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## **SOME EVIDENCE ON THE OPERATIONAL EFFICIENCY OF NATIONAL OIL COMPANIES**

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### **Overview**

According to the *International Energy Annual* produced by the Energy Information Administration (EIA), National Oil Companies (NOCs), or those companies with majority government ownership, produced around 66% of annual world oil output from 1994 to 2004. The NOC share of output fell from around 55% in the early 1980s to slightly less than 50% in the mid-1980s, but rose again above 60% by 1991. Perhaps more significantly, the EIA notes that the NOC share of proved crude oil reserves (excluding unconventional reserves from the Athabasca tar sands in Western Canada) was around 90% for each year from 1991 to 2006. Even if the Canadian tar sands are included, the NOC share of proven reserves in 2006 is still around 76%. International Oil Companies (IOCs) thus are finding it increasingly difficult to get access to large prospective oil resources, making it likely that the role of NOCs in the world oil market is likely to increase in future years. Thus, it is important to understand how well NOCs perform relative to their privately owned counterparts.

At the IAEE Conference in Potsdam in 2006 we presented a theoretical paper titled "A Model of the Operation and Development of a National Oil Company." The present paper is a follow-up empirical study that examines some of the predictions of our theoretical analysis. The paper briefly outlines the theoretical model in sufficient detail to motivate the empirical analysis. The major part of the paper, however, involves a statistical analysis of the operating performance of NOCs relative to privately owned and partially privatized competitors.

### **Methods**

The analysis focuses on a panel of 80 firms over a period of three years (from 2002-2004). The data includes revenue, net income, reserves of natural gas and crude oil, employment, production of natural gas and crude oil and crude oil products, and the share of government ownership. We use both non-parametric Data Envelopment Analysis and a parametric Stochastic Frontier Approach to examine the relative operating efficiencies of the different firms in the sample. The theoretical model is used to provide a framework for the selection of variables to include in both of the empirical analyses.

### **Results and conclusions**

Preliminary results appear to be consistent with the predictions of the theoretical model – the positions of NOCs and IOCs relative to the frontier can be explained in large part by factors that differentiate their respective objective functions. In particular, subsidized domestic prices, employment used for political ends, and/or inactivity outside own country borders are all factors that tend to move firms away from the frontier. The results also suggest some new avenues of research on the operation of NOCs.