EXPLORING THE RELATIONSHIP BETWEEN ENERGY POLICY UNCERTAINTY AND INVESTMENT IN RENEWABLE ENERGY

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Overview

Investment in renewable energy globally has been declining in recent years and the International Energy Agency (I.E.A.) has expressed concern that this will inhibit our capacity to meet climate change objectives (I.E.A., 2018). While there exists some empirical evidence about the drivers of renewable energy consumption (see, for instance, Bloch et al., 2012; Bloch et al., 2015; Sadorsky, 2009), we know little about the drivers of investment in renewable energy. Policy uncertainty can represents a significant risk for investors and risk is a fundamental factor taken into account when assessing the profitability of investment decisions (Bernanke, 1983). Anecdotal evidence suggests that policy uncertainty relating to carbon emissions reduction, renewable energy and fossil fuels detrimentally affects the level of investment in renewable energy (see, for instance, Potter and MacDonald, 2018; Ritter, 2018; Harrabin, 2016). Several surveys support the proposition that investors' perceive renewable energy investments as carrying greater risk (reflected in higher weighted average cost of capital) due to risks stemming from energy policy uncertainty (see, for instance, Byrnes and Brown, 2015; Eryilmaz and Homans, 2013).

This study examines the association between energy policy uncertainty and renewable energy investment using a unique dataset sourced from Bloomberg New Energy Finance (BNEF) and by developing an innovative Energy Policy Uncertainty (EPU) index. Using monthly data from January 2008 to December 2015, we examine the contemporaneous and lag / lead associations between energy policy uncertainty and renewable energy investment in the United States (U.S.). The results make a valuable contribution to our understanding about the drivers of renewable energy investment and are of particular relevance for policy-making aimed at reducing greenhouse gas emissions, decarbonising the value chain and achieving environmental objectives.

Methods

For data on renewable energy investment, we aggregate unit record data sourced from BNEF into a monthly time series and deflate the nominal values using the Consumer Price Index. For data on energy policy uncertainty, we develop an innovative Energy Policy Uncertainty (EPU) index. To develop the index, the study leverages off the methodological framework proposed by Baker et al. (2015) used to construct broad measures of economic policy uncertainty at the country level. We construct the index as follows:

1. Obtain a monthly count of articles appearing in either of five leading U.S. newspapers (USA Today, The New York Times, The Wall Street Journal, Los Angeles Times and New York Post) that contain the following words:
    - 1.1. "United States" or U.S." or "America", and
    - 1.2. "economy" or "economic", and
    - 1.3. "uncertain" or "uncertainty", and
    - 1.4. one or more of the following: "government", "legislation", "regulation", "policy", "tax", "tariff", and
    - 1.5. one or more of the following category-specific policy terms: "energy", "renewable", "fossil fuel", "decarbonisation", "RET".
2. Scale the raw counts by the total number of articles in the same newspaper and month to yield a monthly EPU series for each newspaper.
3. Generated a weighted EPU series across the five papers by month (where the weights are determined by the relative number of articles published by each of the newspapers).
4. Calculate the index using a base period of January 2008.

We use Granger Causality to test for causal relations between renewable energy investment and the EPU index. We then fit a polynomial of order 4 to each of the time series and test for structural breaks using the Quandt-Andrews breakpoint test (Andrews, 1993) and the Bai and Perron (1998) test for multiple structural breaks. Market analysis is then employed to shed light on the cause of these structural breaks. Both time series are then decomposed into trend and cycle using the Hodrick-Prescott Filter. Trend analysis is then undertaken on the

filtered time series. Using the International Energy Agency's policy and measures database, we then examine the correlation between renewable energy and climate change policy developments and the publication of energy related articles in the U.S. Technical and market analysis is used to assess whether there is an association between EPU and renewable energy investment in the U.S.

Results

The results indicate there is an empirical association between EPU and renewable energy investment. We find that there is an inverse association between trends in energy policy uncertainty and renewable energy investment. This finding supports the hypothesis that higher energy policy uncertainty leads to lower renewable energy investment. Further, there is evidence of a statistically significant causal relationship between EPU and the level of renewable energy investment in the U.S characterised by a lag/lead relationship.

Conclusions

The results generated by this study demonstrate that there is an inverse association and causal relationship between energy policy uncertainty and renewable energy investment in the U.S. Specifically, changes in energy policy increase uncertainty and lead to lower levels of renewable energy investment. The results shed light on the importance of energy policy certainty in stimulating renewable energy investment. This is an important finding in the current environment where declining trends in renewable energy investment are threatening our capacity to meet climate change objectives (I.E.A., 2018). We conclude that energy policy uncertainty is an important factor that policy-makers should take into account when attempting to encourage investment in renewable energy in order to help reduce greenhouse gas emissions, achieve global environmental objectives and decarbonise the value chain.

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