

THE ECONOMICS OF A REGULATED NATURAL GAS PIPELINE PROJECT IN A DEVELOPING ECONOMY

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Overview

Inspired by the recent development in Mozambique, this paper examines the economics of a natural gas pipeline project in a developing country. We consider a simple point-to-point infrastructure that is provided by a private company that is subject to a traditional rate-of-return regulation. It is envisioned that the installation of the infrastructure could unlock a growing demand for natural gas but the firm is presumed to be myopic and reluctant to build ahead of proven demand.

In this paper, we first characterize analytically the technology and the cost function of a natural gas pipeline system. We then use this information to assess the magnitude of the overcapitalization effect (the so-called Averch-Johnson effect) generated by the application of rate-of-return regulation in that industry. Lastly, the paper examines the determination of a socially optimal rate of return in that industry.

Methods

A theoretical analysis based on microeconomics.

Results

First, we prove that the technology of a natural gas pipeline can be approximated by a Cobb-Douglas production. This analysis confirms the presence of increasing returns to scale and confirms the natural monopolistic nature of that industry.

Second, we analytically characterize the behavior of a monopolistic pipeline operator that is subject to rate of return regulation. The results document the magnitude of the Averch-Johnson effect and its impacts on output, overcapitalization levels, production costs, and net social welfare.

Third, we model the relations between a welfare-maximizing regulatory agency that decides an allowed rate of return for that activity, and the profit-maximizing firm that designs and operates the infrastructure. We clarify the conditions for the existence of a solution to that problem and discuss the policy implications.

Lastly, the paper considers investment timing considerations: we allow for the possibility to observe ex post a demand larger than the one used at the planning stage. We analytically characterize the ex post behavior of the regulated firm and how its output is modified compared to the output that was expected ex ante.

Conclusions

This paper reveals that it can be socially optimal to set an allowed rate of return larger than the market price of capital in that industry. Moreover, the paper suggests that it is possible to strategically set ex ante the allowed rate of return so that the generated overcapitalization is aligned with the capital required to achieve ex post cost efficiency (and limited social welfare losses) which has important implications for the development of pipeline infrastructures in developing economies.

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