Economic Impacts of Renewable Energy Promotion in Germany

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Executive summary

Germany has been a forerunner in the promotion of renewable energy over the last decade with the outspoken objective to achieve a share of renewable energy in gross power production of 35% by 2020 and of 80% by 2050. The core element of the Erneuerbare-Energien-Gesetz (EEG) are technology-specific feed-in tariffs (FITs) that guarantee purchases of green power at fixed prices over longer periods. The difference between FITs and the (lower) electricity market price is borne by the electricity consumers via the EEG reallocation charge (RAC). For reasons of international competitiveness, electricity-intensive industries are paying a reduced RAC.

The flip side of the massive expansion of renewable power is the drastic increase of subsidy payments. From 2006 to 2014, the total subsidies almost quadrupled from 5.8 to roughly 21.4 billion euros. As a consequence, the EEG surcharge on households' electricity bills meanwhile exceeds 6 euro cent/kWh, which is roughly a quarter of the average household electricity price in Germany. We investigate how the overall macroeconomic cost of renewable energy promotion change by switching to uniform as compared to differentiated FITs. Regarding cost incidence, we examine how the abolition of exemptions for electricity-intensive industries or a more fundamental shift towards value-added financing of green subsidies affect the burden across households.

Clearly, in a broader economic perspective the efficiency and incidence of policy design are intertwined and potentially subject to trade-offs. For our quantitative assessment we use a numerical framework which combines a computable general equilibrium (CGE) model with a microsimulation (MS) model. The advantage of the CGE–MS combination is that we can analyse the overall macroeconomic cost of policy reforms while at the same time provide a very detailed perspective on households' cost incidence. The integrated modelling framework does not only feature a rich representation of household heterogeneity but accounts for important inter-sectoral linkages and price-dependent market feedbacks across the whole economy. Another special feature of our modelling framework – owing to the requirements of technology-specific policy regulations in the electricity sector – is the bottom-up representation of discrete power generation technologies within the top-down CGE model.

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We find that phasing out the exemptions from the RAC for electricity-intensive sectors lower the macroeconomic cost of the EEG. Replacing the RAC by increasing the value-added tax (VAT) uniformly across all consumption goods would lower cost even further. The VAT financing would also attenuate the adverse incidence on the poorest households which are particularly hurt under the current policy design. Making FIT uniform across subsidised renewable technologies neither improves on the total economic adjustment cost nor on the regressive impacts of renewable energy promotion as long as the distortive RAC is in place.

Keywords Renewable energy policy, feed-in tariffs, computable general equilibrium, microsimula