Michael Pahle, Oliver Tietjen and Philippe Quirion

AN ANALYSIS OF THE ALLOCATION AND COSTS OF RISK UNDER DIFFERENT RENEWABLE SUPPORT INSTRUMENTS

Michael Pahle, Potsdam Institute for Climate Impact Research (PIK)
P.O. Box 60 12 03, 14412 Potsdam
Phone: +49 (0)331 288 2465, email: pahle@pik-potsdam.de
Oliver Tietjen, Potsdam Institute for Climate Impact Research (PIK)
P.O. Box 60 12 03, 14412 Potsdam
Philippe Quirion, Centre International de Recherche sur l'Environnement et le Développement (CIRED)
45 bis, avenue de la Belle Gabrielle, 94736 Nogent-sur-Marne Cedex

Overview

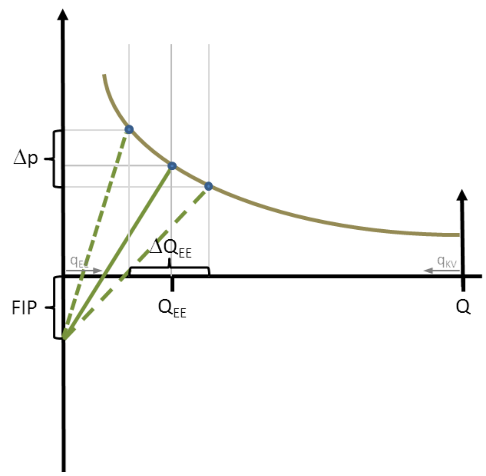
Driven by national policies and the EU target for a 20% share in gross final energy consumption in 2020, support schemes for renewable energy sources (RES) are by now widely employed in EU member states. Commonly used instruments are feed-in tariffs (FIT) and the very similar contracts-for-difference (CfD), feed-in premia (FIP) and tradable green certificates (TGC) and there is an ongoing discussion about their respective performance regarding the achievement of targets (effectiveness) and overall support costs (costs-effectiveness). This discussion has gained new relevance in recent years as several European countries – notably the UK, France and Germany – currently undertake fundamental reforms of their schemes accompanied by an often heated political debate about the advantages and disadvantages of alternative instruments. The probably most controversial issue in this debate is how different instruments allocate investment risks in general and to which degree investors in renewables should be exposed to investment risks in particular. Somewhat surprisingly, the allocation of risk between sectors and the costs that come with it have so far received very little scientific attention. While there is a lot of literature that compares actual support schemes in different countries (e.g. Ragwitz & Steinhilber 2014) or analyzes risks for renewable investors only (e.g. Newberry 2012, Fagiani et al. 2013, Kitzing 2014), investment risks from a partial equilibrium perspective have only been touched upon (e.g. Schmalensee 2012). Hence this issue still lacks a thorough analysis that theoretically and conceptually sheds light on how they affect performance. This is where this papers aims to make a contribution to the scientific and political debate alike.

Method

In order to analyze the risk allocation for the different instruments, we use a stylized analytical model of the electricity sector that differentiates between renewable and fossil producers and takes account of cost uncertainties and information asymmetry between producers and a regulator. The model comprises two stages: In the first stage the regulator sets the control of each instrument – either a price or a quantity – according to expected costs. In the second stage uncertainties resolve and producers set generation according to the market equilibrium conditions, assuming under simplifying conditions that investment and production fall together. Based on this we determine investment risks for renewable and fossil producers and overall electricity price risks for consumers – or the risks for total social costs – under each instrument. We furthermore discuss the economic factors that determine the efficient risk allocation in which overall costs of risks are minimal. Based on this we derive recommendations for instruments choice.

Results

The analysis confirms that the three instruments indeed vary considerably in their allocation of risk between sectors. A FIT does not expose renewable producers to main investment risks and thus cost uncertainties translate into variable RES production, which itself constitutes an investment risk for the fossil sector. In contrary, under a TGC cost uncertainty fully translates into investment risks for renewable producers and fossil producer face no additional investment risk. The FIP is a middle case, where cost uncertainties are spread between both sectors and lead to respective investment risks (see figure below). It turns out that there is no universal instrument ranking regarding overall risks for social costs, but the magnitude of risk depends on various parameters like the marginal costs of fossil generation. Moreover, the impact of information asymmetry on risks is particularly high for the FIP because optimal control of the instrument not only requires information about the costs of renewables, but also about the costs of fossils. Concerning the efficient risk allocation, we review the case against the Arrow-Lind theorem, namely that in line with the liberalization of electricity sectors investment risk should in principle be borne by producers and not consumers. However we find that under the assumption of less effective risk management instruments for in the renewable sector, disproportionally allocating risk to the fossil sector is less costly at least for relatively low share of renewables because it is more broadly distributed and better managed.



Conclusions

Our results suggest that there is no universal theoretical recommendation for any instrument. Rather the performance in terms of risks depends on market parameters, the targeted share of renewables in total production, and access to risk management instruments in the renewable sector. However, the higher the share of renewables, the more important it gets to expose renewable producers to investment risks and to guarantee that they have the full set of risk management instruments available.

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