

LEVERAGE AND THE OIL INDUSTRY – ANALYSIS ON THE FIRM AND PRODUCTION LEVEL

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Overview

This paper analyzes the relationship between leverage and the production decision of companies active in the exploration and production of oil and gas in the United States. Over the last couple of years, the development and application of innovative extraction methods, like hydraulic fracturing and horizontal drilling, led to a considerable increase in U.S. oil production. In connection with these technological changes, Domanski et al. (2015) identify another important economic development in the oil industry: largely debt-driven investments in the oil sector. The extensive use of debt was fostered by the macroeconomic environment of low interest rates and investors looking for yield in the aftermath of the financial crisis, which was mainly driven by the risk-taking channel. Additionally, the rising prices in the commodities markets until mid 2014 led to higher asset valuation and thus to higher return expectations fueling a virtuous circle. This increased investment activity, especially in the U.S., raised the production capacity and as a consequence contributed to a higher production of oil and natural gas. This trend continued in spite of the oil price decline in 2014, whereas the oil price slump in 2008 led to a reduction in oil production, which seems to be the more plausible reaction.

The aim of this paper can be split into two research questions. The first research question is whether leverage affects production decisions of companies active in the exploration and production of oil and natural gas. The second research question then is, if the technological changes in the industry and the increased indebtedness of U.S. oil companies led to a markedly different reaction in their production decision in 2014 compared to the similar price decline in 2008. A potential reason for the absence or delay in cutting back production after the price drop in 2014 could be supposedly higher leverage prior to the price decline. These questions are addressed using a novel data set combining financial data on publicly listed firms and their production data on well level. Using quarterly data for over 300 companies from 2000 to 2016 it is then possible to disentangle the different financial conditions affecting the production decision. As the data covers both oil price drops, it allows for comparing firm behavior in the aftermath of both events. Additionally, the data set also includes the companies' production of natural gas and since the price trajectory of natural gas after the price decline in 2008 was markedly different than the trajectory of crude oil, it is possible to see how the producers adjusted their output to a significantly changed relative price of their main outputs.

Another advantage of this novel dataset is the use of detailed well level data that allows for studying the production decisions in great detail. It offers the opportunity to analyze companies' behavior with regard to the location and the characteristics of the oil well to get a better understanding of the economic fundamentals behind the decisions. It thus expands previous research, e.g. Lehn and Zhu (2016), by (i) using a more detailed data set and (ii) applying a different, more suitable empirical methodology, namely a dynamic panel data model proposed by Love and Zicchino (2006).

Methods

Descriptive Statistics

Dynamic Panel Data Model

Results

First, the novel data set is presented and analyzed in great detail and the dynamic panel data model used for the empirical analyses is presented. Second, the results of the empirical analysis show that leverage has an impact on production decisions of oil companies.

Third, the analysis shows that, controlling for other relevant determinants, indebtedness is a main explanation for the U.S. companies' decision not to cut back production after the oil price slump in 2014.

Conclusions

The empirical analysis shows that leverage of oil companies has a decisive impact on their production decisions. Relatively cheap debt financing in the aftermath of the financial crisis fueled high investments in production capacity, i.e. the development of oil wells. The increased indebtedness of these firms then induced a relatively high oil production in spite of falling prices. An explanation might be that, in spite of the reduced profitability of oil sales, the oil companies required a certain amount of sales revenues as cash flows to cover the relatively high debt repayments.

References

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