

# Abstract

Title of Dissertation: The Economics of Nuclear Power

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We extend economic analysis of the nuclear power industry by developing and employing three tools. They are 1) compilation and unification of operating and accounting data sets for plants and sites, 2) an abstract industry model with major economic agents and features, and 3) a model of nuclear power plant operators.

We build a matched data set to combine dissimilar but mutually dependant bodies of information. We match detailed information on the activities and conditions of individual plants to slightly more aggregated financial data. Others have exploited the data separately, but we extend the sets and pool available data sets. The data reveal dramatic changes in the industry over the past thirty years. The 1980s proved unprofitable for the industry. This is evident both in the cost data and in the operator activity data. Productivity then improved dramatically while cost growth stabilized to the point of industry profitability. Relative electricity prices may be rising after nearly two decades of decline. Such

demand side trends, together with supply side improvements, suggest a healthy industry.

Our microeconomic model of nuclear power plant operators employs a forward-looking component to capture the information set available to decision makers and to model the decision-making process. Our model includes features often overlooked elsewhere, including electricity price equations and liability. Failure to account for changes in electricity price trends perhaps misled earlier scholars, and they attributed to other causes the effects on profits of changing price structures. The model includes potential losses resulting from catastrophic nuclear accidents. Applications include historical simulations and forecasts.

Nuclear power involves risk, and accident costs are borne both by plant owners and the public. Authorities regulate the industry and balance conflicting desires for economic gain and safety. We construct an extensible model with regulators, plant operators, insurance companies, and consumers. The model possesses key attributes of the industry seldom found in combination elsewhere. We then add additional details to make the model truer to reality. The work extends and corrects existing literature on the definition, effects, and magnitudes of implicit subsidies resulting from liability limits.