



Modeling fluctuations in the global demand for commodities

Lutz Kilian^{a,c,*}, Xiaoqing Zhou^{b,1}

^a University of Michigan, USA

^b Bank of Canada, Canada

^c CEPR, USA

ARTICLE INFO

Article history:

Available online xxxx

JEL Code:

F44
Q11
Q31
Q41
Q43

Keywords:

Commodity market
Demand
Real economic activity
Global economy
Oil price
International business cycle
Leading indicators, BDI

ABSTRACT

It is widely understood that the real price of globally traded commodities is determined by the forces of demand and supply. One of the main determinants of the real price of commodities is shifts in the demand for commodities associated with unexpected fluctuations in global real economic activity. There have been numerous proposals for quantifying global real economic activity. We discuss which criteria a measure of global real activity must satisfy to be useful for modeling industrial commodity prices, we examine which of the many alternative measures in the literature are most suitable for applied work, and we explain why some popular measures are inappropriate for modeling industrial commodity prices. Given these insights, we examine the question of whether there has been a slow-down in global real economic activity between 2011 and 2016 and by how much. Drawing on a range of new evidence, we show that the global commodity price boom of the 2000s appears to have been largely transitory and that the partial recovery after 2016 has been fueled by the strength of advanced economies rather than China. Our analysis has important implications for the design of structural models of commodity markets, for the analysis of the transmission of commodity price shocks to commodity-importing and -exporting economies, and for commodity price forecasting.

© 2018 Elsevier Ltd. All rights reserved.

1. Introduction

There has been growing interest in the determination of the real price of globally traded commodities, especially after the surge in global commodity prices in 2003–08. It is widely accepted that commodity price booms and busts are primarily driven by fluctuations in global demand that are associated with unexpected shifts in global real economic activity. This view is supported by a range of evidence based on monthly and quarterly data since the early 1970s (see, e.g., Barsky and Kilian, 2002; Kilian, 2009a; Kilian and Hicks, 2013) as well as annual data since the 1870s (see, e.g., Jacks and Stürmer, 2018; Stürmer, 2018). Identifying such shifts in global demand requires reliable measures of fluctuations in global real economic activity. Some researchers have viewed changes in the prices of individual industrial commodities such as copper or iron ore (or changes in broad indices of industrial commodity prices) as indicators of changes in global real economic activity (see, e.g., Barsky and Kilian, 2002; Alquist et al., 2013; Alquist and Coibion, 2014; Delle Chiaie et al., 2016; Newell et al., 2016). Other researchers have relied on various measures of changes in global real output or in the volume of shipping of industrial raw materials (see, e.g., Kilian, 2009a; Ravazzolo and Vespignani, 2015; Bornstein et al., 2018; Herrera and Rangaraju, 2018).

* Corresponding author at: University of Michigan, Department of Economics, 611 Tappan Street, Ann Arbor, MI 48109-1220, USA.

E-mail addresses: lkilian@umich.edu (L. Kilian), xzhou@bankofcanada.ca (X. Zhou).

¹ Address: Bank of Canada, 234 Wellington Street, Ottawa, ON K1A 0G9, Canada.

Indicators of global real economic activity are of central importance in macroeconomics as well as in microeconomics. In macroeconomics, they are used in nowcasting and forecasting world trade as well as domestic economic growth and inflation (see, e.g. Stratford, 2013). They also play a central role in forecasting the prices of oil and other commodities (see, e.g., Alquist et al., 2013; Alquist and Coibion, 2014), in designing fiscal policies in commodity-exporting economies (see, e.g., Kilian, 2017), in modeling the determinants of commodity prices (see, e.g., Kilian, 2009a; Kilian and Murphy, 2014; Khalil, 2017; Stürmer, 2018; Bornstein et al., 2018), in studying the effects of commodity price shocks on commodity-importing and -exporting economies (see, e.g., Kilian, 2009b, 2017), in studying agricultural commodity markets (see, e.g., Baumeister and Kilian, 2014a; Jacks and Stürmer, 2018; Bruno et al., 2017), and in studying financial market integration and the role of speculation (see, e.g., Kilian and Murphy, 2014; Büyüksahin and Robe, 2014; Büyüksahin et al., 2017). In applied microeconomics, they have also been used in identifying the short-run price elasticity of supply in commodity markets (see Newell et al., 2016; Bornstein et al., 2018).

The objective of this paper is to compare alternative indicators of global real economic activity and to assess their suitability for modeling industrial commodity markets. Our focus is not on quantifying the statistical relationships between these indicators, but on highlighting their conceptual differences and merits.² In Section 2, we outline several criteria that help choose among alternative measures of global real economic activity. Section 3 reviews a commonly used measure of global real economic activity proposed by Kilian (2009a) and addresses several potential objections to this index that have been raised in the literature, including the role of changes in bunker fuel prices and of the shipbuilding cycle. We also investigate the determinants of the negative spike in this index in early 2016. In Section 4, we discuss the merits of proxies for global real output such as indices of world real gross domestic product (GDP) or industrial production as well as global steel production. In Section 5, we discuss the use of indices of real commodity prices as proxies for fluctuations in global real economic activity. In Section 6, we use these and other indicators to provide broad-based evidence that there has been a sustained global economic slowdown in commodity markets since 2011. In Section 7, we conclude that the Kilian (2009a) index and indices based on real commodity prices have clear advantages in modeling industrial commodity markets compared with alternative indicators of global real economic activity, including proxies for global industrial production. Although many of the qualitative results in the literature are robust to the choice of the indicator of global real economic activity, there are at times important differences in the timing and amplitude of global business cycle fluctuations.

2. How to measure global real economic activity when modeling commodity prices

It is widely understood that the real prices of most commodities are determined in global markets subject to the forces of demand and supply.³ The demand side of commodity markets tends to be competitive. One of the main determinants of the real price of commodities is shifts in the demand for commodities associated with unexpected fluctuations in global real economic activity. A global business cycle boom tends to lift all real commodity prices, whereas a slowdown of the global business cycle tends to lower them. Kilian (2009a) refers to demand shifts associated with unexpected fluctuations in the global demand for all industrial commodities as aggregate demand shocks (not to be confused with the notion of a shift in the domestic aggregate demand curve in macroeconomic models).

This is not to say that aggregate demand shocks are the only demand shocks affecting real commodity prices. Demand may also shift over time, as consumer preferences or technologies change. For example, the demand for rare earths was stimulated by advances in computer technology, while the demand for pork bellies and whale oil has greatly diminished, as consumer tastes have evolved. Moreover, storage demand may fluctuate in response to shifts in expected real commodity prices or in response to shifts in the uncertainty about future real commodity prices (see Alquist and Kilian, 2010; Kilian, 2009a; Kilian and Murphy, 2014; Kilian and Lee, 2014; Knittel and Pindyck, 2016). The latter channel also allows nonfundamental beliefs to affect the real price of commodities. Nevertheless, a large body of literature based on a range of different models and data has concluded that the bulk of the fluctuations in industrial commodity prices not only since the 1970s, but for the last 150 years has been driven by shifts in aggregate demand (see, e.g., Barsky and Kilian, 2002; Kilian, 2009a; Lippi and Nobili, 2012; Kilian and Hicks, 2013; Kilian and Murphy, 2014; Alquist and Coibion, 2014; Delle Chiaie et al., 2016; Knittel and Pindyck, 2016; Jacks and Stürmer, 2018; Stürmer, 2018). This conclusion, of course, hinges on our ability to accurately measure fluctuations in the global business cycle. Thus, the question of how to measure cyclical variation in global real economic activity is paramount in modeling global commodity markets.

2.1. Global real activity is not global demand

Indicators of global real economic activity are sometimes incorrectly referred to as proxies for global demand. This practice is common in government reports, but also in academic papers. It is important to understand why this terminology is

² A number of studies have examined the contemporaneous correlation and lead-lag patterns among alternative indicators of global real economic activity and their relative predictive accuracy (see, e.g., Bakshi et al., 2011; Alquist and Coibion, 2014; Baumeister and Kilian, 2014b; Ravazzolo and Vespignani, 2015; Tapia, 2016). These results, while of independent interest, are not immediately relevant for our analysis because they do not address the question of how to choose among these indicators.

³ This is not always the case. For some commodities, global markets did not exist until recently; in other commodity markets prices were regulated or constrained by contractual agreements (see, e.g., Alquist et al., 2013; Jacks and Stürmer, 2018).

Download English Version:

<https://daneshyari.com/en/article/7364947>

Download Persian Version:

<https://daneshyari.com/article/7364947>

[Daneshyari.com](https://daneshyari.com)