**Referee report**

**Paper:** *Differences in the intraday return-volume relationship of spots and futures : A quantile regression approach*

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### (i) Summary of the paper

In this paper, the authors study the intraday relationship between asset returns and trading volumes in the market index KOSPI 200 spot and index futures markets, which is highly liquid and with active investor participation. Previous literature have endorsed the relationship between trading volumes and volatility, rather than the level of returns. They employ the quantile regression method (QRM), which is an extended version of OLS to address the relationship between trading volumes and the distribution of returns. QRM is used with a variable with heterogeneous distributions. The dataset, which goes from the 3$^{rd}$ of January 2005 until 30$^{th}$ of June 2014, consists of five-minutes observations of the KOSPI 200 index, trading volumes of KOSPI200 futures, and the implied volatilities constructed from the KOSPI 200 options prices.

They run a set of quantile regressions, which are composed by four main variables: (i) the dependent variable, r, is the percentage return of the KOSPI 200 spot index over each five-minute period; (ii) as independent variable, the natural logarithms of the KOSPI 200 spot trading volumes indicated by *lsv*; (iii) as independent variable, the natural logarithms of the KOSPI 200 futures trading volumes indicated by *lfv*; (iv) *div* which measures the first difference of the implied volatility of KOSPI 200 index options. The main results show that the distribution of returns widens following active trading in the spot market. Moreover, the findings indicate a positive relationship between the return volatility and futures transactions. They find that the duration of the return-volume relationship differs for spot and futures trading. Indeed, the positive effect of the spot volume on the return volatility may disappear within five minutes since the relationship between return and volumes in the spot market can be attributable to disagreement

rather than market information. On the contrary, the positive relationship between futures trading volumes and the magnitude of stock index movements persist over time.


**(ii) Is the contribution of the paper potentially significant?**

Other empirical papers study the contemporaneous return-volume relationship, the return variance – volume relationship and the dynamic aspects of the return-volume relationship.

The contributions of this paper consist in:
- Intraday analysis of the relationship between asset returns and trading volumes;
- Focus on Korean financial market;
- Compare the differences in the relationship return-volume between two markets: KOSPI 200 spot and index futures market;
- Use of quantile regression method (QRM) to examine the relationship between trading volumes and the distribution (e.g. the quantiles) of returns.

The research question was already explored in previous literature, therefore the novelty of the paper consists in the dataset and the comparison between two markets. Indeed, it helps to understand the Korean financial markets and it explains the differences between spot and futures markets. The results are in line with previous studies of return-volume relationship.


**(iii) Is the analysis correct?**

They use the quantile regression method (QRM) to examine the relationship between trading volumes and the distribution (e.g. the quantiles) of returns rather than conditional mean of returns. It is an appropriate methodology to study variables with heterogeneous distributions and when the relationship among variables is asymmetric.

The empirical analysis is well explained and documented. They separate the analysis in two main blocks: return-volume relationship and impact on implied volatility.

The results are in line with previous studies of return-volume relationship and provide meaningful implications.