Commodities Sectors And The Business Cycle

Different economic scenarios elicit different reactions

By Geetesh Bhardwaj and Adam Dunsby

Commodities investors increasingly have access to a wide range of sector-based products including energy, industrial metals, precious metals, agriculturals and many others—both broader and narrower. Here we explore how the returns of the major commodities sectors are related to economic activity, as measured by the NBER-dated recessions and the OECD composite leading indicators (CLI). Understanding this relation is potentially valuable to investors, allowing those with views on future economic activity to position their commodity portfolios appropriately. We find the industrial metals and the energy sectors are procyclical (their returns vary with economic activity), while the grains and softs sectors are defensive (their returns are relatively insensitive to economic activity). Precious metals and livestock lie somewhere in between. We also find that a simple strategy that rotates between cyclical and defensive commodities based on the OECD CLI does better than the defensive, procyclical or equally weighted sector portfolios.

Sector Returns

The commodities we study are those contained in either the Dow Jones-UBS Commodity Index or the S&P GSCI (the former Goldman Sachs Commodity Index), omitting duplicates (e.g., we include WTI crude oil, but not Brent crude oil), and including tin, platinum and soybean meal, based on the subjective assessment that they are important economically, have liquid futures markets and are of interest to investors. The 25 commodities identified by their sectors are listed in Figure 1.

We construct (excess) investment returns for futures by taking a long position at the end of each month in the nearest-to-expiry future that does not have its first notice date or expiration date in the next month. Further, we form six commodities sector portfolios (industrial metals, energy, precious metals, grains, livestock and softs) consisting of equally weighted positions in all of the commodities within the sector available at that point in time.

Using statistical methods, Bhardwaj and Dunsby [2011] identify five commodities sectors: industrial metals, energy, precious metals, grains and livestock. They do not find a softs factor. Coffee, sugar, cocoa and cotton do not cohere to a common sector, and can be best categorized as miscellaneous agriculture.[1] They further show that different commodity sector returns have different sensitivities to the business cycle. Agricultural commodities tend to be less affected by the business cycle than industrial commodities such as industrial metals and oil.

Figure 2 displays commodities sector returns over five-year intervals from 1960 through early 2012. The sector returns are often quite different. For instance, from January 2000 to December 2004, the energy subindex outperformed the grain index by 236 percent. These divergences raise the prospect that different fundamentals drive the different subindex returns and that the subindexes may offer opportunities to investors over and above those of broadly diversified commodity indexes.

Figure 3 shows the average monthly commodities sector returns during various stages of the business cycle, as identified by NBER. The most salient feature is that all commodities sectors earn higher returns during expansions than during recessions. However, there are wide differences. Industrial metals and energy exhibit strong cyclicality, earning monthly about 3 percent more during expansions than during recessions. On the other end of the spectrum are grains and softs, which respectively earn monthly about 30 and 60 basis points more during expansions. In between are precious metals and livestock, which earn monthly about 1.5 percent more during expansions than recessions. Note that these returns do not reflect the returns of a trading strategy, as the NBER identifies business cycles after the fact.

Figure 1

Commodities And Start Date For Futures Returns: January 1960-March 2012

Sectors	Commodity	Futures Returns Start Date	Sectors	Commodity	Futures Returns Start Date
Industrial Metals	Aluminum	Jul 1987	Grains	Corn	Jan 1960
	Copper	Jan 1960		Soybean Oil	Jan 1960
	Nickel	May 1979		Soybeans	Jan 1960
	Zinc	Feb 1977		Wheat	Jan 1960
	Tin	Aug 1989		Soybean Meal	Jan 1960
	Lead	Mar 1977	Softs	Cocoa	Jan 1960
Energy	Crude Oil	Apr 1983		Coffee	Sep 1972
	Gasoline	Jan 1985		Sugar	Feb 1961
	Heating Oil	Dec 1978		Cotton	Jan 1960
	Natural Gas	May 1990	Livestock	Feeder Cattle	Dec 1971
Precious Metals	Platinum	Apr 1968		Lean Hogs	Mar 1966
	Silver	Jul 1963		Live Cattle	Dec 1964
	Gold	Jan 1975		—	—

Source: Commodity Research Bureau (CRB), Bloomberg and London Metals Exchange

Figure 2

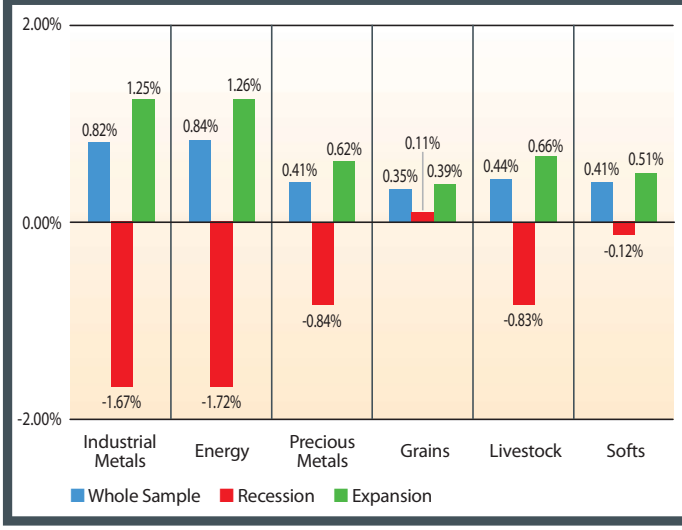
Five-Year Commodity Sectors Returns

Start Date	End Date	Industrial Metals	Energy	Precious Metals	Softs	Grains	Livestock	Range
Jan 1960	Dec 1964	72%	—	—	-14%	14%	—	86%
Jan 1965	Dec 1969	530%	—	17%	-28%	7%	100%	558%
Jan 1970	Dec 1974	-2%	—	13%	419%	439%	8%	441%
Jan 1975	Dec 1979	27%	—	217%	120%	-16%	109%	233%
Jan 1980	Dec 1984	-44%	-28%	-78%	-48%	-49%	-20%	58%
Jan 1985	Dec 1989	162%	96%	-5%	8%	1%	42%	167%
Jan 1990	Dec 1994	-1%	-25%	-25%	20%	-18%	44%	69%
Jan 1995	Dec 1999	-26%	61%	-14%	-15%	-29%	-7%	89%
Jan 2000	Dec 2004	40%	234%	64%	-2%	2%	47%	236%
Jan 2005	Dec 2009	115%	-40%	98%	3%	29%	-43%	158%
Jan 2010	Mar 2012	-3%	-13%	50%	17%	18%	13%	64%

Sources: Commodity Research Bureau, London Metals Exchange and Bloomberg
Note: Table presents the returns for the six commodity sector portfolios. We also report the range of sector returns (the difference in returns of the best- and worst-performing sector). Returns in blue indicate the best sector and ones in red the worst sector. Futures returns for Copper and commodities in all the sectors except industrial metals are based on data from Commodity Research Bureau (CRB) and Bloomberg. For industrial metals other than copper, we use data from the London Metals Exchange and Bloomberg.

Figure 3

Average Monthly Returns And Stages Of The Business Cycle: January 1960–March 2012



Sources: Periods of recession and expansions are identified based on business cycle reference dates as announced by NBER's business cycle dating committee. Author calculations based on commodity price data from Commodity Research Bureau, London Metals Exchange and Bloomberg.
Note: While returns for industrial metals, grains and softs sectors start on January 1960, precious metals sector returns start on July 1963; livestock sector returns start on December 1964; and energy sector returns start on December 1978. See Figure 1 for starting date of returns for individual commodities.

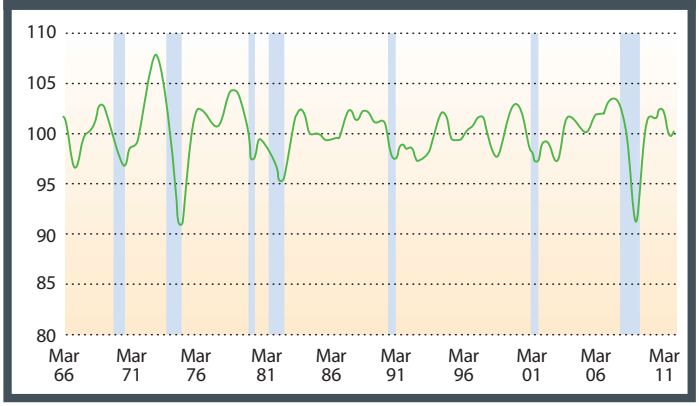
These results are intuitive. The returns of grains and softs, which are staple foods, are much less sensitive to the business cycle than industrial metals and energy, whose usage vary with industrial activity. Livestock also contains basic foods, but its more cyclical behavior relative to the other foods may be due to it being more of a luxury. From a tactical standpoint, this suggests that an investor who believes that the economy is going to weaken should allocate away from industrial metals and energy toward agriculturals. Interestingly, though precious metals are often held out as a safe harbor to bad times, they return less to investors during recessions than expansions.

While the recession/expansion categorization of the NBER is extremely useful, it suffers from some flaws, including that it only pertains to the United States and that the dates of the turning points are decided well after the fact. Another measure of world economic strength is the OECD composite leading indicators: "The OECD CLI system is based on the growth cycle approach, where business cycles and turning points are measured and identified in the deviation-from-trend series."[2]

The OECD system of composite leading indicators was developed in the 1970s to provide early signals of turning points of economic activity. The OECD calculates leading indicators for 30 OECD countries as well as major emerging economies. It also provides combined leading indicator indexes for various groups of countries. CLI data is released monthly, reflecting conditions two months prior; historical data is avail-

Figure 4

OECD Composite Leading Indicators (CLI) For OECD Countries Plus Six New Emerging Countries: March 1966–January 2012



Sources: NBER and OECD

Figure 5

Correlation Of CLI With Monthly Commodity Sector Returns

	Industrial Metals	Energy	Precious Metals	Softs	Grains	Livestock
Mar 1966 - Jan 2012	0.26	—	0.11	0.14	0.17	0.10
Dec 1978 - Jan 2012	0.21	0.19	0.07	0.10	0.11	0.06

Sources: Author calculations based on commodity price data from Commodity Research Bureau, London Metals Exchange and Bloomberg, and OECD composite leading indicators.

able starting March 1966. In Figure 4, we plot the OECD CLI for OECD countries plus six new emerging markets (Brazil, India, China, Russia, Indonesia and South Africa). The shaded regions show the NBER recession dates. The dips in the index track recessions closely.

Figure 5 displays the correlation between the CLI and the monthly commodities sector returns. The sample is broken into the full period and the post-1978 period, the period for which energy returns are available (heating oil starts in December 1978). The correlations are highest (though not huge) for industrial metals and energy. The remaining four sectors form a lower correlation group, with correlations ranging from 0.06 to 0.11.

Taking the information from Figures 1 and 3 as a whole, we categorize industrial metals and energy as procyclical. The categorization of the remaining four sectors is less clear, but given that grains and softs do not post losses during NBER recessions, we categorize them as defensive, and leave livestock and precious metals uncategorized.

Sector Rotation

We have shown that commodity sectors can be divided into procyclical and defensive sectors based on how they perform during periods of economic strength and weakness. We extend this analysis to ascertain whether information about the economy available to investors in real time can be used to choose between procyclical and defensive sectors.

Figure 6 displays return statistics for a portfolio equally weighted across the six sector portfolios (EW Sectors), a procyclical sector portfolio (industrial metals and energy) and a defensive sector portfolio (grains and softs). The procyclical portfolio has the highest return, followed by the equally weighted portfolio and then the defensive portfolio. The procyclical portfolio also has the highest volatility. This is broadly consistent with asset pricing theory—the asset that does the worst during bad times must offer high overall returns.

It is difficult to accurately date business cycles in real time; even the CLI is only available with a lag of two months. However, we can use the lagged values of the CLI to simulate the performance of a strategy that switches between procyclical and defensive commodity sectors based on the available value of the CLI.[3] The final column of Figure 6 displays the results numerically and Figure 7 displays the results graphically. The sector selection strategy invests in procyclical sectors if the CLI is greater than 100 or the CLI increased month-to-month; otherwise it invests in defensive sectors. This "double path" methodology results in about 77 percent of months being categorized as expansionary, consistent with economic growth as the normal state. As the first data point available for the CLI is March 1966, the first available monthly returns for the sector selection strategy are for June 1966.[4] The sector selection strategy does significantly better than any of the three static portfolios, returning 11.9 percent annually compared with 6.4 percent for the procyclical portfolio (with lower volatility), and achieving a Sharpe ratio of 0.64 compared with 0.49 for the equally weighted portfolio of sectors.[5]

Conclusion

Commodities naturally group into the industrial metals, energy, precious metals, grains, and livestock sectors. There is no softs sector in any statistical sense (it's best thought of as miscellaneous agriculturals), though we employ this categorization as it is well

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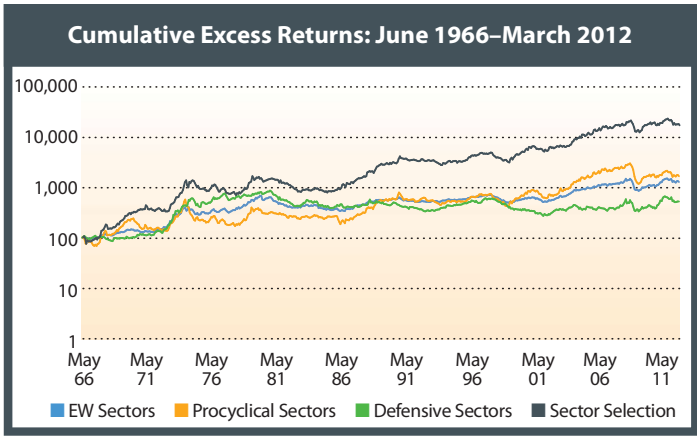
Figure 6

Sector Portfolio Returns, June 1966-March 2012

	EW Sectors	Procyclical	Defensive	Sector Selection
Cumulative Excess Returns	5.8%	6.4%	3.7%	11.9%
Volatility	13.4%	22.5%	18.0%	21.6%
Sharpe Ratio	0.49	0.39	0.29	0.64

Sources: Author calculations based on commodity price data from Commodity Research Bureau, London Metals Exchange and Bloomberg, and OECD composite leading indicators.

Figure 7



Sources: Author calculations based on commodity price data from Commodity Research Bureau, London Metals Exchange and Bloomberg, and OECD composite leading indicators.

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ingrained. Based on performance over the business cycle, these sectors can further be categorized into procyclical (industrial metals and energy) and defensive (grains and softs) groups. Precious metals and livestock fall somewhere in between. These categorizations are useful to investors who have a view on the future state of the economy. A simple strategy that switches between procyclical and defensive sectors based on the available OECD composite leading indicators significantly improves the return of a commodity investment.

References

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MSCI Barra research bulletin, "Sector Performance Across Business Cycles" November 2009.

Nilsson, Ronny and Emmanuelle Guidetti, "Current Period Performance of OECD Composite Leading Indicators (CLIs): Revision Analysis of CLIs for OECD Member Countries," OECD Statistics Working Paper, April 2007.

Endnotes

[1] We continue to use the "softs" categorization, as it has become industry standard.

[2] www.oecd.org/std/cli-ts. The OECD CLI has been used in a study of equity sectors and the business cycle in the MSCI Barra research bulletin, "Sector Performance Across Business Cycles," November 2009.

[3] The OECD CLI is subject to revision: "Revisions are a natural phenomenon for the CLIs. In order to isolate cyclical patterns, component series have to pass through several filters (seasonal adjustment, outlier detection, de-trending, smoothing, normalization). All these filters operate on the whole time series and generate revisions of the CLIs." See Nilsson and Guidetti [2007] for a comprehensive analysis of the revision process and its impact on CLI data. They conclude: " . . . first and second estimates of the CLIs give early signals of approaching turning points which in most cases are not revised later." In our analysis, we do not account for historical revision of CLI.

[4] CLI data is released during the second week of the month. February 2012 data was released on April 10, 2012. Current schedule for updates is available at: http://www.oecd.org/document/29/0,3746,en_2649_34349_1837341_1_1_1_1,00.html

[5] An alternative methodology might be to invest in procyclical sectors if CLI is greater than 100, which by construction is the long-term mean of series. This "single path" methodology results in about 53 percent of months being categorized as expansionary. The resulting portfolio does better than three static portfolios, returning 9.0 percent annually, and achieving a Sharpe ratio of 0.53.