North American Journal of Economics and Finance 37 (2016) 63–83

Contents lists available at ScienceDirect

North American Journal of Economics and Finance

journal homepage: www.elsevier.com/locate/ecofin

Volatility transmission across currencies and commodities with US uncertainty measures

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ARTICLE INFO

Article history:
Received 23 November 2014
Received in revised form 23 January 2016
Accepted 27 January 2016
Available online 17 March 2016

Keywords:
Markov switching
Commodities
FX
US uncertainty measures
Volatility transmission

ABSTRACT

This paper uses the Multi-chain Markov Switching model (MCMS) conditioned on US uncertainty measures (VIX, VIX-oil and FSI) to examine the patterns of volatility transmission across the resource, major and safe haven currencies The results with and without the uncertainty variables generally identify three patterns of volatility transmission: interdependence, spillover and comovement. They reveal the dominance of interdependence over spillovers and comovements when the uncertainty variables are excluded, highlighting the significance of mutual reciprocity of individual market shocks over common shocks across the selected assets. Within portfolios of a two-variable framework (two variables representing two minimum variance portfolios (à la Markowitz), containing a weighted combination of the currencies and of the commodities, respectively), we find interdependence between the two portfolios with and without the VIX, a spillover from commodities to currencies in the case when the FSI is included and independence between the two portfolios in the case when the oil-VIX is accounted for. The implications of the results are important for the portfolio managers in selecting portfolios' components during high oil volatility periods.

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http://dx.doi.org/10.1016/j.najef.2016.01.005
1062-9408/

1. Introduction

The world financial markets have been unstable over the recent periods, following the onset of the 2007 subprime crisis in the United States, the 2008–2009 global financial crises (GFC) and the 2010–2011 Eurozone debt crises. The importance of volatility transmission mechanisms stems from the fact that they provide insights into asset pricing, risk management, portfolio diversification, and market microstructure issues. For instance, Ross (1976) demonstrates that under the condition of no arbitrage, return volatility is directly related to the rate of information flows. A logical extension to this argument is that interdependence among markets may be viewed in the context of volatility linkages and information flows (including macroeconomic news in an environment of uncertainties). Moreover, the mechanisms of volatility transmission are related to the possibility that abrupt changes in the volatility level of a certain market can lead to changes in the volatility level of related markets. This fact is consistent with the presence of regimes in the time series of volatility corresponding to high and low levels of volatility.

The questions we ask in this study are as follows. Are volatilities of resource and major currencies and relevant commodities linked? If so, what is the nature of the volatility transmission across these various related markets? Do tranquil and turmoil regimes in one market have disproportionate influences on the related markets? And finally, do the US uncertainty measures matter when it comes to the transmission patterns between important currencies and commodities? Answering these questions is relevant to investors and decision makers, and should also help portfolio managers construct their portfolios under different volatility regimes.

Although there have been several recent studies that deal with volatility transmission across financial markets (e.g., Choi & Hammoudeh, 2010; Hammoudeh & Yuan, 2008; Hammoudeh, Sari, & Ewing, 2009; Hammoudeh, Yuan, McAleer, & Thompson, 2010), to the best of our knowledge, there is a paucity in the literature pertaining to the examination of the selected asset classes within a framework that simultaneously contains important uncertainty measures (U.S. volatility VIX, financial stress (FSI), economic policy uncertainty index (PUI) and equity uncertainty index (EUI)) in a regime-changing environment that is able to ascertain the specific pattern of volatility transmission mechanism.

The asset classes include eleven assets (seven major commodities and four major currencies). The commodities include aluminum, copper, gold, oil, platinum, palladium and silver. The currencies include the Australian dollar, the Canadian dollar, euro and Swiss franc. All are expressed in U.S. dollar terms. The selected commodities are widely traded and have populated international trade and generated international capital flows. The patterns of volatility transmission have influenced the world's major currencies, which in turn affected those commodities and vice versa. Therefore, it is valuable to study the nature of volatility between these asset classes to understand the three patterns of transmissions (e.g., spillover, interdependence and comovement) between them. Volatility spillover is defined as a situation in which a switch in the regime of a dominating asset market precedes or leads to a change in the regime of the dominated market (Khalifa, Hammoudeh, & Otranto, 2014). In contrast, in the case of interdependence, it is not possible to distinguish between dominating and dominated markets: a switch in the regime of the first market leads to a change in the regime of the second market, but also a switch in the regime of the second market can cause a switch in the regime of the first market. The volatility comovement, on the other hand, is a contemporaneous change in regimes across markets due to common shocks. It is important to note that the spillover, interdependence and comovement relationships refer to the full time interval analyzed and not to single periods. For example, if at a certain date a variable seems to have a spillover effect on another variable, the first variable cannot be classified as a dominant asset if this behavior is not regularly repeated in the full data period. We examine those patterns in an environment that is wrapped by different measures of uncertainty to account for increases in risk and stress in the wake of the U.S. subprime crisis, the recent global financial crisis and the Eurozone debt crisis. Understanding the transmission patterns should also help trace the interplays between these asset classes and infer their implications for inflation, interest rates and currency appreciation and devaluation, issues that are high on the radars of monetary authorities and commodity and forex traders.

We also fill the gap in the literature by distinguishing between the different types of linkages of volatility across different regimes of a wide range of FX and commodity markets. Moreover, the