

THE RESOURCE CURSE AND FOSSIL ELECTRICITY: RESOURCE RENTS AND THE DEMOCRACY EFFECT

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Overview

Since the power sector accounting for over half of greenhouse gas emissions worldwide (IEA and IRENA 2017), decarbonisation of electricity generation will be critical for meeting the targets adopted in the Paris Agreement (IPCC 2018). Yet, despite the importance of and attention to transitioning from fossil energy sources, their shares in the overall energy mix have varied significantly across countries and over time. While some countries, such as certain EU member states, have become undisputed leaders in the clean energy transition, many others, including both emerging and advanced economies, have clearly lagged behind by slowing or stalling a shift from fossil fuels, leading to widespread concern that the international community will fail to meet its shared mitigation target.

Undoubtedly, national paths of energy transition are influenced by many factors such as natural resource endowment (Parks and Roberts 2007), economic wealth (Bogdanov 2019), industrial capacity (Henisz and Zelner 2006), institutional conditions (Bayulgen and Ladewig 2017) and global energy prices (Trutnevte 2016). One dominant explanation is the resource curse thesis (Ross 1999; Parks and Roberts 2007; Brooks and Kurtz 2016), which suggests that countries that depend on fossil fuel rents for a large share of national income tend to face higher politico-economic disincentives for reducing the role of the fossil industry in electricity generation, in contrast to countries that accrue only a small share of income from fossil rents (Bayulgen and Ladewig 2017). Increasingly, attention is turning to the importance of the national political context in facilitating key interest groups to influence energy policy (Henisz and Zelner 2006; Cadoret and Padovano 2016) and creating politico-economic incentives (Bayulgen and Ladewig 2017) for (and against) energy transition. To a large extent, the empirical landscape is indeterminate, with democracies sometimes embracing (Battig and Bernauer 2009; Hughes and Urperlainen 2015), and, at others, obstructing (Beeson 2010; Lipsy 2018) transition. We contribute to this literature by investigating empirically the joint effects of the democratic attributes of countries' formal political institutions and fossil rent dependencies on shares of coal, gas and oil energy of the overall energy mix for electricity generation.

Methods

While numerous studies have found evidence that political factors influence energy deployment (e.g. Henisz and Zelner 2006; Cadoret and Padovano 2016; Bogdanov 2019), most quantitative work focuses on cross-sectional differences between countries (e.g. Bayer and Urperlainen 2016; Carley 2009; Yi and Feiock 2014), which creates the possibility that observed correlations might be due to other (unmodelled) factors such as national culture and environmental awareness that vary between countries rather than political drivers. To explore such possibilities, we employ a two-level hierarchical model consisting of country-years nested in countries, to isolate the effects of fluctuations in the levels of democracy and fossil rents shares (and other putative drivers of energy transition) within the same country, thereby eliminating the possibility for country confounding.

We evaluate the influence of democracy on coal, gas and oil shares of the overall energy mix deployed for electricity generation using worldwide country-year data spanning 134 countries over forty years (1980 to 2020). For each energy source, we employ three separate models: (i) a single level ordinary least squares regression, (ii), a random intercept model which differentiates between observations from different countries and (iii) a random coefficient model (RCM) that allows the effect of democracy on fossil shares to vary between countries. We conduct t-tests comparisons of the country-specific democracy effects predicted by the RCMs to evaluate whether and, if so, how the relationship between democracy and fossil shares varies across countries with different levels of fossil rent dependency and economic development under different price conditions in world energy markets. We also employ a fourth model that introduces a series of interaction terms between democracy and economic development to formally evaluate the role of fossil rents in moderating the country-specific democracy effect across countries with different levels of fossil dependency and economic development in different time periods and analyse the predicted shares of coal, gas and oil to understand the nature of these interactions. We explore the robustness of our model using different proxies to measure democracy (namely the V-Dem additive polity, Freedom House and Polity II indices), economic development (per capita GDP and per capita CO₂ emissions) and different configurations of low, medium and high fossil rents, economic development and fossil energy prices.

Results

Our results indicate that even when country clustering is accounted for, democracy does indeed have a significant effect on the share of fossil sources in the energy mix employed for electricity generation. However, we also find that

the direction and magnitude of the effect of democracy varies substantially across countries, suggesting that international generalisations about the influence of democracy on the energy transition could be misleading. In line with the resource curse thesis, we find strong evidence that in low-income countries, fossil rents significantly increase the positive effect of democracy on coal, oil and gas shares, while reducing inhibitory democracy effects in high fossil rent countries. While these patterns consistently hold for low-income countries under the presence of low coal, gas and oil prices in the world energy markets, fossil rents cease to exhibit a positive moderating effect on democracy in medium and high income countries during medium and high price periods, suggesting that the resource curse is more determinative for developing economies.

Conclusions

Though largely understudied, political context is an important driver of (and impediment to) energy transitions. In particular, democracy plays a significant role in shaping the historical transitions of coal, gas and oil energy and fossil rents increase the positive marginal effect of democracy on all major fossil sources, particularly in low-income countries. Our results also suggest that international generalisations about the drivers and obstacles to energy transition could be misleading, supporting the need for more detailed country-specific analysis.

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