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Testing for asymmetric causality between U.S. equity returns and commodity futures returns

Duc Khuong Nguyen [a,*], Ricardo M. Sousa [b,c], Gazi Salah Uddin [d]

[a] IPAG Business School, France
[b] University of Minho, Portugal
[c] London School of Economics and Political Science, LSE Alumni Association, United Kingdom
[d] Linköping University, Sweden

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ABSTRACT

This paper examines the causal relationships between the U.S. equity returns and the returns of energy, metal and agricultural commodity futures. Using an analytical framework that accounts for seasonal effects on commodity returns, we find that asymmetry plays an important role in these two-way around relationships. This asymmetry seems to be more relevant since 2000 than in the nineties, and the asymmetric linkages are observed both when returns are measured in nominal and real terms.

1. Introduction

Commodities are a crucial economic and political factor. Given the world's dependence on commodities, the fluctuations in their prices, in particular oil prices, have important effects on the performance of the national and global economies (Hamilton, 2003) and are largely used as predictors of economic downturns (Hamilton, 2011). On the other hand, changes in equity market are likely to affect commodity investors' confidence and expectations and, therefore, the behavior of commodity futures markets.

* Corresponding author at: 184 Boulevard Saint-Germain, 75006 Paris, France. Tel.: +33 (0)1 53 63 36 00; fax: +33 (0)1 45 44 40 46.
E-mail addresses: duc.nguyen@ipag.fr (D.K. Nguyen), rjsousa@alumni.lse.ac.uk, rjsousa@eeg.uminho.pt (R.M. Sousa), gazi.salah.uddin@liu.se (G.S. Uddin).

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Investigating the relationship between the equity market and the commodity sector is thus a key issue. There is now some evidence to suggest that movements in the price of crude oil interact with stock returns and economic growth in a nonlinear manner, but the results depend on economic sectors and the oil-dependence profile of the countries under consideration (Jones and Kaul, 1996; Kilian and Park, 2009; Aloui et al., 2012). Kilian and Park (2009) also note that the response of equity prices to oil price shocks depends on the nature of the shocks. In a related study, Conlon et al. (2014) document that the risk aversion of fund managers has a relevant effect on optimal commodity futures hedging strategies and performance.

A few works have put forward some theoretical arguments to contest such feature of the data. For instance, Gorton and Rouwenhorst (2006) show that, despite the fact that the risk premia on commodity futures and equities are broadly the same, the returns of the two assets are negatively correlated partially because of their different dynamics over the business cycle. The authors also highlight the positive correlation with inflation as one of the potential benefits from the investment in commodities. Gorton et al. (2013) uncover a significant relationship between price-based signals (i.e. the prior futures excess returns and the prior spot price changes and volatility) and both inventories and risk premium. Other studies find that shocks to oil supply (unexpected demand) have a positive (negative) impact on stock market returns, and that a constrained oil supply raises the risk of oil shocks and also dampens other growth risks (Ready, 2013a,b).

Our study contributes to the abovementioned literature in several dimensions. First, we look at the two-way causality between the U.S. equity market and a wide range of commodity futures, while controlling for seasonality in the commodity sector. In this regard, the results of our study are not only helpful for commodity futures market participants to make asset allocation/investment decisions related to their commodity holding, but also for stock investors to design optimal portfolios and hedging strategies in the presence of commodity futures. For example, if a fall in equity returns causes a positive change in commodity futures returns, stock investors should hold more commodities during equity market declines. Second, our empirical framework takes into account the potential asymmetry by means of asymmetric causality tests, thus, separating the potential impact of positive and negative shocks of equity (commodity futures) returns.[1] Moreover, the existence of asymmetric information as well as their different sensitivity to business cycle and market conditions may accentuate the asymmetric relationship between equity returns and commodity futures returns. Third, we use commodity futures and equity returns in both nominal and real terms in order to evaluate the importance of inflation in explaining such nonlinearity. Finally, we investigate asymmetry at different sub-samples in order to account for the fact that the commodity futures have been used in substantially different ways in the course of time.

A number of studies have been devoted to assessing the dynamic relationship between commodity prices and stock returns, but have largely focused on oil prices (Kaul and Seyhun, 1990; Jones and Kaul, 1996; Huang et al., 1996; Park and Ratti, 2008; Arouri et al., 2011). Other works recognize the importance of nonlinearity in the relationship between the oil price and the stock markets around the world (Ciner, 2001; Chiou and Lee, 2009; Aboura and Chevallier, 2013). The large capital inflows from financial traders into commodity-related financial products have been suggesting an increase in the behavior of commodities as an asset class. Moreover, they seem to have impacted on commodity markets via the risk sharing channel and the process of information discovery (Cheng and Xiong, 2013). Yet, there is still no clear-cut answer to whether the increased co-movement among commodities and equities is due to financialisation or not (Fattouh et al., 2012; Kilian, 2012). Perhaps, most importantly, the apparent lack of relationship between stock returns and commodity prices (such as oil prices) seems to be due to an aggregation bias that masks the nonlinear dynamics of the relationship. Our study provides some light into this question.

The rest of the article is organized as follows. Section 2 describes the data. Section 3 presents the econometric frameworks and discusses the empirical results. Section 4 concludes.

[1] This potential of asymmetry can mainly arise from the difference in the reaction of commodity returns to changes in equity returns (and vice versa) during different equity market regimes (low and high volatility) and the asymmetric dependence between equity and commodity markets. For instance, investors tend to react more to negative news than to positive news of the same magnitude (Nelson, 1991; Kothari et al., 2009). Several studies have also shown that the cross-market dependence is higher during bear periods than during boom periods (Longin and Solnik, 2001; Hong and Zhou, 2006; Aloui et al., 2011).