

Determinants of renewable energy: a note

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Abstract

Renewable energy has become a buzzword in policy papers and public debates. Economists have attempted to identify what are the determinants of the increase in renewable energy production and consumption. This is a concise review of these efforts.

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Keywords: renewable energy, GDP, corruption, economic freedom.

Renewable energy has become a buzzword in policy papers and public debates. Moreover, the interest around renewables has surged to unprecedented peaks and both private sector and households become anxious to increase consumption of renewable energy.

Perhaps the most important factor associated with the development of renewable energy (RE) is Gross Domestic Product. GDP per capita is a well-known determinant of renewable energy consumption, but only in developed countries. This illustrates the so-called “environmental Kuznets curve” according to which, at an early stage of development, the increase in income leads to pollution and other environmental damages, but at a more advanced stage of development, when people preferences change, economic growth improves the environmental quality and increases the share of renewable energy. The causal relation between GDP and RE was noticed, among others, by Menyah and Wolde-Rufael (2010), who studied this issue in US for almost half a century. Table no. 1 summarizes the recent empirical research on the influence of GDP on renewable energy consumption.

Table no. 1. Empirical evidence about the nexus between GDP and RE

Study	Sample; Study Period	Results
Sadorsky (2009)	18 emerging countries; 1994 to 2003.	A 1% increase in real income per capita increases the consumption of renewable energy per capita by 3.5%.

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Sadorsky (2009)	G7 countries; 1980-2005.	A 1% increase in real GDP per person increases the consumption of renewable energy per capita by 8.44%.
Li et. al. (2020)	OECD economies over the period from 1990 to 2017.	Income is an important factor in explaining renewable energy consumption.
Tudor and Şova (2021)	94 countries; 1995-2019.	Positive correlation between GDP per capita and renewable energy consumption, but only for the countries with middle-high, high and very high income levels.
Polcyn et. al. (2022)	10 european countries; 2000-2018.	A 1% rise in GDP per capita leads to the growth of renewable energy consumption by 0.69%.

Intuitively, the quality of government should be associated with the development of renewable energy, because honest decisionmakers will pursue policies reflecting the preferences of their population. Therefore, one could expect corruption to prevent investment or consumption of renewable energy. However, the relation between corruption and renewable energy seems to be complex. Corruption can reduce investment and consumption of renewable energy if the lobbying power of fossil fuel sector is overwhelming, but it can also increase them if the environment regulations are exploited by the interest groups associated with wind and solar energy. A consistent review of the literature can be found in Leitao (2021). Cadoret and Padovano (2016) show that an improvement in the quality of governance, as measured by corruption perception index, increases the share of renewable energy consumption in European countries. However, a similar study over a different time period illustrates inconclusive results: corruption is negatively associated with REC in the European Union, but the result is not statistically significant (Tu *et. al.*, 2022). Details about the empirical research in this area are summarized in Table no. 2.

Table no. 2. Empirical evidence on the relation between corruption and RE

Study	Sample; Study Period	Results
Strunz et. al. (2016)	Germany, before 2016.	The “Energiewende” narrative is determined by ideology and rent-seeking.
Gennaioli, C., Tavoni (2016)	Italy; 1990–2007	Government subsidies for renewable energy can determine the formation of criminal associations between entrepreneurs and politicians.
Mahmood et. al. (2021)	Pakistan, India, Bangladesh, and Sri Lanka; 1996–2019	Control of corruption has a positive impact on natural gas consumption, but insignificant effects on renewable energy.

Uzar (2020)	38 countries; 1990–2015.	Institutional quality has a positive impact on renewable energy consumption in the long run.
Amoah et. al. (2022)	32 African countries; 1996–2019.	A 1% increase in Corruption Perception Index reduces the share of renewable energy consumption by 0.31%.
Cadoret and Padovano (2016)	26 EU countries; 2004–2011.	Positive effect of the quality of governance on renewable energy consumption share.

The political orientation of governments may be a significant factor of renewable energy development. The general ideological inclination of governments is well illustrated by the level of economic freedom. Economic freedom is a multi-dimensional concept used in measuring the quality of institutional framework, covering the rule of law, business freedom, fiscal and regulatory burden and other elements. Various studies have shown that, in relation to the environmental and climate issues, it can work both ways: it can sometimes increase the environmental damage and, in other cases, enhance sustainable development. While Loris (2015) argues that economic freedom supports environmental performance, Amoah et. al. (2020) and Rapsikevicius et. al. (2021) discover different nuances in this relation: some aspects of economic freedom have a negative impact on the environment in general, and on the share of renewable energy consumption in particular, while other aspects have a positive effect. Also, Le et. al. (2020) comprehensive study find that economic freedom improves environmental performance in high-income countries only. Tu et. al. (2022) show that in Europe there is a clear and positive connection between economic freedom and RE, but this study covers only ten years (2011–2020). Additional information about this line of research is presented in Table no. 3.

Table no. 3. Empirical evidence on the relation between economic freedom and REC

Study	Sample; Study Period	Results
Tu et al. (2022)	27 european countries; 2011–2020.	A rise in the Economic Freedom Index by 1 point increases the share of renewable energy consumption by 0.21%.
Amoah et al. (2020)	32 african countries; 1996–2017.	The rule of law and the tax burden have a negative impact on the share of renewable energy consumption, while business freedom and trade freedom have a positive influence.

Rapsikevicius et al. (2021)	23 european countries; 2005–2018).	Economic freedom reduces pollution, but increases CO ₂ emissions.
Marinescu, C.; Fucec, A.A. (2014)	5 european countries; 1995-2011.	Economic freedom positively influences renewable energy investments in some of these countries.

A central indicator defining political orientation is the attitude on gender issues. The growing political representation of women has led many scholars to investigate the relation between gender and decision-making. In particular, a number of authors studied how women participation in politics influences the environmental and energy policy. Fredriksson and Wang (2011) show that women legislators are more inclined than men to vote for severe environmental regulations, a conclusion that was confirmed by Mavisakalyan and Tarverdi (2019). Salamon (2022) finds that a higher presence of women in parliament determines a higher consumption of renewable energy in developed countries. Finally, a very recent study shows that “a 1 percentage point increase in the proportion of women in the legislature increases the renewable energy production between 0.74 and 1.64 percentage point” (D’Agosti, 2022).

Considering the above literature review, we have found a consistent research indicating that ideology matters when it comes to environmental and energy policies.

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