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Petroleum Exploration, Debt and Firm Financing: Evidence from Norway

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Exploratory well-bore drilling is fundamental to future oil and gas supplies. It is also a highly financially risky investment. While a large literature exists estimating the relationship between oil prices and drilling activity, the mechanism behind this relationship clearly relates to decision making at the firm level and in turn the financial state of individual firms. However, there has been considerably less attention to establishing the connection between the financial state of firms and the effect on exploratory drilling.

The relationship between the financial situation of oil and gas firms and drilling has taken on a particular importance with the growing concern over climate change and the financial and political risks that oil firms face from potential technological innovations and political and regulatory actions. Recently, several prominent investment and pension funds have announced divestments in petroleum firms, including the Norwegian State Oil Fund, Blackrock, and the Canadian Pension Fund.

Exploratory well-boring in off-shore fields is of particular importance since offshore finds often represents the marginal oil and gas supplies. Global changes in demand induced by either technological change or political actions will be first and foremost felt by high-cost off-shore actors.

The reduced form observation that a change in oil prices affects drilling has a priori two underlying mechanisms. The first is that a lower oil price carries information that lowers the expectation for future oil prices. Exploratory drilling will only lead to increased production with a substantial lag, in the case of off-shore drilling, usually on the scale of several years. Thus the current oil price has little direct impact on the expected profitability of drilling, other than through the information the oil price conveys about future prices.

While the expectations theory of prices is the main mechanism cited for the relationship between prices and drilling, a related but distinct reason exists. Drilling is a capital intensive and highly risky activity. Firms without large balance sheets can be expected to be reliant on outside financing in order to be able to drill. If a fall in oil prices interrupts firm financing, then oil firms may need to reduce their drilling because of the financing constraint.

A practical impediment to understanding how the financial state of firms affects exploratory well boring is a lack of data on both detailed well boring as well as the financial situation of private firms. In this article, I combine detailed data from Norway, western Europe's largest oil and gas producer, that combined detailed data on drilling on the Norwegian Continental Shelf with financial register data on the firms responsible for the drilling, including non-listed privately held firms.

Off-shore drilling tends to be a highly structured and regulated activity, and if anything this is even more so on the Norwegian Continental Shelf. In the following section I present a brief description of the structure of the industry on the continental shelf. In section III I present the data and descriptive results. In section IV I present a general Poisson model of drilling activity and relate it to the oil price. In section V I extend the model with some modifications and include firm-level financial variables.

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Petroleum exploration, poisson model, financing

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