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# A look upstream: Market restructuring, risk, procurement contracts and efficiency<sup>☆</sup>



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### ABSTRACT

We study how market deregulation affects the upstream industry both theoretically and empirically. Our theory predicts that firms respond to increases in uncertainty due to deregulation by writing more rigid contracts with their suppliers. Using the restructuring of the U.S. electricity market as our case study, we find support for our theoretical predictions. Our findings imply a greater emphasis on efficiency at coal mines contracting with restructured plants. The evidence suggests a 17% improvement in productivity at these mines, relative to those contracting with regulated plants. We find, on the other hand, that transaction costs may have increased. We

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conclude that deregulation has significant impacts upstream from deregulated markets.

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## 1. Introduction

Attempts to liberalize previously regulated natural monopolies such as telecommunications, rail and air transportation, water provision, and energy generation and distribution have been commonplace in OECD countries since at least the late 1970s. A large literature has emerged that assesses the effects of deregulation (Olley and Pakes, 1996; Ng and Seabright, 2001; Syverson, 2004; Davis and Kilian, 2011, among others). Most contributions to date, however, have taken a rather narrow view of the issues and discussed the consequences of the policy exclusively from the point of view of firms operating directly in the deregulated market. Such analyses, while informative, provide at best a partial picture of the overall consequences of deregulation, as they neglect its impacts on the supply chain upstream from the deregulated market. This omission is certainly relevant from a theoretical standpoint, as the aim of the policy is to eliminate all types of inefficiencies and transfer the associated rents to the final consumers. It is, however, also likely to be empirically significant in situations where input costs represent a large share of the total costs of production.

In this paper, we take a first step into investigating the consequences of deregulation upwards along the supply chain. This endeavor yields novel theoretical insights into the consequences of deregulation, and allows the identification of empirically relevant channels through which the policy affects efficiency. Our analysis is cast in terms of the restructuring of the U.S. electricity market, which has received special attention in the past due to a combination of political salience and data availability (e.g. Borenstein et al., 2002; Fabrizio et al., 2007; Davis and Wolfram, 2012; Cicala, 2015) and is an industry where input costs are significant.<sup>1</sup>

We develop a theoretical model to analyze how deregulation impacts coal procurement contracts signed between electricity generators and coal mines. An established literature identifies the key dimensions along which long-term contracts are negotiated in the price adjustment mechanism and the length of the contract (e.g., Joskow, 1987; 1988). Accordingly, our model captures the negotiation between the parties in terms of the rigidity of the price setting mechanism and the duration of the contract, and focuses on the changes in the degree of risk faced by generators following the electricity market restructuring. The key insight we derive is that one would expect to observe more rigid (e.g.,

<sup>1</sup> For the large coal-fired electricity generators at the center of our analysis, fuel costs contribute over 80% to total variable costs (Cicala, 2015).

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