

Agriculture Practice

Amid volatile commodity prices, beware of cognitive bias

Advanced analytics can help overcome cognitive biases that can lead managers to make irrational risk-management decisions.

by Tay Feder, Arvind Govindarajan, Ryan McCullough, and Chetan Venkatesh



Since the beginning of 2020, prices for many commodities have declined substantially and become more volatile (Exhibits 1 and 2). Many factors underpin this shift, including oil-market supply dynamics and concerns about demand disruptions related to the COVID-19 pandemic.¹ For example, futures price volatility² has increased year to date by a multiple of six for WTI crude,³ by about a multiple of four for live cattle, and by approximately 160 percent for copper.

fuels, crude-oil futures prices have declined more sharply and rapidly than they did during the 2008–09 global financial crisis. Futures prices of industrial metals and agricultural commodities have followed crude oil's downward trend but less sharply than in 2008–09. Price volatility of most categories increased during both crises, suggesting exceptional uncertainty about future commodity prices among market participants.

Due to government-imposed lockdowns that quickly reduced demand for transportation

Increasingly volatile prices present both opportunities and challenges to commodity buyers

¹ Notable exceptions are year-to-date price increases in gold, rice, and orange juice futures. Gold is often viewed by commodity traders as a hedge against market volatility and currency debasement. Prices and volatility of rice and orange juice futures increased through April 2020 due to changing supply-and-demand dynamics.
² The 30-day rolling historical price volatility of the second futures contract for each commodity.
³ West Texas Intermediate, the primary US crude oil benchmark.

Exhibit 1

Most commodity prices declined substantially in the first four months of 2020.

Commodity futures prices¹

Index (100 = Jan 2020), 2020 year to date



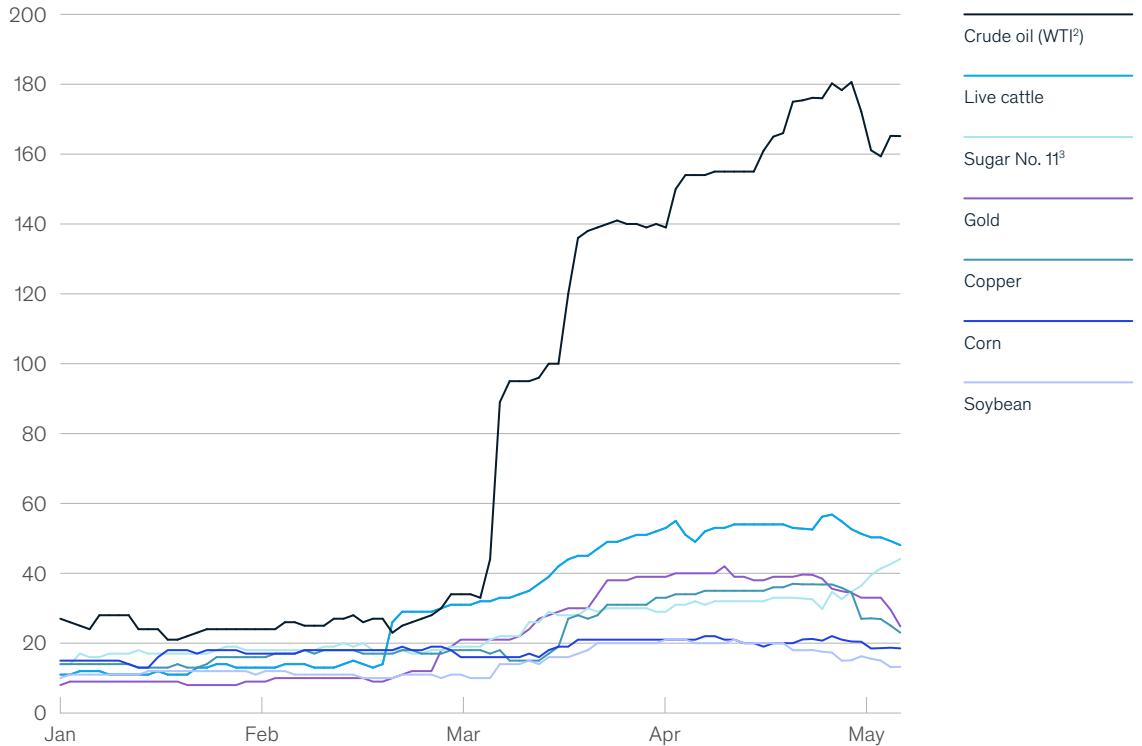
¹ Prices of second futures contract for each commodity.
² Global benchmark contract for raw sugar.
³ West Texas Intermediate, the primary US crude oil pricing benchmark.
 Source: DTN ProphetX

Exhibit 2

The volatility of commodity futures prices increased substantially in March and April.

Historical volatility of commodity futures prices

30-day trailing volatility,¹ 2020 year to date



¹ Volatility of price changes over the prior 30 days of the second futures contract for each commodity.

² West Texas Intermediate, the primary US crude oil pricing benchmark.

³ Global benchmark contract for raw sugar.

Source: DTN ProphetX

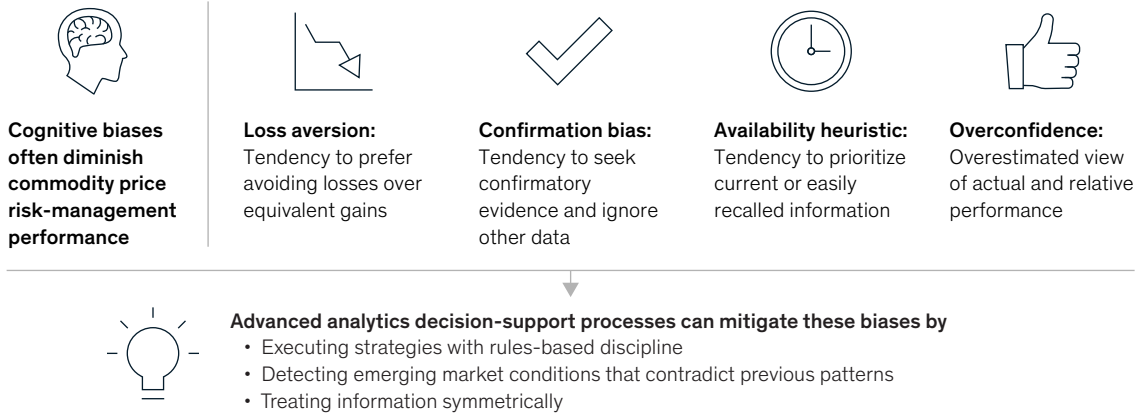
and traders who must decide how to structure their price-risk exposure. During periods of heightened uncertainty, we think it's paramount for managers to be cognizant of flaws in heuristics the human brain uses to quickly make decisions. These cognitive biases can systematically skew human perceptions, often leading to poor business decisions and suboptimal financial results (Exhibit 3). The implications of subconscious biases and heuristics in finance are well researched. Three notable

Nobel prizes in economic science were awarded in 2002 (Kahneman), 2013 (Shiller), and 2017 (Thaler) for behavior research that established managers are predictably irrational in ways that defy economic theory.⁴

To counteract these biases, commodity buyers and risk managers can combine structured human processes with advanced analytics to create robust, repeatable, and neutral methods that offer

⁴ For more, see Daniel Kahneman, "Daniel Kahneman: Beware the 'inside view,'" November 2011, McKinsey.com.

Advanced analytics can improve risk-management performance by reducing the impact of cognitive biases.



Source: "Automated finance: The assumptions and behavioral aspects of algorithmic trading," *Journal of Behavioral Finance* 13, 1 (September 17, 2013), doi.org/10.2139/ssrn.2327251; Daniel Kahneman, *Thinking, Fast and Slow*, Farrar, Straus and Giroux, 2011; Benjamin Chiou, "Could automated trading mean the end of volatility?," *Raconteur*, November 24, 2019, raconteur.net; Royal Swedish Academy of Sciences; McKinsey team analysis

multiple benefits. Leading organizations use it to mitigate predictable errors in human judgment and optimize risk taking.

Examples of advanced analytics used to reduce biases include the following:

- **Simulation modeling:** Mitigate confirmation bias by developing strategies that use information systematically, including data that may be contradictory to initial hypotheses, to simulate the forward price curve of relevant commodities.
- **Backtesting possible strategies:** Use historical data to compare the results of multiple strategic options and identify a strategy that achieves an optimal balance of earnings and volatility with rules-based discipline few humans can match.
- **Sensitivity analysis:** To correct for overconfidence bias, form a better understanding of uncertainties inherent in a model's parameters, such as relationships

between related commodities, by comparing outcomes across variations in key inputs.

For organizations interested in improving decision making under uncertainty, we suggest the following:

1. **Set up the tools, data, and capabilities needed to deploy advanced analytics effectively.** Organizations already have many of the tools (for example, Excel and Tableau) or can get them for free (for example, Python and R). Data are ubiquitous, with numerous sources providing access to historical commodity prices.
2. **Evaluate the volatility of earnings and cash flow for relevant commodities.** This can be done using backtesting, which provides a rationale for which commodities or categories to target.
3. **Focus on the one or two most important areas to create a "minimal viable product" (MVP).** Use price scenarios to capture uncertainties in outcomes; more complex methods, such as

⁵ For more, see the Bias Busters Collection on McKinsey.com.

stochastic simulation, can be applied to better understand the risks.

Our research⁵ has shown that in uncertain times, cognitive biases (and their mitigation) play a material role in long-term outcomes. Using advanced analytics is an important way to begin addressing those biases. The key is getting started and not letting perfect be the enemy of

good. Using an iterative approach can continually improve capabilities that reduce bias and optimize price risk management.

This article was produced by [ACRE](#), our Agriculture Practice's advanced-analytics group, experienced in applying analytics to address challenges and unearth opportunities across the food system.

Tay Feder is a consultant in McKinsey's Denver office, where **Ryan McCullough** is a partner. **Arvind Govindarajan** is a partner in the Boston office. **Chetan Venkatesh** is an associate partner in the New York office.

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