

THE VALUE OF LONG-TERM CONTRACTS IN FINANCING NEW GENERATION CAPACITY

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Overview

As electricity markets are restructured to encourage greater competition in generation, regulatory authorities have generally sought to reduce the use of long-term contracts for power and, in fact, have often proscribed contracts lasting longer than a couple of years. However, long-term contracts may be essential for certain types of technologies. We develop a model in which two technologies are available to generate power: one is lower cost but has a longer time-to-build, while the other is higher cost but can be brought on-line quickly. The lower cost technology can be thought of as nuclear power, while the higher cost technology. The two compete in a market where demand grows stochastically. The key decision is when to install new capacity of either technology. We show that restricting the market to spot sales biases the equilibrium capacity investment decisions away from nuclear towards gas – away from the long time-to-build technology. Allowing long-term contracts increases the investment in nuclear and lowers the average delivered price of power as well as total welfare.

Methods

The model nests a dynamic investment game between competitive suppliers of power using two different technologies into a market where demand grows stochastically.

Results

We first derive the equilibrium investment strategy for a competitive market with only one technology – whether the long time-to-build or the short time-to-build technology. We show how the equilibriums for the two technologies differ in terms of the risk profile of the wholesale power price and the satisfaction of consumer demand. We then derive the equilibrium for the two-technology problem. We derive how introduction of the second technology alters the risk profile and the satisfaction of consumer demand. Finally, we analyze the effect of long-term contracting on the equilibrium investment decision.

Conclusions

Restricting the market to spot sales biases the equilibrium capacity investment decisions away from nuclear towards gas – away from the long time-to-build technology. Allowing long-term contracts increases the investment in nuclear and lowers the average delivered price of power as well as total welfare.

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