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Does energy policy hurt international competitiveness of firms? A comparative study for Germany, Switzerland and Austria

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ABSTRACT

This paper investigates the impact of energy policies on the export performance of firms. There has been a long policy debate on potentially negative impacts of cost-increasing energy policies on international competitiveness. We use firm-level data from three countries with similar industry structure but different energy policies: Germany, Switzerland, and Austria. We rely on firm manager assessments on the relevance of energy policy (in terms of taxes, regulations, standards, subsidies and demand stimulation) for their firm operation and link data on adoption and development of new energy technologies. Regression analyses and matching approaches both show very few impacts of energy policy on export performance, suggesting that either policy impacts on firms' cost are negligible in the period of study 2012–2014) or likely negative impacts are balanced by the adoption of new technology.

Introduction

There is a long debate on the role of energy policy for firm competitiveness. On the one hand, energy policy is often seen as a factor that can increase production costs and lower international competitiveness. This view is particularly linked to energy policy that aims at reducing environmental impacts of energy consumption, e.g. through energy taxes, regulation, emission trade schemes or measures to raise energy efficiency or switching to renewable energy sources (Jaffe et al., 1995). On the other hand, energy policy might provide a dynamic comparative advantage, if firms learn early to respond to future challenges in energy supply and use. This perspective is linked to the so-called Porter Hypothesis (Porter, 1990; Porter and van der Linde, 1995). It stresses a likely positive role of environmental policy on firm competitiveness, if policy encourages innovation and the adoption of new technologies, giving firms a head advantage over competitors.

Most studies that deal with the relation between energy-related policies and competitiveness focus on environmental policy in general, and often on regulations of end-of-pipe approaches to reduce environmental externalities of energy production and consumption (see Cohen and Tobb, 2015, Horváthová, 2010, Iraldo et al., 2011). This study focuses on energy policy, which is a policy field that touches both environmental policy (reducing negative environmental externalities) and resource policy (securing sufficient supply of resources at affordable cost). Energy policy does not only affect firms through higher costs for complying with policy regulation but may also provide competitive advantages, if policy results in lower costs of energy use, e.g. by increasing efficiency or switching energy production to sources with a slower increase in price, or if it stimulates innovation in energy technologies.

The main interest of this paper is on competitiveness impacts of energy policy, using export performance as a key indicator for international competitiveness of firms. The choice for export performance is linked to the countries we analyse: Germany, Switzerland, and Austria. All three countries are highly open, internationalised economies with a strong export-oriented manufacturing sector, including some highly energy-intensive production (see OECD, economic surveys, OECD, 2015a, 2015b, 2016). At the same time, energy policies differ significantly in terms of level of taxes and types of regulations as well as policy goals towards renewable energies. Policy debates in all three countries often highlight the role of energy costs as a main determinant

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of international competitiveness and a potential threat to export This is particularly true in Germany where the government provides subsidies for the adoption of renewable energy production that are financed through higher electricity prices (Gawel et al., 2014). However, for the majority of firms in all three countries, the share of energy costs in total costs does not exceed 1%, including many firms from export oriented manufacturing sectors. The objective of the study is to investigate whether energy policy in the three countries has an effect on export competitiveness in firms, and which areas of energy policy drive this effect.

The role of energy policy for the competitiveness of firms has been analysed in many empirical studies both at the country, sector and firm/plant level. Many studies focused on the effects on investment, productivity, employment or profitability. With respect to studies that looked at impacts on exports and trade, most did not find a clear evidence for negative consequences of energy policy. The sector-level study by Costantini and Mazzanti (2012) based on export data for five manufacturing sector groupings in 14 of 14 European countries for the 1996–2007 period showed that energy taxes and other environmental policies (while controlling for innovation) are either neutral or even positively influencing exports, particularly in high-tech and medium-tech sectors. Flues and Lutz (2015a, 2015b) use a huge plant-level panel data set from the German manufacturing sector covering almost 40,000 plants for the 1995–2005 period and analyse the effects of the German electricity tax introduced in 1999. Building upon the fact that firms with electricity use above a certain threshold are subject to a lower tax rate, they are able to identify a causal effect. Their analysis shows that the electricity tax did not affect firms' exports sales, exports, nor did it affect other firm performance measures. Using the same data base, Gerster (2017) investigated the impacts of the electricity surcharge imposed by the German Renewable Energy Law (EEG), exploiting the fact that highly energy-intensive plants (electricity consumption of more than 10 GWh and electricity costs in value added of more than 15%) are exempted from most of the surcharge on ex-post application. Using the years 2008 and 2009 as reference when the economic crisis pushed plants unexpectedly above or below the thresholds, Gerster (2017) did not find any significant results on exports or other performance measures while exemptions contributed to higher electricity consumption and hence a weaker environmental performance. Martin et al. (2014) examined the introduction of carbon taxes in the UK using manufacturing plant data covering almost 7000 plants during 1999–2004. They found that taxes decreased energy intensity and electricity consumption while no impacts are found on plant performance. This holds both for plants with low and with high trade intensity.

With respect to effects of the EU Emission Trading Scheme (ETS), Martin et al. (2016) summarise the evidence found in various empirical studies. While the effects on turnover and employment are mixed, the few trade-related studies did not find any effects on aggregated trade flows (Wagner et al., 2013 based on a French plant-level data set and Reinaud, 2008 based on data of the EU aluminium industry). The literature review by Arlinghaus (2015) on competitiveness impacts of carbon taxes shows that emission levels have been significantly decreased while competitiveness has been affected only to a small extent or not at all. Other studies found that innovation in clean technologies was stimulated by the ETS, though other policies (renewable energy obligations, feed-in tariffs) had stronger impacts. The recent study by Johnstone et al. (2016) investigated the relationship between environmental regulation, innovation, and competitiveness for the thermal power plant sector in 20 countries from 1990 to 2009. They showed that integrated approaches to environmental innovation and a high level of stringency of environmental regulations are more likely to result in higher efficiency gains.

The study attempts to contribute to the literature in four ways. First, we explicitly analyse the interaction between energy policy measures and firms' decision to adopt or develop new energy technologies for the competitiveness impacts of policy. For assessing policy impacts on competitiveness, it is important to understand how policies affect innovation activities of firms and the pace and direction of technological change, and how these innovations contribute to competitiveness (see Johnstone et al., 2016). It is important to distinguish the impact on innovation (i.e. the development of new energy technologies) and the diffusion of these innovations through the adoption of new green energy technologies or spillovers of the knowledge generated by innovators (Jaffe et al., 2005; Martin et al., 2016). Prior studies have shown that energy-related policies tend to induce innovation (for the ETS, see Calel and Dechezleprêtre, 2016 and Rubashkina et al., 2015 using patent data and Borghesi et al. (2012) using Italian firm-level data).

Secondly, we adopt a broad understanding of energy policy that does not look at a single measure only (like studies on the ETS or certain energy taxes). In addition to energy taxes and energy-related regulation, we also consider energy-related standard setting and voluntary agreements, government subsidies for developing or adopting 'green' energy technologies (which either increase energy efficiency or promote the use of renewable energy sources), and demand-side impacts of policy such as demand for energy-efficient products. This broad concept of energy policy is in line with the approach followed in other studies, e.g. the IPCC report on renewable energy sources and climate change mitigation (IPCC, 2012). The primary goals of energy policy include a sufficient, stable and affordable supply of energy and the minimization of likely negative short-term and long-term impacts of energy production, distribution and consumption on the environment.

Thirdly, and in contrast to other firm-level studies, we measure the relevance of energy policy through a firm-specific assessment for each policy area, hence avoiding a selection bias if the policy impact is only measured for firms directly affected by the policy (see Rexhäuser and Rammer, 2014). We consider both (potentially negative) cost-related and (potentially positive) technology-related impacts of energy policy. The empirical analysis rests on a unique firm-level data set. Based on a common methodology and a uniform questionnaire, a survey of a representative sample of manufacturing and service firms from Germany, Switzerland, and Austria has been conducted in 2015 (Arvanitis et al., 2016). The data allow both to identify the role of different energy policy approaches for firm operations, and the development and adoption of green energy technologies.

Finally, our study compares energy policy in three different countries based on a uniform firm-level data set that allows full comparison across countries while offering detailed survey-based firm-level information. So far, cross-country firm-level studies either used register-based data on firms (e.g. from public or private company registers) that suffer from a restricted set of firm-level information or limited cross-country comparability of key policy data (see for example Chan et al., 2013, Commins et al., 2011, Bushnell et al., 2013, Abrell et al., 2011). Through a dedicated survey based on a uniform methodology and tailor-made questions to investigate our research question, we try to overcome these data shortcomings.

We use both standard regression modelling techniques and a semi-parametric matching approach and perform a series of robustness checks. All results indicate that energy policies do not significantly affect the export performance of firms, neither positive nor negative. We also do not find country-specific differences in the impacts of energy policy. Our results suggest that potential negative effects from cost increase balance out with potential positive impacts from technology adoption triggered by energy policy. However, the results suffer from a cross-section approach. Since energy policy in all three countries has been following a rather stable approach over the past fifteen years or so, it is highly likely that firms have adjusted to this policy environment so that no policy impacts can be observed in the short time window we have been looking at 2012–2014).