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The association between energy taxation, participation in an emissions trading system, and the intensity of carbon dioxide emissions in the European Union

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Abstract

Energy taxes are intended to internalize the costs of greenhouse gas (GHG) emissions and to incentivize reductions in GHG emissions; evaluating whether taxes have the desired effect on emissions is an important research question. A second tool to incentivize GHG reductions is an emissions trading system (ETS). We examine data across countries in the EU from 1996 to 2009 and find that as implicit tax rates on energy increased, carbon intensity of emissions decreased. Further, participation in an ETS also resulted in a significant reduction in overall carbon intensity.

Carbon emissions can be reduced by using fuel with a lower carbon content (effectiveness) or by using less fuel per unit of output (efficiency); we decompose overall carbon intensity into effectiveness and efficiency measures. We find that as implicit tax rates on energy increased, efficiency measure improved, but effectiveness did not.

The EU introduced the ETS in 2005, and we find that while participation in an ETS reduced carbon intensity, it also changed the relation between implicit tax rates on energy and carbon intensity. Specifically, there is a significant inverse relationship between implicit tax rates on energy and all three carbon intensity measures prior to the imposition of the ETS, but after imposition of the ETS, implicit tax rates on energy are only significantly inversely related to the efficiency measure. We suggest that the need to immediately reduce emissions below a specified cap encourages

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companies to focus on efficiency measures with immediate results, potentially at the expense of effectiveness initiatives. These trade-offs have potential implications for long-run policy outcomes.

JEL classification: M48
Keywords: Carbon taxes; Carbon emissions; Carbon intensity; Energy taxes; Energy effectiveness; Energy intensity

1. Introduction

The linkage between corporate social responsibility and corporate taxation is an important research topic in accounting, and both academicians and commentators have called for more research on this relationship (Hoi, Wu, & Zhang, 2013; Hanlon & Heitzman, 2010; Sikka, 2010). A key environmental issue is corporate greenhouse gas (GHG) emissions.[1] Because businesses are responsible for a majority of such emissions (World Resources Institute, 2004), policy initiatives often are focused on reducing business GHG emissions.

The European Environment Agency (EEA) concluded in 1995 that policy initiatives and their outcomes as of that date were not adequate to motivate either the full integration of environmental objectives into economic sectors or sustainable development (European Environment Agency (EEA), 1995), and stated that increased governmental intervention is necessary if environmental damage is to be limited. As a result, the European Union (EU) has actively worked to develop more effective environmental policies; energy taxation has been a key component of this effort (Harper, 2007). As tax policies are designed and imposed, it is important for research to evaluate the effectiveness of these policies in motivating and achieving the desired outcomes. Further, as other governments, including the U.S. Congress, grapple with these issues, research can help shape emerging governmental policies in the EU and in other jurisdictions.

While there have been modeling studies that predict the theoretical impact of energy taxation (see e.g., Bovenberg & Goulder, 1997; Fang, Tian, Fu, & Sun, 2013; Fakoya, 2013; Goulder, 1995; Li & Lin, 2013; Parry & Williams, 1999), scant research has examined the empirical relationship between energy taxation and greenhouse gas emissions (Sumner, Bird, & Smith, 2009). Further, research has not addressed how energy taxation is related to the choice of different emission reduction strategies. Emissions may

[1] The reduction of GHG emissions is a key policy issue because of their impact on climate and the related economic and ecological changes that scientists predict. The United Nations Intergovernmental Panel on Climate Change (IPCC) concluded that the use of fossil fuels with the resultant GHG emissions is, with more than a 90% probability, the primary cause of climate change (Intergovernmental Panel on Climate Change (IPCC), 2007). There is a widespread belief that global climate change, if left unchecked, will have significant impact on people and the ecosystems that support them (see e.g., Energy Information Administration (EIA), 2008). This has led to a focus on the economic importance of developing policies to reduce GHG emissions, thereby preventing or reducing climate change (Stern, 2007). Particular emphasis has been placed on reducing CO_2 emissions, with the ultimate goal of stabilizing atmospheric GHG concentrations (Aldy et al., 2008).