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The political economy of investment: The case of pollution control technology

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Abstract

This paper seeks to explain the implications of corruption and political instability for firm investment in abatement technology. In our theoretical set-up, a firm has an incentive to under-invest in abatement technology in order to gain a political advantage. The prediction that emerges is that greater corruptibility *increases* the level of abatement technology investment. This occurs because the strategic incentive to under-invest in pollution control technology declines when policymakers become more corruptible. Moreover, the model predicts that political instability *raises* abatement technology investment. Using steel-sector panel data from 41 countries for the years 1992–1998, we find empirical support for these predictions.
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1. Introduction

In 1998, steel producers in Colombia, Indonesia, and Venezuela primarily used environmentally friendly technology, while the predominant technology used by steel producers in The Netherlands was more pollution-intensive.[1] Meanwhile, the Colombian, Indonesian, and Venezuelan governments are classified as highly corrupt, while the Dutch government is perceived as among the cleanest in the world (Kaufman et al., 1999).[2] The observed pattern of abatement technology investment is particularly puzzling since a recent literature argues that lower corruption *raises* the stringency of environmental policy and quality (see, e.g., López and Mitra, 2000; Fredriksson and Svensson, 2003). In this paper,

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[1] In 1998, 60.8% of Colombian, and 100% of Indonesian and Venezuelan steel was produced using relatively less polluting electric arc furnaces (International Iron and Steel Institute, 2000). In the Netherlands, only 2.4% of steel was produced using environmentally friendly methods (Bode et al., 2000).

[2] Kaufman et al. (1999) report year 1998 graft scores of 5.98, 6.6, and 6.45 for Colombia, Indonesia and Venezuela, respectively, while the Netherlands had a score of 2.4 (high score reflects a greater degree of corruption).

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we seek to explain the cross-country pattern of firm abatement technology investment choices by exploring the roles of corruption and political instability. This issue has previously not received attention in the literature.[3,4]

We utilize a model where a single firm invests in an irreversible pollution abatement technology. More advanced technologies are more expensive, but are associated with lower variable abatement costs per unit of pollution. The monopoly offers the government a bribe in exchange for more favorable pollution tax policy, in the spirit of the menu auction approach by Bernheim and Whinston (1986), applied (to trade policy) by Grossman and Helpman (1994).

Investment in pollution abatement technology may serve several purposes (in addition to reducing variable abatement costs). In particular, it may be part of a so-called "puppy dog" strategy, as discussed by Damania (2001) (see also Fudenberg and Tirole, 1984), where the firm voluntarily imposes high costs on itself.[5] Damania identifies a strategic incentive for a polluting monopolist to *under*-invest in abatement technology, which leads to high marginal (variable) abatement costs.[6] In this case, the government is more reluctant to set a high pollution tax since the marginal negative effect of such a tax on profits is high. Irreversible under-investment in abatement technology enables the firm to gain an advantage in the political process that determines the pollution tax policy; it serves as a credible commitment device for the firm by resulting in high marginal abatement costs. Thus, while it saves on abatement technology expenditures, the firm also reduces its pollution tax payments and the political expenditures aimed at influencing the government.

Our contribution to this theoretical model is to include political instability (here defined as the probability that the incumbent government loses power before an announced policy is implemented). This enables us to derive novel predictions of the effects of both political instability and corruption on abatement technology investment (both of which Damania (2001) abstracts from). Our second contribution is to provide empirical evidence of the existence of several of the relationships suggested by our model.[7]

In the first stage (of a four-stage game), the single firm selects its optimal level of pollution abatement technology. In the second stage, it offers a prospective bribe (campaign contribution) to the incumbent government in return for a more favorable environmental policy (see e.g., Bernheim and Whinston, 1986; Grossman and Helpman, 1994; Aidt, 1998; Schleich, 1999). The government values bribes and social welfare. Third, the incumbent sets its optimal environmental policy, collects the corresponding bribe, and announces its policy choice. In the final stage, the government is with some positive probability forced out of office (our measure of the degree of political instability) before the previously selected policy is implemented (see Fredriksson and Svensson, 2003). In this event, the challenger sets the welfare maximizing policy, since it has not received a bribe. If the incumbent government remains in power, the previously chosen policy is implemented (this is assumed to occur with some probability also if the government departs from office). Thus, the government is assumed able to commit to implement the promised policy, given that it remains in office. This is consistent with earlier work by, e.g., Baron (1989, 1994) and Grossman and Helpman (1996) who specify models with short-term commitment contracts stipulating that funds are furnished before elections by interest groups in exchange for service during the politician's subsequent term, if she is successful. Finally, the firm sets its optimal output and variable abatement levels.

Real-world political relationships between lobby groups and politicians are often of a long-term nature, but the ability of government politicians to deliver on promises made is sometimes upset, e.g. by surprise landslide electoral

[3] Bohn and Deacon (2000) study the effect of ownership security (a function of political violence and instability) on deforestation and oil extraction, Brett and Keen (2000) explore politicians' incentive to earmark pollution tax revenues in the presence of political uncertainty, and Fredriksson and Svensson (2003) study the interaction between corruption and political instability on agricultural sector environmental policies. This literature does not discuss the issue of pollution technology investment, however. Thus, no previous study exists on the joint effects of corruption and political stability on abatement (or other forms of) technology investment.

[4] Empirical evidence on the effects of corruption and political instability on (non-pollution-control related) investment and growth include Mauro (1995), Alesina et al. (1996), Alesina and Perotti (1996), Svensson (1998), Ades and Chua (1997), Wei (2000), Campos and Nugent (2002, 2003), Egger and Winner (2005), and Méndez and Sepúlveda (2006).

[5] Farzin and Kort (2000) find that uncertainty over the magnitude and timing of an increase in environmental taxation has an ambiguous effect on firm investment in abatement capital. They find that a longer period of uncertainty over the timing of the implementation of the new tax leads to a negative influence on firms' abatement investment, but that the technology investment increases as the size of the anticipated new tax rises. Gray and Shadbegian (1998) report that firms in U.S. states with strict environmental regulations are less likely to invest in more polluting technologies. Requate and Unold (2003) study the implications of various environmental policy instruments for the incentive to invest in advanced abatement technology, and Greaker (2006) explores the role of upstream markets for innovation of pollution abatement techniques.

[6] While the logic is for simplicity illustrated using a monopoly model, the prediction holds for any imperfectly competitive market structure as long as the firms are able to organize joint political action.

[7] Damania (2001) contains no empirical work. Congleton (1996) contains several empirical contributions to the political economy of environmental policy and Cropper et al. (1992) study policymaking by the U.S. EPA.

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