nations. They discovered that the elimination of fuel and energy subsidies and the ensuing rise in energy costs contributed to 5% of the protests (136 occurrences), including those in Algeria, Cameroon, Chile, Ecuador, India, Indonesia, Mexico, Mozambique, Nicaragua, Niger, Peru, Sudan, and Uganda, among other places [228]. Energy shortages and outages have also sparked protests, for instance, in Pakistan, Zimbabwe, and Myanmar.

The research reveals that fuel riots are not confined to a specific region nor indicate a clear developed/developing country distinction; rather, they can occur in every continent and country, despite their different characteristics [224]. Increases in energy prices can cause instability due to external inflationary pressures or the elimination of price subsidies.

Finally, the impact of war on financial markets has been the subject of some research. Most published works have concentrated on World War II; however, the Gulf War, the Israeli–Palestinian conflict, and the civil war in ex-Yugoslavia are the three most recent international conflicts examined by Schneider and Troeger [229]. They concluded that war has a generally negative effect on global markets. Stock prices tend to fall as the likelihood of war rises, but the occurrence of war itself tends to boost stock prices, as discovered by Brune et al. [230]. The stock market tends to fall when war breaks out unexpectedly. When doubt is eliminated, ambiguity aversion explains these findings. The sudden Russian invasion of Ukraine seemed to have caught stock markets off-guard. Related research considers a geopolitical risk index developed by Caldara and Iacoviello [44]. An increasing number of economists are looking to this geopolitical risk index as a predictor of economic variables.

Several studies have been conducted regarding the status of energy costs during the COVID-19 epidemic and the Russian–Ukrainian conflict. Deng et al. [231] found that if Europe were to wean itself off of Russian energy sources, the resulting short-term increase in fuel oil and natural gas prices would be offset by a long-term decrease. Investors appear to be anticipating a disparity in the rate at which the United States and Europe move toward a low-carbon economy. Market observers may have been too quick to write off inflation concerns before the start of the war. Still, the study’s results suggest that these worries have become deeply rooted and are not going away anytime soon.

Zhang and Huang [232] examined the impact of environmental accidents on people’s new energy-use behaviours based on their perceptions of such accidents and new energy policies. They discovered, among other issues, a considerable positive correlation between new energy policies and the use of new energy cars and stoves. Changes in these behaviours have an indirect impact on energy demand and prices.

To sum up, international fossil fuel prices climbed in 2021 as demand rebounded from the COVID-19 pandemic and continued to surge in 2022 following the Russian–Ukrainian conflict [233]. Although unevenly among and within countries, the rise in energy prices has considerably impacted household budgets (on average, 7%). The goal of policy responses to the spike in energy prices should be to maintain the price signal while offering focused assistance [234]. The focus of the policy reaction in Europe should quickly move from generalised price-suppressing measures to targeted subsidy policies and other measures

to cut energy prices, calculated at least at the cost of 1.5% of GDP on average for each country [235].

Numerous empirical attempts have been made in addition to the theoretical models, according to the studies mentioned above. In those, it was finally emphasised how uncertainty affected the demand for and supply of energy products, with the typical result being a rise in prices. The econometric approaches employed in the correlations described above are dynamic (41) and static (15). The econometric procedures proposed by the above literature are presented in Figure 7 below:

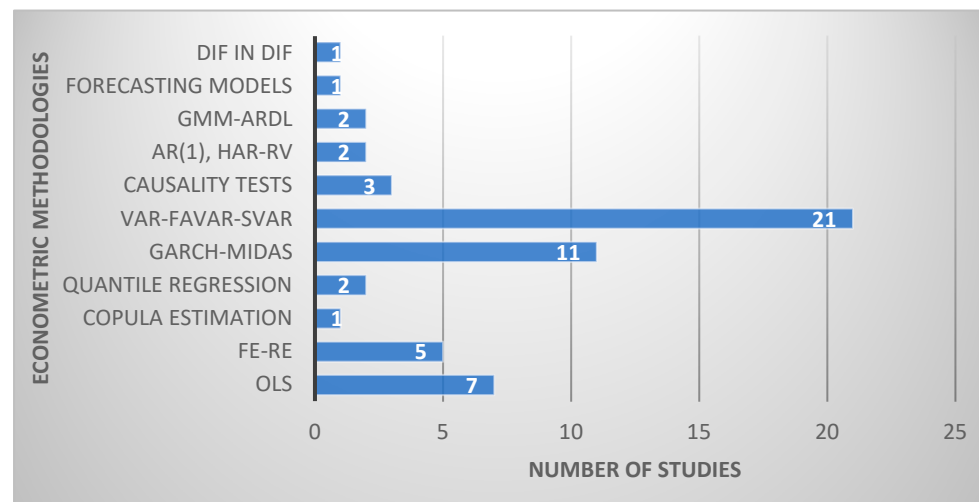


Figure 7. The econometric methodologies used in relation to the number of studies on the nexus between uncertainty and energy prices.

Due to the need to examine the pricing of energy products, most research involves dynamic models, primarily using the econometric methods: VAR (19 studies) and GARCH (10 studies).

8. Discussion and Future Directions

When examining the potential causes of energy pricing, the most fundamental answer is to identify the energy–growth nexus, which is the analytical connection between energy prices, energy consumption, and economic growth. The second phase of this investigation’s literature analysis revealed no apparent causal relationships between the three components. Consequently, it appears that the three factors of the energy–growth nexus—energy consumption, GDP growth, and energy prices—have a bidirectional causal relationship based on the classification of the literature. However, additional research is required to examine the geographic location, net oil exports, and economic growth rate to assess the scope and significance of each line of causality. Thus, it is required to evaluate which countries and circumstances are more favourable to the causal relationship between growth, changes (increases) in energy product consumption, and initial price imbalance (rise), or the causal path: energy prices, consumption, and growth.

This subject’s third and fourth phases are governed by a nation’s fiscal and monetary policies, which promote economic growth. The importance of taxes is undeniable, but because taxes are a part of pricing, the literature has not fully examined a common relationship, namely that changes in taxation affect all energy costs directly and in the same way. Despite extensive research, there is still confusion over the function of government spending. The aforementioned country-specific traits may have a substantial role in explaining how fiscal policies affect energy prices.

The simple interest rate transmission channel for monetary policy also applies to energy prices. The literature we analysed in the corresponding section shows that the impact of every central bank decision and policy shock on energy prices will be the same

as its impact on all other economic prices. Particularly, rising (falling) interest rates will result in lower energy prices (rise). However, the size, length, and direction of monetary policy shocks must be determined. The impact of monetary policy on renewable energy is also unaddressed since lower interest rates lead to more investments, some of which may be devoted to infrastructure for producing renewable energy.

Summarising the aforementioned research on the energy–growth nexus and macroeconomic policies, it is clear that country-specific features, such as income level, geography, and oil-exporting/producing status, have an important impact on determining energy costs. In contrast, no research combines worldwide data with all these features, and this gap should be addressed in future studies. In terms of fiscal and monetary policy, no research has provided explicit indications on the duration and extent of a policy's effects. Finally, it is essential to include additional variables, such as corruption and economic uncertainty, despite the conclusions and gaps that are explored below.

According to the analysis above, corruption is attracted to the energy sector like a magnet. One obvious conclusion is that energy corruption, energy dependence, and energy costs are all clearly linked. Petty corruption affects people and businesses on an individual and business level, but it also affects nations (grand corruption). Even if these condemned firms to continued dependence and low levels of energy efficiency, the potential private profits from the opaque energy trade are too substantial for any significant parties to have a genuine interest in pursuing greater energy independence (Balmaceda, 2007). On the other hand, the energy corruption systems are so pervasive that the potential financial penalties for engaging in corrupt transactions (and getting caught) are rarely significant enough to act as a deterrent. Its benefits first take effect as it advances procedures previously stalled by bureaucracy, a lack of significant investments, etc. (Ukraine, some African countries) [24,27,121]. However, in the end, the relationship becomes strongly negative. The entities (households, businesses, and countries) will have little chance of achieving greater energy independence and managing their dependence on energy in a proactive, positive manner as long as the energy trade remains non-transparent and a simple source of corruption rents [21]. As evidenced by today's reality, this process results in abrupt price shifts, usually upward. In the process of energy production, distribution, and purchasing, corruption must be challenged. Energy corruption frequently involves numerous significant individuals from the political spectrum who have little interest in giving up lucrative rent-seeking schemes. Thus, the fight against it will not be an easy one. Furthermore, in highly opaque countries, it may be difficult for entities to completely remove gas and oil trade corruption schemes until the situation also changes. According to the literature, although corruption has been substantially linked to final energy prices, its causes have not been examined. This field has a significant gap that research can fill. In other words, every link between corruption and production, distribution, sales, subsidisation, and energy use must be evaluated and thoroughly investigated.

The sixth section of this study examines the literature on the impact of uncertainty and other extreme events on energy policy and prices. We summarise the context and then examine the effect of EPU and other uncertainty indices on energy stock markets and prices. This review could assist researchers in better understanding and developing future research in the field. Furthermore, it is especially pertinent given current political discussions, and the results compiled here also explain today's environment. The overall analysis of the critical topic covered in this literature review demonstrates that the study of economic policy uncertainty is dynamic, growing, and changing at a rapid pace. To summarise, in times of great uncertainty, corporations act more conservatively. This fact is regarded as a risk in which public policies and regulatory frameworks are unclear for the foreseeable future. This phenomenon may cause businesses and individuals to postpone spending and investments due to market uncertainty, implying that supply does not respond to increased demand, raising energy prices [179,182,188]. Climate uncertainty indicators can have the same effect on prices. Climate policy uncertainty piques the interest of practitioners and researchers alike. Energy traders, in particular, should consider climate

policy uncertainty in their decision-making process, as this can affect demand for carbon emission rights [171]. As a result, uncertainty indices can forecast the realised volatility of energy prices. Nonetheless, some of these findings indicate an asymmetric effect of uncertainty. This is due to two factors: the immediate aftermath of extreme events that cause rapid imbalances and the spread of uncertainty from key countries (in terms of energy supply and demand) to the rest of the world [236].

We answer the issues posed in the introduction to understand better the research's directions regarding uncertainty and energy prices. According to economic policy uncertainty indices, oil-exporting countries are more negatively affected by oil price shocks than oil-importing countries.

Oil price shocks affect supply-side outcomes, and estimates show that they reduce economic output. The study's location determines this. US real output is unaffected by natural gas price shocks, unlike that of Russia. Increases in natural gas supply affect prices more than decreases. In volatile markets, EPU predicts energy market price volatility and pricing. Due to alternate energy sources and the oil and gas markets' decreased sensitivity to economic policy shocks, EPU's impact has diminished. The rise in output allows market participants to react faster to exogenous shocks than before 2010. Finally, severe events (natural and human) increase the probability of increased oil and natural gas prices, with epidemics having the most significant impact and terrorism having no detectable effect.

By investigating the impact of certain economic conditions and extreme events, it was discovered that global economic conditions contain more helpful information than uncertainty indices in predicting natural gas, oil, and clean energy price volatility. Therefore, market participants should prioritise and pay attention to overall conditions over only text-based measures of uncertainty extracted from newspaper articles to predict the realised volatility of energy prices [170]. In addition, policymakers and investors should consider the above-mentioned conjecture when making market regulation and investment decisions. This study provides insights that can be used to comprehend the impact of uncertainty and extreme conditions on energy prices. It demonstrates the research directions that have been pursued to date and those that must be followed in the near future.

However, there are several limitations to the scope of this study. First and foremost, the direct impact of corruption on changes in energy prices has not been sufficiently and explicitly explored. Conclusions have been drawn from the literature that indirectly examines the effect of corruption on energy policy. This restriction reveals a preliminary plan for the direction studies will go in the future. The empirical research can use various corruption indicators (CPI, CCI, ICRG) and energy commodity pricing (oil, gas, renewables) to make quick judgments. This process can use recent attempts to assess corruption, such as the CRI index, which employs AI to determine corruption from media reporting in various countries [237]. In order to identify similarities and differences, comparing regions to one another is possible in light of these conclusions. The enormous research on the connection between uncertainty and energy policies represents a second barrier in the opposite direction. In these situations, we grouped our efforts while simultaneously using the proper selection techniques to identify the studies that qualified for each synthesis. We presented the study intervention features and compared them to the intended groups for each synthesis.

Nevertheless, several unresolved issues remain, opening up numerous avenues for further study. First, there is a shortage of studies on the long-term effects of corruption in connection with contracts for importing energy from generating to consuming countries. Examining the circumstances that result in the construction of the distribution processes reveals a matching absence (pipelines, LNG ships, electricity transmission networks, etc.). Additionally, more study is required to determine how corruption affects the unequal distribution of resources used to produce renewable energy sources, eventually resulting in distortions in energy prices.

In addition, given numerous approaches for estimating uncertainty, the suitability of each methodology must be evaluated on a case-by-case basis. Moreover, what elements

impact EPU, and how may the EPU index be enhanced in the future? Identifying the primary sources of policy uncertainty is essential to determining ways to mitigate their effect on energy costs. In other words, what roles do monetary and fiscal policies play in the economy's performance and decreasing uncertainty? Also, can countries utilise renewable energy sources extensively and lessen the danger of price volatility? Can risk management and prevention methods be used to educate citizens to reduce the impact of uncertainty about energy concerns on demand? Lastly, the majority of the approaches in this field are empirical. Consequently, it is required to connect and justify these conclusions using more concrete scientific foundations.

9. Conclusions

Due to the interconnected nature of the modern world, GDP, monetary and fiscal policy variables, corruption, and uncertainty are critical to energy policy decisions. The global energy crisis, exacerbated by rising energy prices, has prompted a comprehensive investigation into its origins. This review contributes to the existing literature on the primary causes of the formation of energy prices by providing a comprehensive overview of studies that develop a clarification of the paths between fiscal and monetary variables, corruption, and other events that cause uncertainty in energy policies and the formation of energy prices. Through this procedure, the contribution of the adoption of energy policies is highlighted, existing gaps in the international literature are recognised, and guidelines for future research in specific sectors are suggested. The evaluation of 237 studies reveals that the formation of energy prices by their primary components has garnered considerable interest during the past two decades. Over 75% of the selected papers were published after 2010, and 40% of the articles have been published over the past four years.

Our examination revealed that the topic of energy costs was frequently chosen for studies on the effect of politics on the sale of goods and services. Specifically, energy consumption, GDP growth, and energy prices have a causal link in both directions. However, the literature needs to determine which causal direction is the most significant. While it is evident from the literature that interest rates and energy costs move in opposite directions, the same cannot be said for taxation. As multiple phases of energy production, transmission, distribution, and consumption are taxed in conjunction with subsidies at various stages, the research has yet to establish which causes are related to which consequences. Energy prices are also greatly influenced by corruption; however, the causes of corruption have not been adequately investigated. Lastly, uncertainty typically increases energy costs. Still, more research is required to examine the characteristics of the countries, the conditions, and, most significantly, the theoretical foundation of the connections.

This research contributes summarised data to the international literature on this topic and makes available to academics and policymakers the aggregated data of the primary factors influencing energy prices today. In addition, it highlights some policy implications, not only from the perspective of addressing the problems that ultimately burden energy prices but also from the viewpoint of prevention.

Our study has some limitations, even though it employs a scientifically rigorous methodological approach and a substantial number of papers. First, the literature review sample comprises many articles published in peer-reviewed academic journals, particularly in energy, economics–econometrics–finance, and environmental science, and fewer book chapters and conferences, which may have resulted in additional significant insights. In addition to limiting the potential outcomes, the included papers focused on energy, energy costs, energy usage, and oil prices. A last limiting criterion is the year of publication, as we restricted the study period of the primary literature to the years 2000 to 2022 to minimise the vast number of articles to be examined.

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