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Volatility transmission from commodity markets to sovereign CDS spreads in emerging and frontier countries

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ABSTRACT

We investigate the volatility transmission from commodities to sovereign credit defaults swaps (CDS) spreads of emerging and frontier markets. Using daily data for seventeen emerging and six frontier countries, we document a significant volatility spillover from commodity markets to sovereign CDS spreads of emerging and frontier markets. We find that this effect is strong for most of the countries in our sample, but the results differ by country and over time. We also examine whether particular commodity sectors are the main driver of the transmission of volatility and our results show a stronger effect of energy and precious metals volatility.

1. Introduction

A large number of developing countries are dependent on commodities as a source of export revenues. According to a United Nations Development Program report, highly volatile commodity prices lead to macroeconomic instabilities, volatility in export earnings, foreign exchange reserves and economic growth in developing countries (UNDP, 2011). The higher the degree of commodity dependence, the more susceptible the country is to commodity price shocks (UNDP, 2011). Furthermore, the more volatile the macroeconomic fundamentals of a country are, the higher the likelihood of extreme deterioration of fundamentals that can lead to sovereign debt default, particularly for countries generating export revenues in dollars and having payments on external dollar-denominated debt (Hilscher & Nosbusch, 2010). This increased credit risk is reflected in the spreads of government bonds and the annual cost of protection for possible losses incurred on government debt.

Sliding oil prices and commodity prices in general since 2014 have resulted in multiple articles in the financial media relating changes in commodity prices to fluctuations in sovereign credit default swap premia. Liau and Karunungan (2016) report in a Bloomberg article that "the recent tightening of Malaysia's CDS spread is mainly due to the rebound in oil prices from the trough in January." Similar stories could be found about Russia, Saudi Arabia, Brazil, South Africa and other major commodity exporters. Sovereign credit default swaps (CDS) have received additional attention in the media also due to the ongoing European sovereign debt crisis, where the CDS speculative nature and potential to exacerbate credit market turmoil, as well as possibly affect borrowing costs, have been the focal point. Sovereign risk is an important consideration for investors looking for direct or portfolio investment in emerging markets, and the sovereign CDS market has been used as a market-based reference for sovereign credit risk.

Sovereign CDS are bilateral contracts between a buyer and a seller where the seller is offering protection against credit event by a sovereign borrower. The buyer pays a premium to the protection seller in exchange for compensation in case of a credit event. The CDS premium is quoted as a fraction of the notional value of the reference obligation (in basis points). The failure of a sovereign borrower to meet debt obligations is known as a credit event. Qualifying credit events include failure of the sovereign borrower to pay principal or interest payments, restructuring or moratorium. While the overall CDS market has peaked from $58 trillion in 2008 to $27 trillion in 2012, Augustin (2014) reports that sovereign CDS have a notional value of $2.99 trillion USD in 2012, which accounts for about 11% of the over-the-counter credit derivatives market. As credit derivatives have been in the spotlight during the 2008 global financial crisis and the European debt crisis, the academic literature on sovereign CDS is growing. A number of papers investigating the dynamics and determinants of sovereign CDS spreads show that

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sovereign spreads are driven not only by country-specific fundamentals, but also by global financial market variables.

However, what has received little attention so far are questions in relation to the volatility transmission from commodities to sovereign CDS. In this paper, we therefore investigate the transmission of volatility between asset markets, and specifically, between commodity and credit markets. In particular, we are interested in the following questions. Is there a significant volatility spillover from commodity markets to emerging and frontier credit risk markets, where we measure sovereign credit risk using sovereign credit default swap spreads? Do the spillover effects differ among countries and over time? More importantly, does the transmission of volatility differ by commodity sector, i.e. energy, industrial metal, precious metals, etc.? Addressing those questions is important to indicate which countries, in terms of credit risk, are most (least) vulnerable to commodity price volatility. It also helps understand better whether this vulnerability depends on the country's heterogeneity in terms of the contribution of its commodity-related exports. Methodologically, we model the conditional mean and variance using an AR-GARCH specification and employ the Lagrange Multiplier (LM) methodology presented by Hafner and Herwartz (2006) to test for causality in variance.

Our findings can be summarized as follows. We find that the volatility of sovereign CDS spreads of emerging and frontier markets is affected by commodity prices and this effect is strong for most of the countries in our sample. The results differ by country, i.e. 10 out of 17 emerging market CDS are affected by commodity price volatility and four out of six frontier markets experience a significant volatility spillover. The volatility spillover effect is similar when an equally-weighted commodity index is used. When commodity sector indices are used, energy and precious metals appear as large contributors to sovereign spreads volatility across most countries in our sample. Our results add to the literature on sovereign credit risk and economic fundamentals and have implications for policy makers concerned with the stability of financial markets and costs of insuring emerging market debt. They are also useful in assessing the contribution of the commodity-specific risk in the overall country risk and the resulting implications for asset pricing and risk management.

The rest of our paper is organized as follows. Section 2 provides a brief survey of the relevant literature. Section 3 discusses the econometric framework, while Section 4 describes the data. The main results are reported in Section 5. Section 6 offers concluding remarks.

2. Literature review

While the literature on the determinants of emerging markets sovereign bond yield spreads is growing, studies focusing specifically on the effects of commodity prices on sovereign debt are scarce. Hilscher and Nosbusch (2010) create a country-specific commodity price index and study the effect of global and country-specific factors on sovereign bond yield spreads of 31 emerging markets. The authors find that countries exporting commodities with more volatile prices could also experience larger swings in the terms of trade and as a result are more vulnerable to outside shocks (Hilscher & Nosbusch, 2010). Sun, Tenengauzer, Bastani, and Rezania (2011) investigate the factors driving emerging markets spreads and also include a commodity index along with macroeconomic factors in their models. They show that commodity price increases are associated with lower sovereign spreads. A recent paper by Arezki and Bruckner (2010) studies how changes in international commodity prices affect foreign currency revenues of emerging market countries and how this ultimately affects the sovereign bond spreads of these countries. While they show that, on average, sovereign bond spreads decrease when export-related commodity prices increase, the result depends on the stage of democratic development. For instance, higher commodity prices result in lower spreads in democracies, while in autocratic regimes spreads increase. Their analysis adds to the resource curse literature, which argues that natural resource abundant economies tend to underperform economies without substantial resources and the strength of this effect depends on the quality of political institutions (Mehlum, Moene, & Torvik, 2006).

Few other studies include the impact of oil prices while modeling sovereign spreads (Duffie, Pedersen, & Singleton, 2003; Alexandre & de Benoist, 2010; Hooper, 2015). More notably, Alexandre and de Benoist (2010) investigate the effect of oil prices on emerging country bond risk premiums and show that the effect of oil price fluctuation depends on the status of a country as an oil exporter or importer. The largest effect of oil prices on sovereign spreads were found for Russian, Argentinian, and Venezuelan spreads. Another study on the impact of oil price uncertainty on CDS returns is by Sharma and Thuraisamy (2013) and they include eight Asian countries in their sample. The authors show that oil price uncertainty predicts out-of-sample CDS returns for six countries under study, namely Indonesia, Japan, Malaysia, the Philippines, South Korea and Vietnam. Hooper (2015) focuses on the link between oil and gas reserves and sovereign spreads. Using annual panel data from 1994 to 2014 for 10 emerging oil-exporting countries, Hooper measures the impact of oil and gas reserves on the mean spread obtained from the JP Morgan Emerging Markets Bond Index. Her findings reveal that oil reserves contribute to widening sovereign spreads when the country has a higher level of corruption and political turmoil, but decrease spreads in politically stable countries.

A number of papers examine the impact of crude oil prices on equity returns for developed markets, but fewer studies investigate this relation for emerging and frontier markets. Gomes and Chaibi (2014) study the volatility spillover from crude oil to 21 frontier stock indices and find significant volatility transmission for some of the markets. Basher, Haug, and Sadorsky (2012) focus on emerging markets and use a structural vector autoregression model to examine the relation between oil prices, exchange rates and stock returns (MSCI emerging stock market index is used a proxy). Basher et al. (2012) find that emerging markets stocks have a negative short-term (2–3 months) relation with oil prices. An earlier study by Basher and Sadorsky (2006) uses daily, weekly and monthly data for 21 emerging markets and reports that the impact of oil price increases on stock returns differs when different data frequencies are used. Few other studies on the impact of oil on emerging or frontier markets include Maghyereh (2006), Maghyereh and Al-Kandari (2007), Aloui, Nguyen, and Njeh (2012), Ajmi, El-montasser, Hammoudeh, and Nguyen (2014), Ghosh and Kanjilal (2014), Bouri (2015), among others. Along this line of research, Arouri, Lahiani, and Nguyen (2011) measure the volatility transmission between oil and stocks in Gulf Cooperation Council (GCC) markets. They document substantial spillover effects in three out of the six markets under study. Significant volatility spillover from oil to Gulf equity markets (Saudi Arabia, Kuwait, and Bahrain) is also reported by Malik and Hammoudeh (2007).

The above short survey of the relevant literature shows that no direct association between the volatilities of commodities and credit markets has been studied. Accordingly, this paper addresses this relevant literature gap.

3. Econometric framework

To test for causality in variance from energy and non-energy commodity indices to the CDS spreads in emerging and frontier economies we employ the Lagrange Multiplier (LM) methodology presented by Hafner and Herwartz (2006). In this framework, the commodity index (Y) is said to cause CDS spread (X) in variance if the former variable has predictive power for forecasting the variance for the latter variable.

Unlike the cross-correlation function (CCF) tests proposed by Cheung and Ng (1996) and Hong (2001), which are not only sensitive to the order of leads and lags but also suffer from oversizing in small and medium samples when the volatility process is leptokurtic, Hafner and Herwartz (2006) propose a causality test based on the LM and show, using Monte Carlo simulations, that this causality test is

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