On the Relationship between Policy Uncertainty and Investment in Renewable Energy

BY KELLY BURNS

Introduction

Investment in renewable energy globally has been declining in recent years and the International Energy Agency (I.E.A.) is concerned this trend 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 supply and demand, we know little about the drivers of investment in renewable energy. In this study, we consider the impact of policy uncertainty on investment in renewable energy in the USA.

Uncertainty & Investment

Policy uncertainty represents a significant risk for investors and is a fundamental consideration 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, Ritter, 2018; Harrabin, 2016). Several surveys support the proposition that investors perceive Renewable Energy Investments (REIs) as carrying greater risk (reflected in higher weighted average cost of capital) due to risks stemming from policy uncertainty (see, for instance, Eryilmaz and Homans, 2013). However, no empirical evidence exists to either support or refute this hypothesis. This study aims to fill this gap in our knowledge base by enhancing our understanding of how Energy Policy Uncertainty (EPU) influences REI. The findings will help support policy-making geared towards energy transition, energy security and environmental objectives (including reducing greenhouse gas emissions and decarbonisation of the global supply chain).

Policy changes & the news

We begin by considering the policy environment in the USA and how this relates to the publication of energy policy related articles. From 2009 to 2015, there were a total of 85 energy policy changes in the USA. Of these, most related to climate change (52%), followed by energy efficiency (29%) and renewable energy (19%). Most policy changes relating to climate change and renewable energy were the introduction of new policies ("in force"), accounting for 65% of policy changes over this period. Existing policies that were "superseded" or "ended" accounted for 17% each over the sample period (33% combined). Since 2009, the introduction of new climate change and renewable energy policy changes in the USA has declined significantly (12 in total were introduced from 2011 to 2015, compared to 17 and 10 in 2009 and 2010, respectively). Over the same period, the number of energy related articles published in the 5 leading USA newspapers[1] has also declined substantially, from a high of 549 in 2008 to less than 300 from 2012 to 2015.

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See footnotes at end of text.

As we observe in Figure 1, when the number of energy policy developments rises (falls), the number of energy related articles published in leading USA newspapers falls (rises). This reflects the trend for media speculation and uncertainty in the lead up to, and anticipation surrounding, significant energy policy changes.

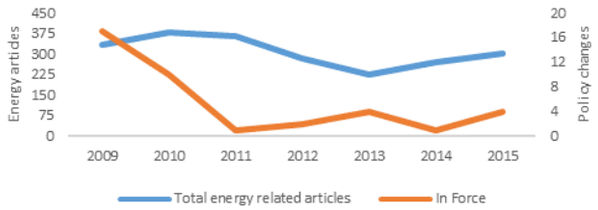

Figure 1. USA energy related articles and policy changes
Source: IEA Policy and Measures database; Burns, 2019

Introducing the Energy Policy Uncertainty Index

A recent advancement in our attempts to better understand and measure the influence of policy uncertainty on REI is the development of an EPU index (Burns, 2019). The index has been developed by adapting the well-known methodological framework proposed by Baker et al. (2015) and provides a measure of news-based policy uncertainty at the country level.[2] To address concerns about the robustness of the EPU index to capture market uncertainty relating to energy policy, we follow the approach of Baker et al. (2016) and apply market analysis techniques to assess whether significant events thought to influence the USA energy policy environment (and may have led to speculation and uncertainty) are captured. We observe that significant peaks and troughs in the EPU index are associated with major energy and emissions reduction policy

changes, as well as the USA Federal election (refer Figure 2). This includes the Climate Action Champions Initiative, the 21st session of the Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change (including the development of Nationally Determined Contributions (NDC)), the Renew300 Initiative and the Clean Power Plan. All four policy events were key pieces of President Obama's Climate Action Plan and were aimed at reducing GHG emissions, promoting energy transition and encouraging private investment in green energy. Based on these observations, it is reasonable to conclude that the EPU index is an appropriate tool to measure EPU in the USA.

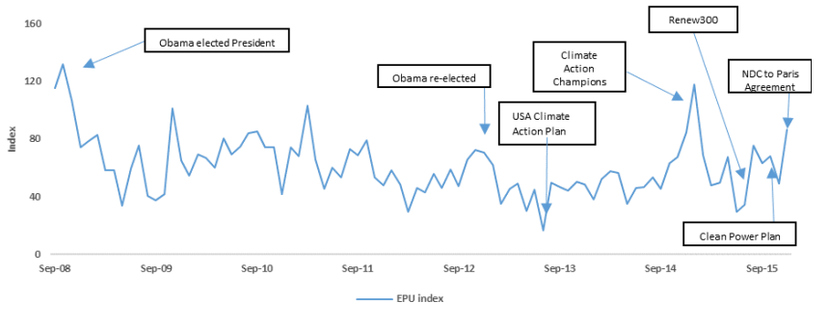

Figure 2. EPU index and energy policy changes in the USA 2008 to 2015

Energy policy uncertainty & investment

Having demonstrated the robustness of the EPU index to capture uncertainty and speculation consistent with significant energy policy changes, we now consider trends and associations between movements in the EPU and REI in the USA[3]. Given the significant amount of volatility in each of the time series, we apply the Hodrick-Prescott filter and decompose both series into trend and cycle components.

As we observe in Figure 3, there is a clear inverse relationship between trends in REI and EPU. Similar to our observations above (refer Figure 1), when the level of EPU rises (falls), the level of REI falls (rises). This is prima facie evidence that EPU influences REI in the USA.

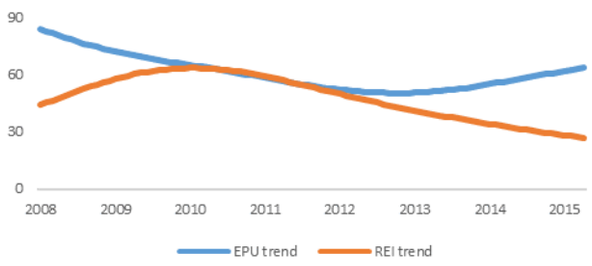

Figure 3. Trend in USA Investment in renewable energy and EPU index

There have been some significant changes in the policy landscape and REI trends in the USA in recent times. To consider and account for this, we apply the Bai-Perron test for 1 to M structural break points and find the following breakpoints for each series: EPU index at 2009M10, 2011M11, 2013M07 and 2014M10; REI at 2009M10, 2012M02 and 2013M06.

There is a striking similarity in the structural breaks identified for each of the series. Importantly, we find contemporaneous breakpoints in October 2009. Interestingly, four significant events occurred in 2009: the inaugural election of President Obama; a record number of climate change and renewable energy policy changes were enacted in the USA; implementation of Executive Order 13514 (Federal Leadership in Environmental, Energy, and Economic Performance); and the ratification of the American Recovery and Reinvestment (ARR) Act. The Executive Order mandated greenhouse gas management as a priority for the Federal government, and introduced detailed targets and reporting requirements on energy use and GHG emissions by Federal agencies. The ARR Act was a supplementary-spending bill containing over USD 80 billion to support clean energy research and development, including USD 277 million for cost-effective alternative energy technologies, USD 6 billion to accelerate the deployment of a range of commercial clean energy technologies and USD 30 billion in tax-based incentives for REIs.

We also find a breakpoint in the EPU index in November 2011, quickly followed be a breakpoint in REI during in February 2012. In 2012, the USA introduced the Africa Clean Energy Finance Initiative. This initiative was a financing mechanism designed to catalyse significant private sector investment in renewable energy infrastructure. Additionally, we find almost simultaneous breakpoints in 2013 that coincide with the re-election of President Obama, the USA Climate Action Plan to cut GHG emissions and the introduction of the Better Buildings Accelerators program (to accelerate investment in energy efficiency). These observations provide evidence that energy policy changes (including the outcome of Presidential elections) coincide with structural changes in REI and EPU.

Concluding remarks

The results indicate there is an association between EPU and REI. We find evidence of inverse contemporaneous trends as well as a lag/lead relationship, consistent with the hypothesis that higher EPU leads to lower REI. We conclude that EPU is an important factor that policy-makers should take into account when attempting to encourage

investment in renewable energy. The results make a valuable contribution to our understanding about the drivers of REI and are of particular relevance for policy-making aimed at reducing greenhouse gas emissions, decarbonising the value chain and achieving environmental objectives.

Footnotes

[1] These are New York Post, USA Today, New York Times, Los Angeles Times and Wall Street Journal.

[2] For full details on the methodology used to calculate this index, please refer to Burns (2019).

[3] REI data is sourced from the Bloomberg New Energy Finance database.

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Plenary Session 5: Can Energy Efficiency Foster Energy Access?

SUMMARIZED BY AMOS OPPONG, DOCTORAL RESEARCHER, UNIVERSITY OF ELECTRONIC SCIENCE AND TECHNOLOGY OF CHINA

This session was chaired by Maya Papineau, Assistant Professor, Carleton University, Canada. She was joined by Sebastian Raoux, Ph.D., J.D, President & CEO of Transcarbon International, and Chairman of the Board of Directors – International Experts on Sustainable Development (IESD); Dr Bernie Jones, Project Co-leader, Smart Villages Research Group Limited; and Saide Sayah, City of Ottawa.

Countries around the globe have made giant strides in providing uninterrupted energy supply to various consumers. However a good proportion of developing nations still have significant fractions of their population that have no access to electricity or experience frequent interruptions in energy supply.

Sebastian Raoux gave a comprehensive overview on the strides made with a comparative analysis of access to energy and energy efficiency policies focusing primarily on low income and lower-middle income economies. Despite the strides made, a significant proportion of the world population still lives in remote areas with limited or no access to grid-related energy supply. The access to sustained energy for all development goal demands that energy supply extended to such off-grid areas.

Bernie Jones presented on smart villages as policy options for providing energy to off-grid communities worldwide based on decentralized sustainable development strategies. He mentioned local GSM network and community broadcasting as among the numerous benefits that remote regions could enjoy in a smart village case.

Saide Sayah presented on affordable housing and energy outlook of Ottawa and introduced the concept of Passive Houses [i.e., houses designed and built such that they are endowed with thermal installations, passive house windows, thermal-bridge-free, airtightness and comfort ventilation with highly heat recovery] as potential consideration in future housing projects.

Based on questions from participants, the panel reiterated that advanced countries could learn from, and possibly implement, the new energy modules that have been successfully implemented in developing economies. The panel also stressed on the need for cooperation among various stakeholders and the government in adopting the proposed technologies to reach energy demands for all at little cost to the environment.