The Quarterly Review of Economics and Finance 68 (2018) 10–22

Contents lists available at ScienceDirect

The Quarterly Review of Economics and Finance

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

A dynamic spillover analysis of crude oil effects on the sovereign credit risk of exporting countries

Ivelina Pavlova[a,*], Maria E. de Boyrie[b], Ali M. Parhizgari[c]

[a] College of Business, 2700 Bay Area Blvd., Box 70, University of Houston – Clear Lake, Houston, TX, 77058, United States
[b] Department of Finance, MSC 3FIN, College of Business, P.O. BOX 30001, New Mexico State University, Las Cruces, NM, 88003, United States
[c] Finance Department, Florida International University, MMC, RB 245B, Miami, FL, 33199, United States

ARTICLE INFO

Article history:
Received 2 December 2016
Received in revised form 4 January 2018
Accepted 9 March 2018
Available online 10 March 2018

JEL classification:
F30
G15

Keywords:
Sovereign CDS
Dynamic spillover
Volatility
Oil-exporting countries
Oil shocks
Global and country specific factors

ABSTRACT

We study the dynamic spillover of crude oil prices and volatilities on sovereign risk premia of ten oil-exporting countries. Among the determining variables, we include a set of local and global factors that are identified through principal components analysis. The results indicate 4%–31% directional spillover from crude oil prices to sovereign credit default swap (CDS) spreads. Venezuela, Colombia, Russia, and Mexico are the top recipients of crude oil shocks. The local and global factors explain a relatively large portion of the spillover as well (22.50% and 17.40% maximum, respectively). Further, using the OVX volatility index as a proxy for oil price uncertainty, we find an average directional volatility spillover of 9%. The effect of political variables, and aggregate demand and supply shocks are relatively less than the oil-specific shocks.

1. Introduction

Decreasing oil prices have attracted considerable public attention due to their effects on the global economy, and in particular, on the sovereign debt default risk of major crude oil exporters. Based on public views, the consensus is that the repeated drops in oil prices are the precursor of increases in the default risk of sovereign governments of oil-exporting countries. However, there are no empirical studies to support this assertion in CDS markets. Earlier studies, e.g., Alexandre and de Benoist (2010), Breunig and Chia (2015), Duffie, Pedersen, and Singleton (2003), and Sharma and Thuraisamy (2013), explore the effect of changes in oil prices on sovereign bonds. Hooper (2015) studies the relationship between oil and gas reserves and CDS return but does not examine the spillover between oil prices and sovereign CDS.

To fill the above gap, this study investigates the dynamic spillover of crude oil prices and volatilities on sovereign risk premia of ten oil-exporting countries. Two types of major crude oil benchmarks (Brent and West Texas Intermediate (WTI)) are considered, and oil price volatility is proxied by the Chicago Board Options Exchange (CBOE) Crude Oil Volatility Index (OVX). We start with Diebold and Yilmaz's (2009, 2012) methodology that analyzes total and directional volatility spillovers. We expand their framework by considering a host of relevant determining variables such as local and global factors, supply and demand, and two political indices (internal conflict and government stability).

Historically, the oil market has shown a high degree of volatility in oil prices. Between the years 2000 and 2016, the average price for OPEC crude oil fluctuated from its lowest point at $23.12/bbl in 2002 to a high of $109.45 in 2012. However, by December 2015, the price stood at $35.35/bbl. Similarly, Brent crude oil reached its highest price of $145.61/bbl in July of 2008 but only traded at $39.73/bbl by mid-December 2015. In the past 15 years, Brent traded at its lowest level in November 2001 when it barely surpassed the $17/bbl.[1] Given that government revenues of oil-exporting countries are

* Corresponding author.
E-mail addresses: pavlova@uhcl.edu (I. Pavlova), deboyrie@nmsu.edu (M.E. de Boyrie), deboyrie@nmsu.edu (A.M. Parhizgari).

[1] Sources: http://www.statista.com/statistics/262858/change-in-opec-crude-oil-prices-since-1960/, www.opec.org/opec_web/en/923.htm, and http://www.tradingeconomics.com/commodity/brent-crude-oil.

https://doi.org/10.1016/j.qref.2018.03.003
1062-9769/

often dependent for the most part on oil prices, volatility of such prices is commonly recognized to have an impact on their economic policies and activities. El Anshasy and Bradley (2012) emphasize this point, stating that governments of oil-exporting countries who derive most of their tax revenues from the oil and gas sector and have underdeveloped non-energy sectors of the economy, may face significant hurdles in formulating their fiscal policy. The highly volatile oil prices observed since the 1970s, suggest future volatility in government revenues. Further, high oil prices over extended periods of time may weaken fiscal pressures and reduce government prudence, contributing to macroeconomic instability during a crisis.

On a different front, Mohanty, Nandha, Turkistani, and Alaitani (2011), Nguyen and Bhatti (2012), and Naifar and Dohaiman (2013) show a time-varying and unstable relation between oil prices and financial market returns, supporting the work of Herrera and Pesavento (2009). The impact of oil prices on sovereign debt of oil exporters has also been discussed, especially after the extended period of low prices that started in 2014.[2] In the first half of 2016, Moody's, a rating agency, initiated a number of downgrade reviews of oil-exporting sovereigns to assess the impact of recent oil shocks on sovereign credit risk.

In the financial sector, sovereign CDS contracts are used as protection against losses from credit events on sovereign debt. These have been used widely both as a tool for hedging credit risk, as well as for speculation. The party willing to purchase credit protection pays a premium in basis points, and if no credit event occurs, the buyer will pay the premiums as an annuity till maturity of the CDS contract. The CDS contract includes a list of events that can trigger protection payments, in addition to specifying the notional principal, the term of the contract, the reference entity, and the particular reference obligations. CDS spreads/premiums are quoted as a percentage of the notional value of the reference obligation. CDS products are traded over the counter and as a result, the size and maturity are determined based on the agreement between the counterparties. Compensatory payments on sovereign CDS can be triggered as a result of a failure to make interest or principal payments, debt restructuring or moratorium.[3] The restructuring event is most likely to be triggered with sovereign CDS contracts (Naraparaju, Chatellier, Sheets, & Lin, 2011).

This study contributes to the literature on sovereign credit risk and oil price uncertainty. Specifically, it examines 1) the dynamic spillover of crude oil prices and volatility on sovereign risk premia of ten oil-exporting countries; 2) whether this spillover is diminished when other determining factors, i.e., country-specific, political and global market factors, are accounted for; and 3) whether oil shocks are transmitted through supply-side shocks, aggregate demand shocks, or oil-specific shocks.

An investigation into each of these three inquiries is of value to practitioners and academics. Understanding the mechanism through which volatility shocks are transmitted from one market to another is valuable for global portfolio management. In addition, identifying the factors that influence the pricing and risk of government debt of oil-exporting countries is required by policy makers and central banks. The implication of volatility propagation may be even more far reaching. The domestic central bank and domestic banking sector collectively hold, on average, approximately forty percent of government debt in emerging markets according to Arslanalp and Tsuda (2014), with the amount varying by country and region. As a result, oil price volatility in major oil-exporting countries may affect not only the cost of debt for sovereign borrowers, but have considerable influence on the entire banking system due to the banks' holdings of government debts, thus creating a moral hazard risk due to the size of their debt holdings. The spillover effects from oil prices through sovereign spreads may also propagate to foreign banks and non-bank holding sovereign debts of oil-exporters.[4]

Our empirical findings can be summarized as follows. First, the spillover effects from oil markets are time-varying and country-dependent. For instance, Venezuela, Colombia, Russia, and Mexico are the top recipients of crude oil spillover effects. Second, the spillover in sovereign debt markets shows a higher magnitude compared to equity markets of oil-exporting countries. Third, after controlling for global and country-specific factors, oil prices still account for a considerable portion of the variability in sovereign spreads. Fourth, oil-specific shocks appear more important in explaining the error variance of sovereign spreads of oil exporters, while aggregate demand- and supply-side shocks account for a lower portion of the error variance.

The rest of this paper is organized as follows. The next section offers a brief overview of the prior related literature. Sections 3 and 4 discuss the data and the methodology employed. Section 5 includes the empirical results. The final section offers concluding remarks and implications of the results.

2. Literature review

2.1. Oil and stocks

The relation between oil prices and stock returns are shown to depend on multiple factors. Some of the more recent studies that investigate this relation include Awartani and Maghyereh (2013), Filis and Chatziantoniou (2014), Kang, Ratti, and Yoon (2014), Mollick and Assefa (2013), Reboredo and Rivera-Castro (2014), Wang, Wu, and Yang (2013), and Zhu, Li, and Li (2014).[5] Wang et al. (2013), extending the work of others, show that the strength of the stock market response to oil fluctuations depends on whether the country is a net exporter or importer, whether the oil price shocks are driven by supply or aggregate demand, and on the importance of oil in the particular economy. Filis, Degiannakis, and Floros (2011) also differentiate between oil exporters and importers. They find that the DCC-GARCH correlations between stock prices and oil increase in response to aggregate demand oil price shocks, especially those caused by political turmoil.

Some studies on oil and stocks use the framework of Diebold and Yilmaz (2009, 2012). For instance, Antonakakis, Chatziantoniou, and Filis (2014) show that spillover effects depend on economic conditions. They differentiate the channels of transmissions and discuss the increased importance of supply-side and oil-specific demand shocks after 2009. Similar to other findings, the strength of the effects differs between exporters and importers and among the countries in each group. Using a similar approach, Kumar (2014) demonstrates that oil price changes affect the Indian stock market. Lee, Liao, Huang, and Huang (2015) also explore the price and volatility spillover between oil and stocks and show that the spillover effects from oil are higher in oil-exporting countries. Along a similar line of research, Zhang and Wang (2014) look into the return and volatility spillovers of the world and Chinese oil

[2] Further discussion of oil and CDS in blogs and financial media can be found at: https://www.markit.com/Commentary/NewsCommentarieFile?CMSID=069387eff9f940e981a3cca74b775ace; http://aswathdamodaran.blogspot.com/2014/12/the-oil-price-shock-primary-secondary.html; http://www.cnbc.com/2015/08/18/could-the-oil-slump-push-venezuela-to-default.html.

[3] Government debt default is typically followed by a debt exchange or restructuring (Ismailescu & Kazemi, 2010).

[4] We are grateful to an anonymous reviewer for pointing out these effects.

[5] See also Kilian and Park (2009), Sadorsky (1999), Filis et al. (2011), and Wen, Wei, and Huang (2012).