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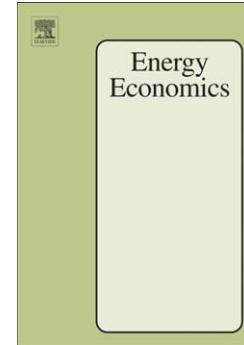
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Higher Moment Risk Premiums for the Crude Oil Market: A Downside and Upside Conditional Decomposition

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Abstract

Relying on options written on the USO, an exchange traded fund tracking the daily price changes of the WTI light sweet crude oil, we extract variance and skew risk premiums in a model-free way. We further decompose these risk premiums into downside and upside conditional components and show that they can be partially explained by USO excess returns and, more importantly, these decomposed risk premiums enable a much better prediction of USO excess returns than the standard, or undecomposed, variance and skew risk premiums. A comparison with existing results for the equity index option market further confirms the usefulness of the decomposition for the crude oil market.

Keywords: Crude oil market, Variance risk premium, Skew risk premium, Conditional risk premiums, Forecasting
G11, G12, G13

1. Introduction

Energy commodities have become a major part of financial markets as a result of the rapid growth in trading volume and the variety of derivative products, among which the crude oil futures and options have taken a significant proportion. Specifically, the trading volume of crude oil futures and options accounts for over 50% of the total trading volume of energy contracts on the NYMEX in 2015. As for the equity (index) option market, the commodity option market enables the study of variance risk premium, that is, the premium asked by market participants to invest/trade volatility risk. For the extensive literature on variance risk premium we refer, without being exhaustive, to [2], [7], [22], [9] and [19]. Beyond variance risk premium, skew risk premium has recently attracted a strong interest among academics. In [14], see also the important and related work of [16], the authors found that skew risk premium naturally completes variance risk premium for the equity index option market.

The fact that financial markets react differently to positive and negative shocks has been widely acknowledged in previous literature. Consequently, semivariance measures, considered in [3] or [18], were found to carry more information than unconditional measures. For the specific case of crude oil market and the relevance of semivariance measures see [8] or [20]. Following that line of research it is therefore natural to assess whether tail risk premium or conditional variance risk premium carries more information than standard (i.e. unconditional) variance risk premium. In [5], [15] and [13], it was confirmed that the conditional variance

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