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Analysis

Green tangible investment strategies and export performance: A firm-level investigation

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ABSTRACT

In this paper we empirically investigate the relationship between investments in environmentally oriented equipment and firms' export performance. We adopt a two-stage model where we first estimate the impact of green tangible investment strategies (GTIS) on the level of productive efficiency (TFP), and then assess whether induced productivity influences the propensity and the intensity of exports. We rely on a rich firm-level dataset on Italian manufacturing. Our results show that firms with higher productivity, induced among other factors by green investments combining environmental and increased revenue objectives, achieve a higher export performance. In particular, GTIS-enhanced TFP affects the probability of exporting in foreign markets characterized by more stringent environmental regulation. Our evidence supports a 'green-based' firm heterogeneity argument.

1. Introduction

This work investigates the effect of environmentally oriented fixed investments on firm's productivity and exports. It is motivated by the increasing policy and academic attention paid to the link between environmental protection and competitiveness.

From the policy perspective, one may consider the core of the Europe 2020 strategy: the achievement of a sustainable, smart and inclusive pattern of economic growth (European Commission, 2010). Of paramount importance in attaining this objective is decoupling economic objectives from environmental pressure.

In parallel with policy attention, the academic debate on the effect of environmental protection on economic performance has flourished in recent decades. Contrary to the conventional wisdom that environmental goals are incompatible with greater competitiveness, a growing body of studies promotes the idea that economic and environmental performance can go hand in hand. In the Porter hypothesis (PH) framework (Porter, 1991; Porter and van der Linde, 1995), for instance, regulations may trigger the adoption of innovative solutions that generate a win–win situation. The PH empirical literature has considered a wide array of possible effects generated by regulation-induced environmental practices, and it reports effects on the firm's competitiveness and productivity (e.g. Ambec et al., 2013; Iraldo et al., 2011).

A parallel strand of research, investigating "whether it pays to be green", has recognized that environmental practices may be enhanced by a set of factors that overcome regulations and comprise profit-seeking strategies (e.g. Ambec and Lanoie, 2008). Empirical tests have mainly concerned the impact on the firm's profitability and financial performance (e.g. Horváthová, 2010).

We contribute to this latter body of literature in two ways. First, in analysing the effect of green tangible investment strategies (GTIS) (i.e. investment in new machinery and equipment aimed at mitigating the environmental impact of production) we adopt an overarching approach that does not limit the analysis to the sole regulation-induced investments, but takes into account the fact that GTIS may be linked to other profit-oriented strategies. Second, drawing on the firm heterogeneity literature (Bernard and Jensen, 1999, 2004; Helpman et al., 2004), we assess whether – and to what extent – targeting fixed investments on environmental goals increases the export performance of firms by first inducing higher productivity.

We test for this by using a two-stage model. In the first stage, we estimate the productivity effect of GTIS. In the second, we consider

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whether GTIS-induced productivity positively influences the firm's export performance, in terms of export propensity and intensity. The data are extracted from the merger of two waves of the Unicredit survey for the period 2001–2006, and they refer to a sample of 850 Italian manufacturing firms.

The results show that investing in environmentally oriented tangible technologies does have a positive effect on firm's productivity, but only when environmental objectives are combined with the intent to increase firm's revenues, e.g. by introducing new products, developing existing ones or increasing the volume of production to address higher demand. This productivity enhancement then enables firms to raise their export performance, in particular by increasing their likelihood to penetrate more environmentally regulated foreign markets.

The paper is organized as follows. Section 2 reviews the relevant literature and defines our research hypotheses. Sections 3 and 4 describe the estimation model and the dataset, respectively. Section 5 presents the results. Section 6 concludes and draws some policy implications.

2. Literature Background and Testable Hypotheses

The conventional wisdom that environmental protection is a barrier to economic performance has been recently challenged. A major contribution has been made by the literature related to the Porter hypothesis (PH), which disputes the idea of a trade-off between social benefits and private costs and reconsiders the notion of environmental protection as a mere cost for industry. Focusing on environmental regulation, Porter and van der Linde (1995: 98) claim that: "properly designed environmental standards can trigger innovation that may partially or more than fully offset the cost of complying with them". Further refinements of the PH consider the possible relations among regulation, innovation and competitiveness. The weak version of the PH posits that environmental regulations stimulate environmental innovations; the narrow version claims that flexible policy regimes are more effective than prescriptive regulations; the strong version postulates that environmental regulation engenders innovation that eventually improves the economic competitiveness and business performance of firms (Costantini and Mazzanti, 2012; Jaffe and Palmer, 1997; Lanoie et al., 2011). In addition, Costantini and Mazzanti (2012) propose a narrow-strong version of the PH, which implies a competitiveness impact on the "green side" of the economy.

Despite its attractiveness, the PH has been a matter of theoretical controversy: it is not clear why regulations should be necessary for firms to adopt a profit-increasing innovation strategy (Ambec and Barla, 2002, 2006). This controversy has been solved by theoretical arguments that point to the presence of market failures, behavioural and organizational constraints that prevent firms from recognising (and taking full advantage of) opportunities related to environmental practices with profit-increasing potential (Ambec and Barla, 2006; Ambec et al., 2013; Gabel and Sinclair-Desgagnè, 1998; Lanoie et al., 2011).[1]

Within the PH framework, the relation among environmental regulation, environmental protection, innovation and economic competitiveness has been investigated by several empirical studies (Ambec and Barla, 2006; Ambec et al., 2013; Iraldo et al., 2011; Koźluk and Zipperer, 2013). Although they do not reach consensus, relatively to the strong version of the PH, extant contributions consider different types of effects, including the impacts on productivity and international competitiveness. With respect to productivity,[2] early (see the reviews provided by Jaffe et al., 1995; Ambec and Barla, 2006) and more recent analyses (Broberg et al., 2010; Gray and Shadbegian, 2003; Shadbegian and Gray, 2005) point to modest, non-significant, or even negative effects of environmental regulation, while other recent studies find partial support for the PH. This support ranges across different industries and geographical contexts, like the following: oil refineries in the U.S. (Berman and Bui, 2001); the Mexican food processing industry (Alpay et al., 2002); the offshore oil and gas industry in the Gulf of Mexico (Managi et al., 2005); the French food industry (Huiban and Musolesi, 2012); heavily polluting manufacturing sectors in Japan (Hamamoto, 2006); manufacturing sectors in Quebec (Lanoie et al., 2008) and Taiwan (Yang et al., 2012).

In considering the relation between environmental regulation and international competitiveness, recent studies find a positive effect of the former on export dynamics of EU15 countries (Costantini and Mazzanti, 2012), export flows from 21 OECD countries of technologies for the energy sector (Costantini and Crespi, 2008), and export performance by US environmental products manufacturers (Becker and Shadbegian, 2008).

Despite the richness of the literature, the large majority of contributions face a trade-off between the level of data disaggregation and the external validity, or generalization, of the analyses. This is a consequence of the scarcity of evidence based on firm-level and cross-sector studies. As we will show (see Section 4), our study fills this gap. Moreover, we believe that the literature on the relation between environmental practices and firm competitiveness should be improved in two directions.

First, it should recognize the broad and diverse set of factors that affect the adoption of environmentally oriented investments. In addition to the heterogeneous effects of different types of regulation (Rennings and Rammer, 2011), it is important to consider that investment in environmental practices may be driven by non-regulatory factors as well.[3] Especially in contexts characterized by weak regulatory frameworks, other key determinants emerge which concern the endogenous and profit-oriented strategies of firms (Ghisetti and Quatraro, 2013), like the intertwining of Corporate Social Responsibility (CSR) actions (see the review by Lee, 2008) with business performance targets (e.g. Nidumolu et al., 2009; Porter and Kramer, 2006, 2011; Portney, 2008).[4]

Environmental investments may have the purpose of either reducing costs or increasing revenues. As regards the increase in revenues, they may enable the firm to enter specific markets, differentiate its products and sell in-house developed environmental technology (e.g. for pollution control). As regards cost reduction, environmental investments can decrease the costs related to litigations, fines and the risks associated with relations with external stakeholders (e.g. government, industry, NGOs, bankers, media, ecological groups and associations, trade unions). Furthermore, adopting environmental practices can directly reduce the cost of materials and energy use, capital assets (e.g. by easing access to green or ethical mutual funds), and labour inputs (e.g. by enhancing loyalty and commitment) (Ambec and Lanoie, 2008). In this way, environmental investment can give rise to superior economic performance, in terms of higher productivity or efficiency.

The empirical literature testing whether it "pays to be green" has extended the analysis to the economic effect of environmental practices that do not necessarily derive from environmental regulation. However, the emphasis is on their impact on the firm's financial performance (Horváthová, 2010; King and Lenox, 2001, 2002; Telle, 2006), whereas the evidence on technical efficiency/productivity remains limited.[5]

[1] In addition to theoretical limitations, the PH literature has also been characterized by some methodological controversies, like use of inappropriate proxies, lack of temporal dynamics, selection bias and generalizability of results (e.g. Ambec et al., 2013; Koźluk and Zipperer, 2013; Lanoie et al., 2008, 2011).

[2] Recent extensions of the productivity measurement applied to macro-data analyses account for natural capital and "bad" outputs (Brandt et al., 2013, 2014).

[3] With some exceptions (Hamamoto, 2006; Managi et al., 2005), PH-related studies largely use pollution abatement capital investment or operating costs to proxy for environmental regulation strategies.

[4] The managerial literature has also highlighted other factors that affect engagement in environmental practices: for instance, managerial environmental concerns (Eiadat et al., 2008); dynamic capabilities related to proactive environmental strategies (Martìn-Tapia et al., 2010); organizational design and managerial attitudes (Sharma, 2000); and customer–supplier relationships (Anderson et al., 1999).

[5] An exception is the study by Cainelli et al. (2011), who find a nonsignificant/negative relation between environmentally oriented innovative strategies and productivity in a sample of Italian service firms.