**What goes up, must come down: The business cycle in global commodity markets**

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*Global commodity prices surged across the board after 2003, with some observers claiming that this reflected a permanent increase in global real economic activity. This column argues that this was a persistent but transitory phenomena tied to rising commodity demand from Asia. It presents evidence of a global economic slowdown since 2011, with low real commodity prices likely to persist.*

When commodity prices surged after 2003, the key determinant was quickly identified to be rising demand from emerging Asia, driven by growth in infrastructure spending and manufacturing, especially in China. Many observers at the time suggested that the global demand for commodities had reached a permanently higher level in response to structural shifts in the global economy (e.g. World Bank 2009: 64). Of course, global industrial commodity prices have weakened considerably since 2012, which (under this interpretation) can only be explained by a large increase in supply. As a result, there has been much interest in the supply side of commodity markets in recent years, the shale oil revolution in the US being one prominent example.1

An alternative interpretation is that global real economic activity never fully recovered from the financial crisis of 2008, having slowed considerably since 2011. Indeed, some commonly used measures of the global business cycle suggest a large decline in the global real economic activity in recent years, to levels predating the Chinese boom of 2003-08, consistent with the view that the increased supply of commodities (such as iron ore and crude oil) is only part of the explanation for declining commodity prices.

In order to determine which of these two interpretations fits the data, one has to measure cyclical fluctuations in global real economic activity. In a recent paper we examine in detail how to approach this question (Kilian and Zhou 2017). We show how a measure of global real economic activity must be constructed in order to be useful for modelling industrial commodity prices. We compare a wide range of competing proposals for measuring the global business cycle, and assesses their merits for applied work on commodity prices.

**A range of alternative indicators**

Although this question arises frequently in applied work, there is no universal agreement on how to quantify cyclical variation in global real economic activity. A popular approach has been the use of an index of global real economic activity, first constructed by Kilian (2009) with the help of ocean bulk cargo freight rates. This index is related to a broader literature, originating in the 1930s, on using indices of ocean shipping rates (such as the Baltic Dry Index) as proxies for fluctuations in real economic activity. Although this approach is popular in empirical work, it is not universal. Some macroeconomists instead favour the use of proxies for global real GDP, while others lean toward using proxies for global industrial production. An alternative proposal has been to focus on global steel production. There has also been increased interest in recent years in extracting measures of the global business cycle from the real prices of selected commodities. Finally, in closely related work, some researchers have proposed to measure the component of the price of commodities associated with fluctuations in global economic activity based on regressions of the change in the nominal commodity price on contemporaneous changes in nominal copper prices, changes in the nominal dollar exchange rate, and possibly other variables (Hamilton 2014, Bernanke 2016).

Among these contenders, we stress the advantages of the Kilian (2009) index of global real economic activity, of indices based on real commodity prices and, to a lesser extent, of proxies for global industrial production. It is useful to review some of the pros and cons of these indicators in modelling industrial commodity prices.

**Indicators constructed from bulk dry cargo rates**

One of the early warning signs of the global economic slowdown was a sustained decline after 2010 in the Kilian index of real economic activity, the construction of which does not rely on poor international price and exchange rate data (see Figure 1). The Kilian index may be viewed as a proxy for changes in the volume of shipping of industrial raw materials and is a leading indicator for changes in global real industrial output. It is designed to have global coverage and automatically adjusts to changes in the dependence of the global economy on commodity inputs, alleviating concerns over structural change. It is available at monthly frequency and covers a long time span including the early 1970s, facilitating the estimation of models of commodity markets.

**Figure 1** Kilian (2009) index of global real economic activity

A picture containing text, room, water

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*Source*: <http://www-personal.umich.edu/~lkilian/reaupdate.txt>

It may seem that variation in this index could simply reflect variation in the price of oil (and hence in the fuel cost of shipping) unrelated to the business cycle, but this is not the case. We show that the readily apparent co-movement between bulk dry cargo shipping rates and the price of oil is caused by a common global demand component rather than by other oil market shocks, adding credence to this measure.

One caveat is that the Kilian index does not allow for changes in the utilisation rate of vessels or for changes in the size of the active bulk dry cargo fleet, which may distort the index at times. In general, the evolution of the fleet size is too smooth, however, to explain much of the observed variation in the Kilian index. For example, the timing and extent of the decline in bulk dry cargo shipping rates in recent years cannot be explained by an increase in the supply of bulk dry cargo vessels.

**Global industrial production**

Measures of global real GDP or global industrial production, in contrast, have their own limitations. One concern with the use of measures of global real GDP in modelling industrial commodity markets is the increased importance of the service sector relative to the industrial sector over time. Since the industrial sector has a higher propensity to import commodities, a good case can be made for focusing on proxies for global industrial output instead.

The main drawback of measures of global industrial production is that typically commodities must be imported well before the start of industrial production. Thus, if we intend to capture shifts in the demand for industrial commodities, not only the timing of fluctuations in industrial output is off, but also their amplitude because orders for commodities depend on expected rather than actual industrial output. This is one key argument for using indices based on dry bulk cargo shipping rates or real commodity prices, in addition to the difficulty of obtaining real output data for many countries and of obtaining appropriate weights.

**Real commodity price indices**

Yet another approach has been to focus on sustained changes in broad-based indices of real commodity prices. The presumption is that fluctuations in real commodity price indices are proportionate to fluctuations in global real economic activity because idiosyncratic price fluctuations in individual commodity markets average out. Rather than constructing equal-weighted indices, one may also extract the common factor in the growth rates of a wide range of real industrial commodity prices.

One drawback of this approach is that it may be sensitive to how the commodity price trends are modelled and which commodity prices are included. Moreover, such indicators may require additional smoothing. Another complication is that any other relationship among real commodity price series arising from vertical integration or joint production processes, for example, must be properly accounted for. In practice, constructing such indicators back to the 1970s can be challenging. Nevertheless, many indicators constructed along these lines show patterns similar to those found in indicators based on shipping rates.

**Global real activity since 2011: Back to square one?**

An obvious question is how important choosing the right indicator for the global business cycle is for addressing the role of global demand in real commodity price fluctuations. The answer depends on what specific question one cares about and what time period one considers. Although the magnitude and timing of these effects are clearly affected by the choice of indicator, the literature has shown that key substantive findings – such as the importance of global demand for commodity prices during 2003-08 – are qualitatively robust to using proxies for global industrial production rather than the Kilian index.

The evidence for a recent global economic slowdown is equally robust. The existence of a major global economic slowdown is supported by the Kilian index and by indicators based on real industrial commodity prices. Figure 2 shows that this development is mirrored by a systematic decline in official Chinese year-on-year real GDP growth rates from a peak in 2007 to levels last seen during the Great Recession. Unofficial estimates indicate an even stronger decline in Chinese growth in recent years. Similar declines also occurred in global steel production. Based on year-on-year growth rates, global industrial production, and global real GDP have declined to values last seen in 2002. The declines are even more dramatic relative to a log-linear linear time trend. Thus, there is overwhelming evidence that the sustained economic expansion associated with the boom of the 2000s has run its course. Essentially, the global economy is back to where it started in 2002.

**Figure 2**Year-on-year growth in China’s real GDP

A close up of a map

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*Source*: National Bureau of Statistics, China.

**Concluding remarks**

The extent of the slowdown in global real economic activity since 2011 has not been previously documented or widely recognised. This finding has important implications for the modelling of global commodity markets that are of equal importance to exporters and importers.

* First, it suggests that, judging by the data available in early 2017, the demand boom in emerging Asia is likely to have been a persistent, but ultimately transitory phenomenon, much like the persistent demand booms in the early 1970s and in the late 1970s and early 1980s.
* Second, our analysis implies that, all else equal, low real commodity prices are likely to persist, which constrains the policy options available to commodity producers and exporters. This is not to say that global real economic activity could not recover in the future. In fact, if the history of commodity markets since the 1970s is any guide, commodity busts are, sooner or later, followed by commodity booms.
* Third, our analysis suggests that the role of increased supply in commodity markets has been overemphasised in popular accounts. An interesting question for future research will be to identify in more detail the deeper determinants of the boom in global real economic activity in the 2000s. Research along these lines will also help researchers pinpoint the conditions that may presage the next global economic boom.

*Authors’ note: The views in this column are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Bank of Canada.*

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**Endnotes**

[1] For further discussion of the shale oil revolution, see Kilian (2017).

<https://voxeu.org/article/how-measure-global-business-cycle>