

Box 1**Price volatility for most commodities has returned to historical norms**

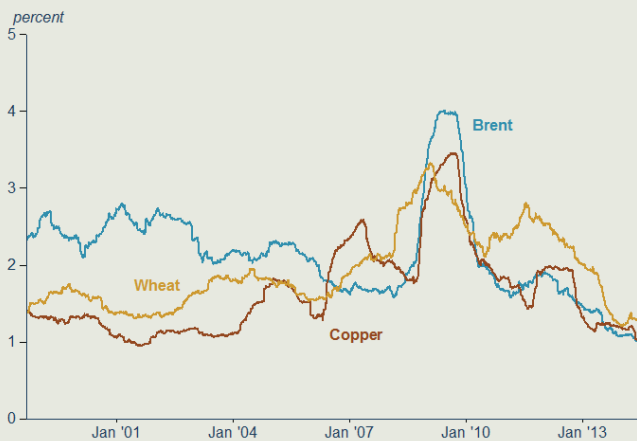
The elevated price volatility in the aftermath of the 2005-08 commodity boom has been (and still is) a key concern among policy makers and multilateral institutions (e.g. World Bank 2012, UNCTAD 2012). To examine whether such concerns are consistent with the recent evidence, this box analyzes daily price movements of 18 commodities traded at futures exchanges, based on the 1997-2014 period. It concludes that price volatility for almost all commodities reached historical highs during 2008-09 (which also coincided with the financial crisis), but volatility returned to historical norms after 2010. The box also provides evidence of a causal relationship between S&P 500 returns (a proxy for expectations on overall macroeconomic conditions) and commodity price returns during the financial crisis. However, such a relationship is significantly weaker in periods before 2005 and after 2009. Taken together, the findings suggest that the elevated volatility during 2008-09 was largely temporary and was driven mostly by cyclical macroeconomic factors rather than changes in the fundamentals of global commodity markets as has been often argued (e.g., expansion of biofuels, demand growth by emerging economies, or changing weather patterns).

Price volatility during 2008-09 has been, on average, more than 50 percent higher than other periods (figure B1.1 depicts price volatility for oil Brent copper, and wheat). A simple difference in means test confirms that volatility was significantly higher during the 2008-09 than in other periods for 17 of the 18 commodities analyzed here. For example, daily crude oil price volatility was 2% during 2008-09 and 2.9% in other periods. Likewise, copper and wheat price volatility was higher by 1.11 and 1.03 percentage points.

Of the 18 commodities examined here, 17 commodities exhibited price volatility that was 25 percent higher than its average—coffee being the sole exception, most likely because coffee exhibits high price volatility throughout the entire period. This further confirms that volatility was abnormally high during 2008-09 across the entire commodity spectrum, but also that it has returned to historical levels after 2010 (figure B1.2).

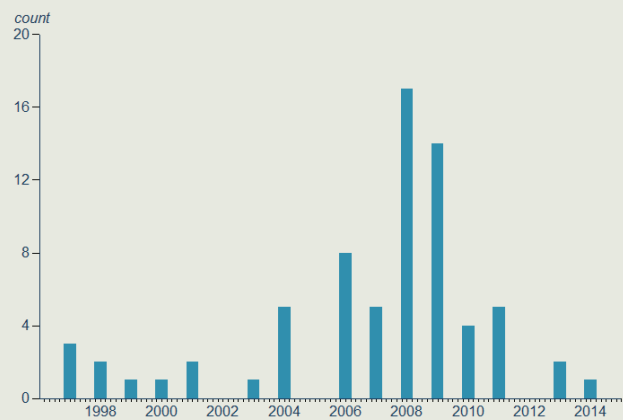
Price volatility in the past quarter was lower than the average volatility during the second quarter of the 1997-05 period across 16 out of 18 commodities—coffee and natural rubber are exceptions (table B1.1). Furthermore, volatility has remained stable over the last two quarters for most commodities. Again, these results are consistent with the view that price volatility for the most recent quarter has been at very low levels across a broad range of commodities. (Maize price volatility was elevated during 2013Q2 and 2013Q3 because of exceptionally adverse weather conditions in the US, which is the major maize exporter).

Several authors (e.g. Bloom 2013) have noted that macroeconomic shocks associated with recessions—such as the 2008/09 financial crisis—are more uncertain than positive shocks because large recessions are rare events with no clear consensus on their likely depth and duration, often amplified by policy uncertainty, they tend to cause greater market volatility than positive shocks. To examine the effect of the macroeconomic conditions on commodity price volatility, Granger-causality tests were run between daily commodity price returns and the returns on the S&P 500 index (figure B1.3 depicts

Figure B1.1 Volatility of returns (oil, copper, and wheat)

Source: ICE, CME, and World Bank estimates.

Note: Volatility is measured as the standard deviation of daily returns and is based on daily closing futures prices of nearby contracts from 1/1/1998 to 06/31/2014, resulting in a total of 3,673 observations; it is presented as 250-day moving averages, roughly corresponding to a calendar year.

Figure B1.2 Volatility of returns, 18 commodity prices

Source: ICE, CME, and World Bank estimates.

Note: The figure reports volatility in excess of 25 percent above annual averages for 18 commodity prices. The averages apply to each commodity during the entire sample and have been calculated separately for each calendar year.

volatility of returns for the S&P 500 index). Summary results, reported in figure B1.4, indicate that a larger fraction of commodities were Granger-caused by S&P 500 returns during the financial crisis than any time before or after the crisis. This suggests that common macroeconomic factors were important drivers behind the spike in commodity price volatility during the financial crisis (Baffes and Kshirsagar 2014).

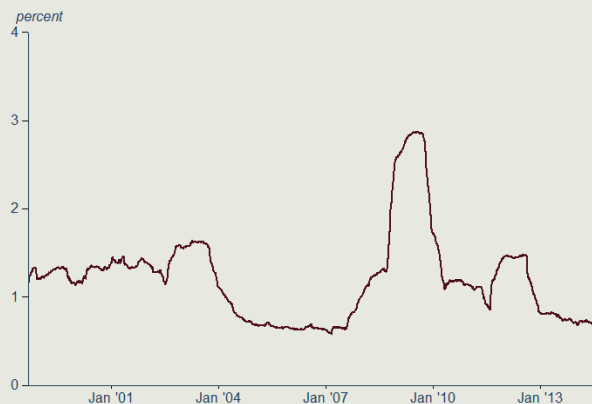
That commodity price volatility has returned to historical levels should not come as a surprise. For example, Jacks et al (2011) find that commodity price volatility has remained stable over three centuries after examining harmonized monthly commodity price returns from 1700 to 2008. Hamilton and Wu (2014) find some influence of indexation on oil returns during 2007-09, but also find that this relationship breaks down post-2009. They also attribute abnormal relationships in commodity markets to factors related to the financial crisis. Yet, it should be noted that these results do not rule out the possibility that commodity prices have become more correlated with each other. Ke and Tang (2012), for example, have documented increased correlation of non-energy prices with oil returns. Further, they argue that the spike in non-energy price volatility during the recession was caused by volatility spillovers from oil. However, their study does not use post-2011 data—a period in which volatility declined and the lagged returns in the S&P 500 had weaker linkages to commodity returns, as shown above.

Table B1.1 Volatility of returns, quarterly averages

	1997-2005 (Q2)	2013Q2	2014Q1	2014Q2
Coffee, Arabica	2.69	1.63	3.34	3.12
WTI	2.51	1.35	1.09	0.84
Brent	2.20	1.27	0.87	0.79
Cocoa	2.11	1.27	1.12	0.82
Nickel	2.10	1.55	1.30	1.98
Cotton	1.86	1.63	1.25	1.49
Silver	1.68	2.59	1.50	1.17
Wheat	1.68	1.52	1.78	1.42
lead	1.56	1.54	0.96	0.91
Soybeans	1.53	1.43	1.08	1.19
Maize	1.51	2.17	1.28	1.29
Copper	1.45	1.63	1.01	0.80
Soybean oil	1.43	0.89	1.09	1.22
Tin	1.29	1.54	0.93	0.69
Zinc	1.28	1.25	1.03	0.90
Natural rubber	1.19	1.91	1.73	1.45
Aluminum	1.14	1.34	1.08	0.97
Gold	0.87	1.96	0.90	0.78

Source: ICE, CME, London Metal Exchange, and World Bank estimates.

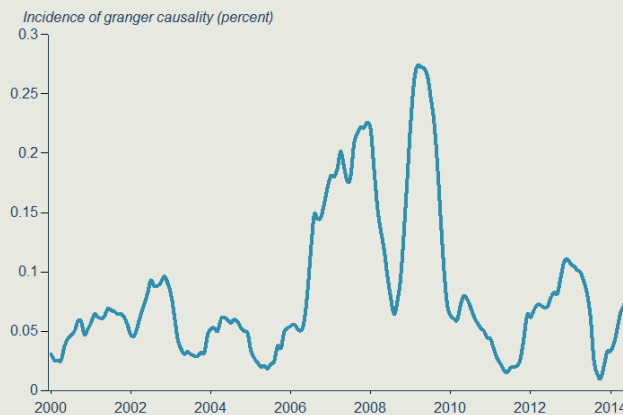
Figure B1.3 Volatility of returns, S&P 500



Source: Bloomberg.

Note: Volatility is measured as the standard deviation of daily returns and from 1/1/1998 to 06/31/2014, resulting in a total of 3,673 observations; it is presented as 250-day moving averages, roughly corresponding to a calendar year.

Figure B1.4 Granger causality



Source: World Bank estimates.

Note: Current commodity returns were regressed on one-day lagged returns of the relevant commodity and the S&P 500 index over a 60-day moving window. A commodity return is labelled as being Granger-caused by the S&P 500 return if the p-value on the lagged S&P 500 coefficient is less than 0.05 and the parameter estimate is positive.