

# Managing industrials' commodity-price risk

Industrial companies can hedge an ever-increasing number of commodities, but effective hedging requires a comprehensive approach.

*by Arno Gerken, Olivier Plantefève, and Xavier Veillard*



**Hedging has long been a way** for global commodity buyers and sellers to mitigate the risks of price fluctuations for feedstocks, which are the raw-material inputs for industrial products. The variety of commodity inputs for industrial goods has increased with the development of products such as advanced batteries, alternative fertilizers, biofuels, and synthetic chemicals. These products have subsequently created new and growing markets for commodities such as ammonium nitrates, cobalt, lithium, methyl esters, and waste oil. At the same time, increased geopolitical and climatological unpredictability have contributed to uncertainty around commodity outputs, leading to persistent volatility in prices. The annualized volatility of commodity prices averaged 10 to 20 percent over the past four years, with annual price swings of up to 70 percent of that year's average price (Exhibit 1).<sup>1</sup>

As the number of in-demand commodities grows in this unpredictable environment, markets are developing new financial instruments to facilitate hedging. More than 40 new commodities financial contracts—including futures, options, and swaps—were introduced from 2014 to 2018. These contracts covered commodities as varied as cobalt, European sugar, rapeseed oil, and urea fertilizer and are available on major international exchanges such as Euronext, the Intercontinental Exchange, the Shanghai Futures Exchange, and the Tokyo Commodity Exchange.<sup>2</sup> Furthermore, the availability of new financial instruments to help hedge the price volatility of commodities presents an opportunity to reduce industrial companies' financial risk. However, many companies struggle to gain from commodity hedging because they do not utilize hedging as part of a comprehensive risk management program. Recent reports have surfaced that detail multiple instances in which companies have incurred significant losses from mishandled hedging, sometimes amounting to 5 to 25 percent of the average annual earnings before interest, taxes, depreciation, and amortization (EBITDA).

Commodity hedging is an opportunity only if companies approach it as a component of a comprehensive risk management program aimed at mitigating EBITDA-margin volatility. It should not be performed to reduce or fix the price of feedstocks in isolation from other margin components. Such an approach requires the involvement of multiple parts of the organization, a deep understanding of a company's exposure to commodity price risks, and an optimized hedging strategy. The best hedging strategy should involve considerations of different hedging avenues, including long-term fixed-price arrangements with both suppliers and buyers as well as an expanded presence in the value chain to avoid exposure to intermediate markets or financial instruments. Therefore, it is critical to consider all options before selecting an approach (or mix of approaches). Companies that successfully hedge commodity prices can smooth out their bottom-line performance while less-skilled competitors are likely to falter.

A comprehensive understanding of hedging instruments is also crucial as liquidity differs between instruments. And hedging commodities that have limited liquidity can introduce additional risk into an organization's hedging strategy.<sup>3</sup> Therefore, it is critical to consider all options and fully understand the implications of each commodity before selecting an approach (or mix of approaches). Companies that successfully hedge commodity prices can smooth out their bottom-line performance while less-skilled competitors are likely to falter.

### **The challenges of hedging are organization wide**

A comprehensive hedging strategy can reduce EBITDA-margin volatility by 20 to 25 percent for commodity feedstock-intensive businesses.<sup>4</sup> However, many companies tend to approach hedging in the wrong way, trying to manage

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<sup>1</sup> Figures are based on analysis of data from the IMF Commodity Data Portal, International Monetary Fund, last updated August 13, 2019, [data.imf.org](http://data.imf.org).

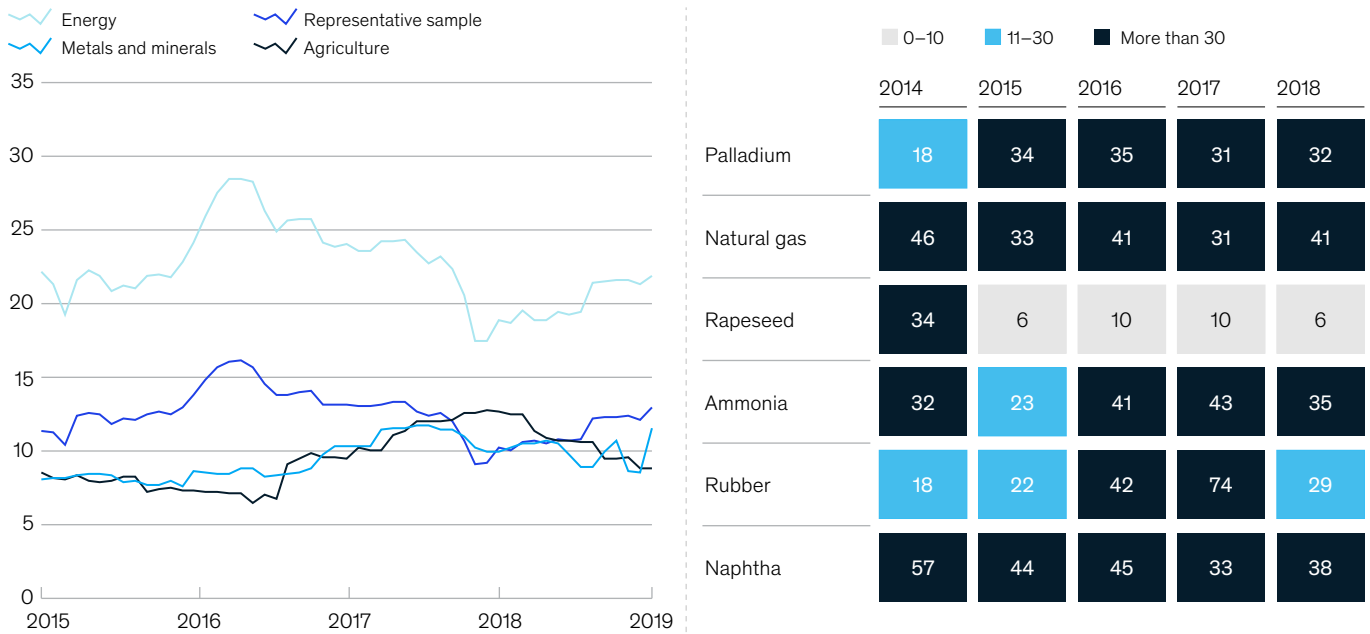
<sup>2</sup> Based on McKinsey research on recently introduced commodities on major global exchanges, such as the Chicago Mercantile Exchange, the Intercontinental Exchange, and the Singapore Exchange.

<sup>3</sup> Liquidity is the ease with which an asset can be converted to cash. Hedging instruments that have limited or variable liquidity can expose companies to losses when exiting transactions or force buyers to hold their positions for longer, which introduces additional risk. Several institutions have scaled back their commodity trading, partly in response to stricter requirements from Basel III and IV norms, which encourage higher bank liquidity. These institutional actions can further reduce the liquidity of some commodities markets.

<sup>4</sup> Estimates were calculated using the financials of a hypothetical company for which the cost of goods sold represents 70 percent of revenue and EBITDA makes up the remaining 30 percent of revenue. This model further assumes that commodities comprise 50 percent of cost of goods sold, demonstrating the effects of commodity price volatility.

## Annualized volatility of commodities is persistent.

Maximum volatility<sup>1</sup> per year for selected commodities, %



<sup>1</sup> Calculated as maximum price of commodity minus minimum price, divided by the average price in a year.

commodity prices in isolation from other elements of margin, such as the prices of end products sold. A more thoughtful way to hedge feedstock is to understand the relationship between its prices and the prices of end products, which reflect the costs of inputs. The sales and operations planning (S&OP) organization can help manage this risk by coordinating sales and purchasing efforts, but only if S&OP is integrated into the price-risk and hedging process. Organizations must also actively manage inventory price risks and avoid making bets on the commodities market.

### Mitigate feedstock price risks with end-product pricing

An obvious way to mitigate margin volatility is to pass on the cost of feedstock inputs through product prices. Indeed, the prices of many industrial products may already be correlated with the cost of their commodity feedstock. For example, the prices of most chemicals are strongly correlated

with the prices of naphtha and liquefied petroleum gas. If chemicals are sold on a floating-price basis, for which the price varies based on the prices of inputs, there may be no need to hedge feedstock. However, if the correlation of product prices and feedstock costs are staggered—often by three to six months—a short-term time-spread hedge can help avoid a sudden drop in margins if product prices are fixed.<sup>5</sup> Because correlations between the prices of feedstocks and products can change over time, organizations should monitor and review these relationships before making hedging decisions (Exhibit 2). For instance, external shocks, such as recently imposed trade tariffs between China and the United States, can disrupt established market correlations and introduce additional risk.

Of course, when the prices of products sold are fixed, the prices of the corresponding volume of feedstock should also be fixed. When feedstock prices fluctuate, the cost should be reflected in the

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<sup>5</sup> A time-spread hedge can be any combination of instruments in a family of spreads that involve options of the same stock, at the same strike price, but with different expiration months.

Exhibit 2

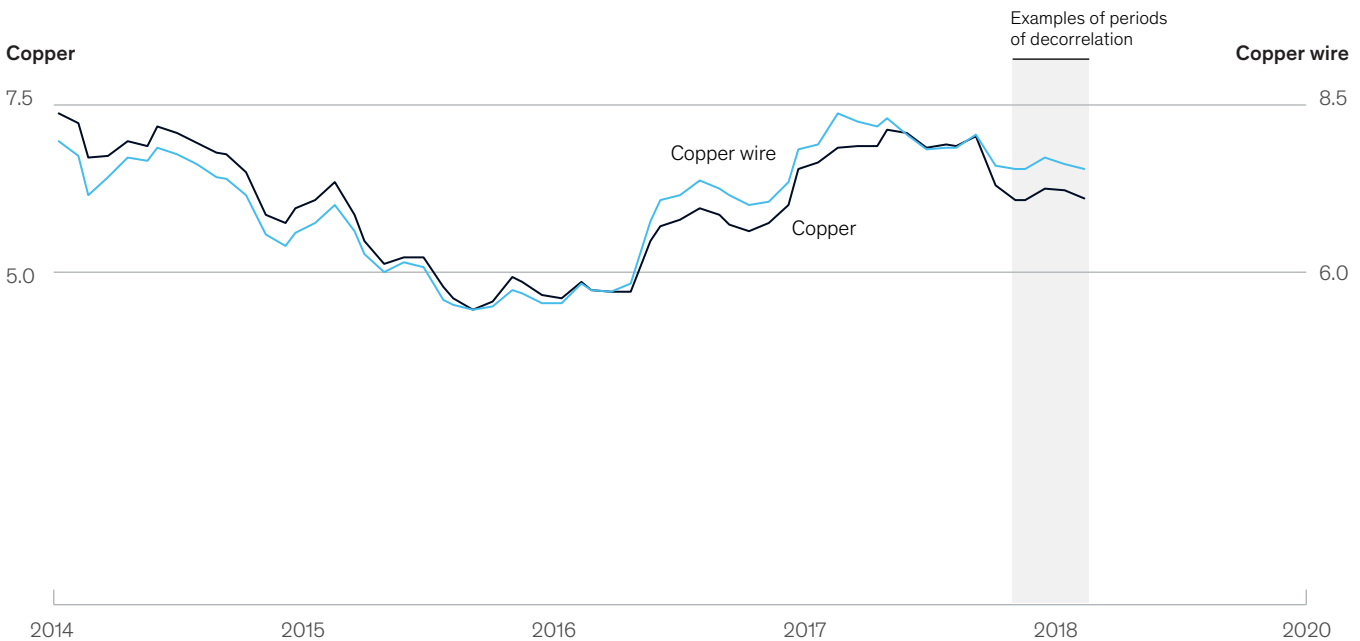
Correlations between the prices of feedstocks and products can change over time.

Correlation between commodities and end products by period of time, 2014–18<sup>1</sup>



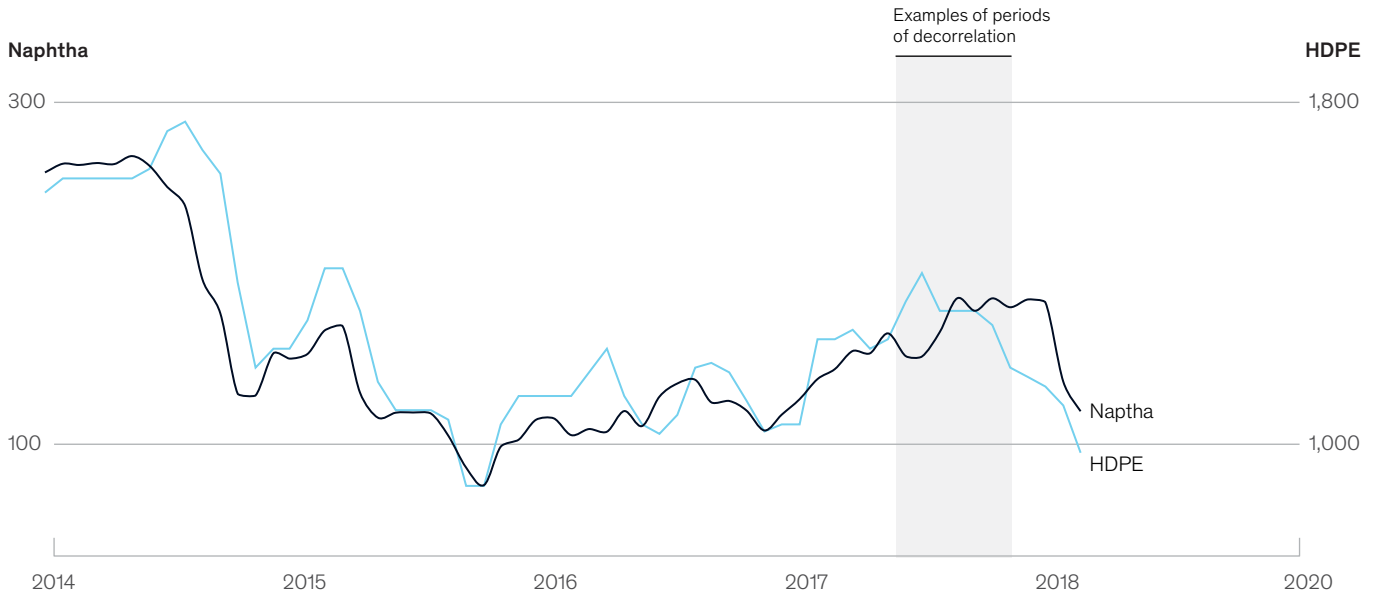
Historical price variations,<sup>3</sup> 2014–18

Copper compared with derivative end-product copper wire, \$ per thousand metric tons<sup>4</sup>



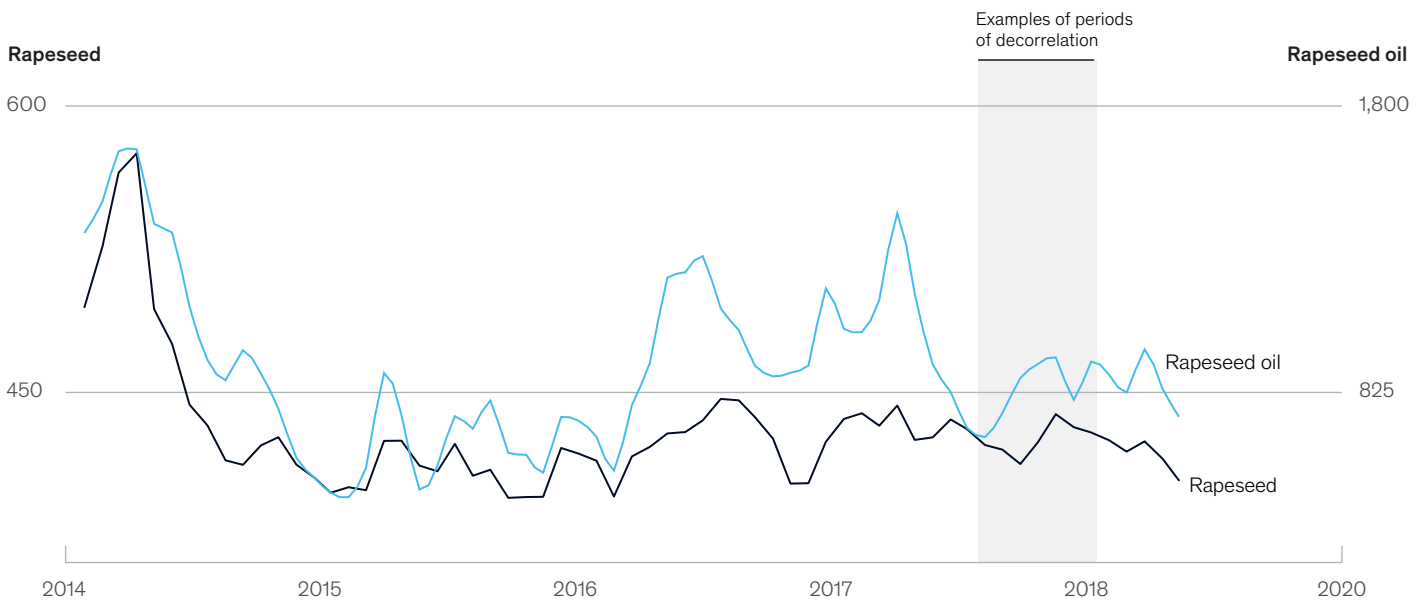
Historical price variations,<sup>3</sup> 2014–18

Naphtha compared with derivative end-product HDPE, North America, cents per gallon and \$ per thousand metric tons<sup>4</sup>



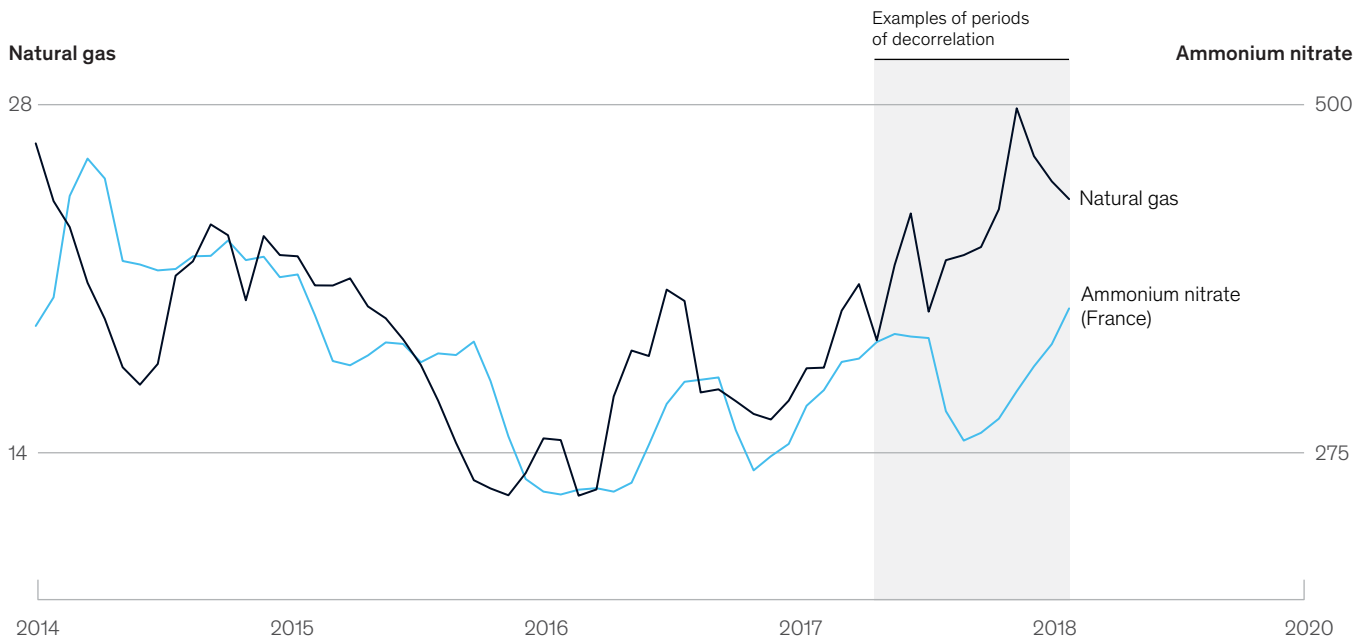
Historical price variations,<sup>3</sup> 2014–18

Rapeseed compared with derivative end-product rapeseed oil, \$ per metric ton<sup>4</sup>



## Historical price variations,<sup>3</sup> 2014–18

Natural gas compared with derivative end-product ammonium nitrate, \$ per megawatt-hour and \$ per metric ton,<sup>4</sup> respectively



<sup>1</sup> Rapeseed and rapeseed oil prices updated for Q1 2019.

<sup>2</sup> High-density polyethylene resin.

<sup>3</sup> Natural gas prices are presented by monthly average.

<sup>4</sup> Metric tons: 1 metric ton = 2,205 pounds.

Source: Platts, Bloomberg, Fertecon

price of end products to the extent that the market will bear. However, sales organizations' pricing decisions are often independent of commodity-procurement and hedging decisions. For example, one large fertilizer company contracted the equivalent of six months of forward sales on fixed prices but only fixed the price of enough natural gas to produce two months of forward sales volume. The reason for this was because the sales organization and financial decision makers failed to consult and coordinate with one another. As a result, the company was exposed to significant commodity price fluctuations. A systematic, coordinated approach to hedging can avoid losses related to these kinds of exposure (see sidebar "Avoiding losses with systematic hedging").

### Ensure sales and operations planning's participation in hedging decisions

The S&OP function, already critical to maintaining a smooth supply chain as well as ensuring that

production output matches sales demand and inventory volumes, can also play a crucial intermediary role in hedging decisions. Indeed, discipline and coordination in cross-functional forecasting can help decrease commodity inventory risks, though the volume forecasts of commodity feedstock inputs must be matched to forecasts for product demand. The commodity-feedstock procurement function should therefore work closely with the sales and marketing group, with S&OP mediating to ensure purchases and sales are in line with production and storage capacities.

The three groups should strive toward a common goal of maximizing margins by managing inventory levels, securing incremental supplies, and even accelerating end-product sales as needed. In its intermediary role, S&OP should ensure that production capacity is as flexible as possible within operational constraints. Overall, S&OP should ensure coordination and the sharing of information

between sales and procurement functions so both groups can easily access insights about sales forecasts and price structures to further optimize hedging decisions. From having an end product in mind, until all inputs have been purchased, there are steps companies can take along the way to better manage price fluctuations (Exhibit 3).

Organizations that favor a more comprehensive approach can delegate decisions around commodities procurement and hedging activities to a multidisciplinary group that can optimize the flow of feedstock. This group can also use a combination of hedging, purchasing, and trading activities to capture arbitrage opportunities as they emerge.

Despite their potential, these activities often suffer from a lack of strong forecasting capabilities within the organization, including advanced price forecasting, risk-adjusted value forecasting, and arbitrage decision modeling. What's more,

corporate processes and governance structures often don't facilitate the exchange of helpful information between procurement, S&OP, and sales. Building and reinforcing these analytical capabilities will be key to realizing the benefits from new ways of managing risk through multiple functions.

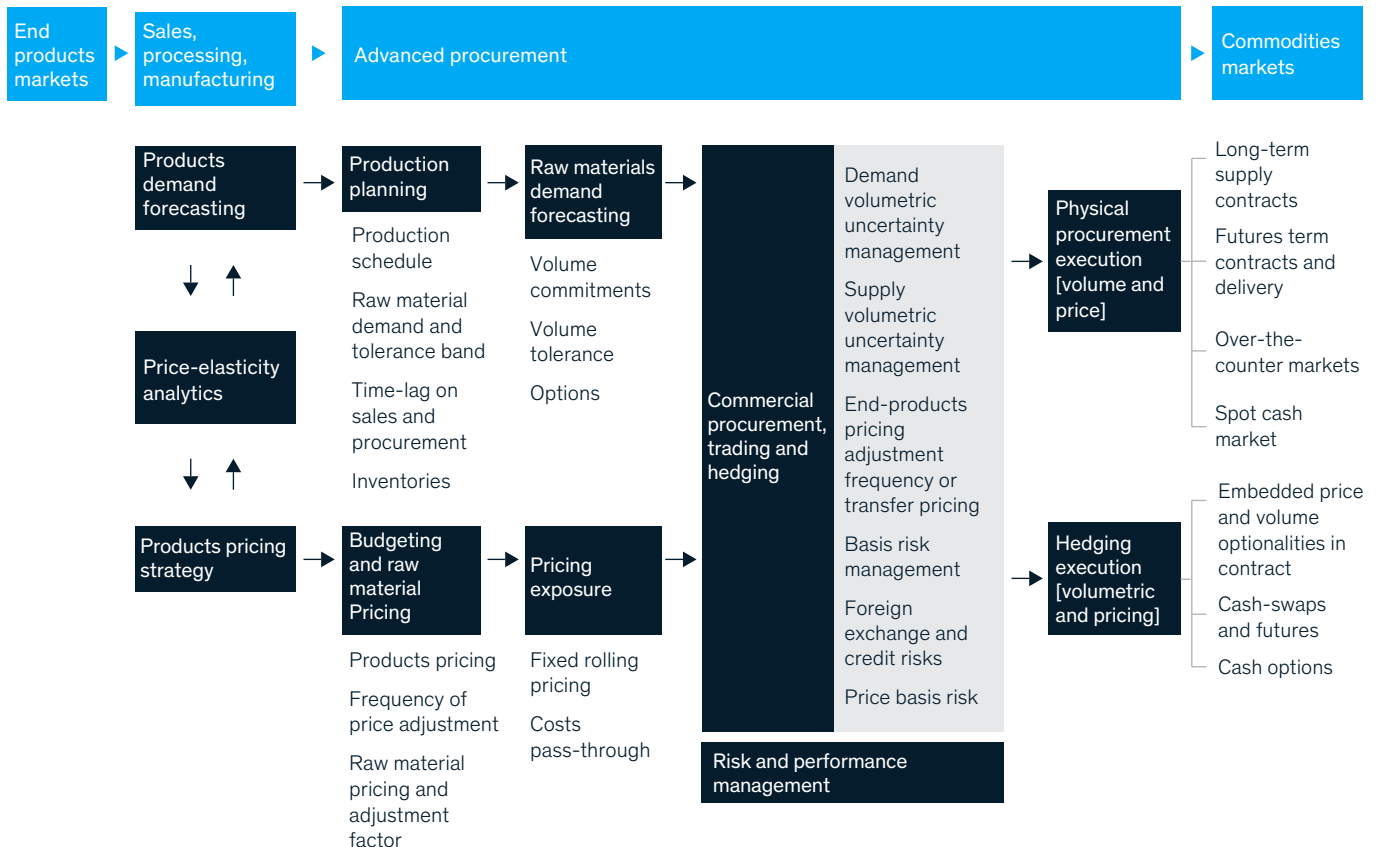
**Proactively manage inventory price risks**

Even though companies don't often think of their inventory as a source of market price risk, the prices of end products and feedstocks can fluctuate before companies sell or process the inventory. To mitigate this risk, companies can hedge inventory risks in addition to margin risks. If commodity inventory is above a certain threshold, such as a company's historical average, it can hedge its feedstock and product inventory on a rolling basis.

Because commodity feedstock inventory is usually valued on a mark-to-market basis instead of a cost basis, hedging can help protect the company from

Exhibit 3

**An advanced procurement function should include hedging and trading.**



## Avoiding losses with systematic hedging

**An agrichemicals company** that produces fertilizers from natural gas had thinner-than-expected margins of earnings before interest, taxes, depreciation, and amortization of 10 to 15 percent (against an expected 20 to 25 percent). Analyzing the company's operations revealed that while a majority of its sales contracts were signed based on fixed prices in advance of delivery

(for instance, six months), the company purchased natural gas at spot prices (which reflected monthly market prices).<sup>1</sup> Because the company had no way to pass on the increased price of natural gas if it needed to, its margins were vulnerable to fluctuations in the price of natural gas.

The company overhauled its hedging strategy and incorporated an approach

that fixed natural-gas prices at volumes that correspond to fertilizer sales volumes on a rolling basis. Backtesting showed that this systematic approach would have helped the company avoid €15 million to €18 million in annual losses that would've resulted from the volatility of the spread between fertilizers and natural-gas prices.<sup>2</sup>

<sup>1</sup> The spot price for a commodity is the current market price.

<sup>2</sup> Backtesting is an approach to analytics that applies a strategy or model to past scenarios to assess how well the model or strategy would have predicted historical results.

write-offs of inventory value if commodities are revalued at lower prices.

Managing inventory levels can also be an implicit hedge. For example, if a tire manufacturing company expects short-term rubber prices to increase, it may build up its inventory of rubber. As always, it is critical to monitor inventory risks, hedge them when necessary, or tactically use commodity inventories (as in the tire example) to hedge anticipated short-term price risks.

### **Avoid betting on the market**

Many companies are tempted to hedge their feedstock prices when market prices are low, but this behavior is equivalent to betting on the market, specifically betting that prices won't fall even further. Locking in commodity prices should instead be aimed at stabilizing margins. If feedstocks and the prices of products sold are decorrelated, such as in the following case of jet fuel prices and airfares, the margin volatility will be high. Concretely, if jet fuel prices increase 30 percent in a year, airfares are unlikely to increase enough to offset the effects of the increase in jet fuel prices and will lead to significant margin erosion. To achieve short-term (a quarter or a year ahead) EBITDA stability, companies can hedge short-term feedstock volumes on a rolling basis to mitigate commodity-pricing risk when revenues are somewhat predictable (such as with

passenger volume and average airfares a month or a quarter ahead). Of course, short-term hedging only makes sense in rare cases, such as when short-term revenues are predictable or when locking in feedstock prices will result in a nearly locked-in margin. Even so, stakeholders should only make such decisions after careful consideration.

## **Capabilities crucial to effective hedging**

Organizations can optimize their hedging strategies by developing the analytics and processes that make it easier to investigate the optimal approach. This undertaking can be broken down into four key components.

### **Developing analytics to understand commodity price risks**

For companies to understand their exposure to EBITDA fluctuations through commodity price risks, they must first analyze and investigate the correlations between the prices of feedstocks and their end products. They should then quantify exposure based on projected feedstock supply and end-product sales commitments. This exercise can help companies test their abilities to withstand scenarios that involve varying volumes and prices for both feedstocks and products (see sidebar "Scenario testing to refine hedging policies and processes").



If companies want to fully understand their commodity-price risks and make rational hedging decisions, they must first ensure that they have capabilities in place that help measure their exposure to commodity price risks (Exhibit 4).

Such a model can help companies forecast volumes of feedstock needed as a function of product-volume sales. On this basis, companies can use the model to determine the share—and corresponding volumes—of products to sell or feedstocks to purchase at a fixed price and identify the associated hedging needs on specific maturities. Specifically, companies can quantify the value at risk from their portfolios and perform stress tests before making hedging decisions. Companies can then quantify their exposure to commodity-price fluctuations after hedging to assess the effects of their approach.

**Implement a sales and operations planning process to optimize price risk management**

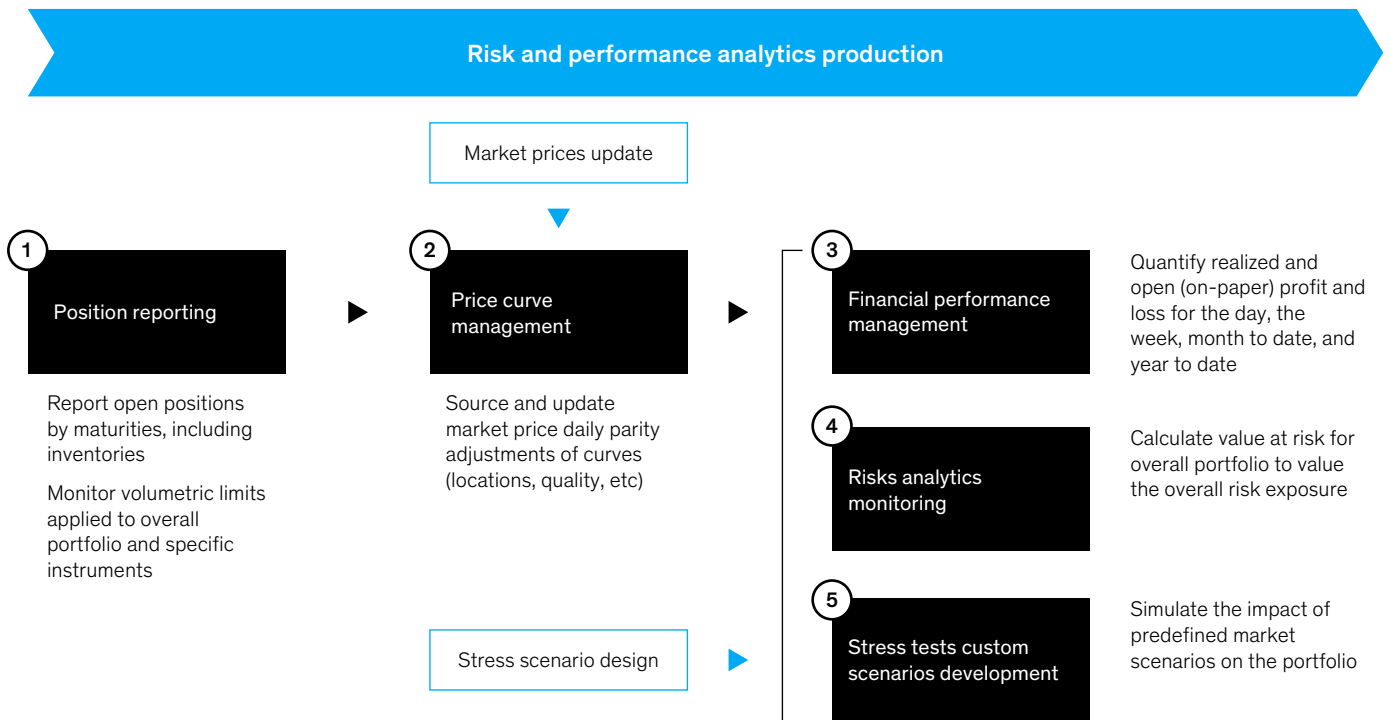
The S&OP function can ensure that a company’s exposure to commodities’ price fluctuations is at

an acceptable level. However, many companies lack formalized S&OP processes even though the supply chain and sales functions must coordinate their actions. S&OP processes tend to be underdeveloped or absent because meaningfully integrating the procurement, sales, and supply-chain functions is often complex and difficult. In particular, the different functions may all want to contribute to—or even control—decisions such as inventory levels, purchasing, and hedging. Sales may advocate for higher inventory levels than is necessary to guarantee responsiveness to short-term demand, but procurement may see this approach as a source of additional market risk.

In spite of—and even because of—these sources of potential conflict, it’s worth instituting an S&OP process to ensure that companies’ approaches to managing the risks associated with commodity-feedstock pricing strategies for end products and feedstocks are based on the latest forecasts. This can help better integrate information about inventory, production capacity, purchasing, and sales.

Exhibit 4

**An exposure risk model can help companies make considered hedging decisions.**



## Scenario testing to refine hedging policies and processes

### A minerals-processing company

that produces specialty products for construction companies used nonferrous metals as feedstock. The underlying markets had a volatility range of 20 to 35 percent and were significantly correlated with the prices of metals used in the company's products. However, the company had a large share of long-term sales that had been made at fixed prices, while its feedstock prices were floating. Despite these risk factors, the company

had neither quantified nor assessed its exposure to commodity-price risks.

To position itself to better track, quantify, and manage its commodity-price risks, the company created a risk-management function to monitor its exposure to price fluctuations of feedstocks such as copper, manganese, and nickel. Underpinning this capability was a solution that allowed the company to perform risk analytics, such as value at risk and stress tests that simulated the impact of different market scenarios.

In parallel with its risk-management solution, the company also developed its hedging policy and governance around the execution process. Eventually, historical backtesting of the new hedging strategies helped the company identify an opportunity to reduce its commodity-price risks.<sup>1</sup> This reduction significantly decreased the earnings before interest, taxes, depreciation, and amortization fluctuations that arise from commodity-price fluctuations.

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<sup>1</sup> Backtesting is an approach to analytics that applies a strategy or model to past scenarios to assess how well the model or strategy would have predicted historical results.

### Continuously optimize the approach to hedging

Companies need to explore all available options to hedge their commodity exposure at the lowest possible cost. Doing so requires regularly evaluating hedging instruments, such as swaps, futures, options, and structured products, such as collars, all of which are available through brokers and financial intermediaries.<sup>6</sup> Companies may also investigate simpler solutions, such as directly engaging with their feedstock suppliers to fix commodity prices through long-term contractual agreements. Finally, companies can leverage advanced analytics and hedging algorithms to optimize the timing of hedging decisions. Indeed, significant recent improvements to hedging algorithms have resulted in models that can predict short-term prices with reasonable accuracy and suggest hedging decisions. Such models have proven more successful on less-liquid commodities,<sup>7</sup> whose prices may not reflect the full set of market information. Industrials can

backtest and explore incorporating these models to their hedging approaches.<sup>8</sup>

### Develop the right governance and policies to oversee hedging

Management of commodity price risks and the use of instruments to hedge these risks require a strong governance structure. This structure should ensure that all activities related to risk monitoring and risk mitigation (often through hedging) are compliant with enterprise policies and appropriately managed (Exhibit 5).

Fundamentally, a risk committee must define the company's risk tolerance and articulate the policies that would limit its exposure to an acceptable level. A group of functional experts should assess risk reports generated by a group dedicated to risk analytics.

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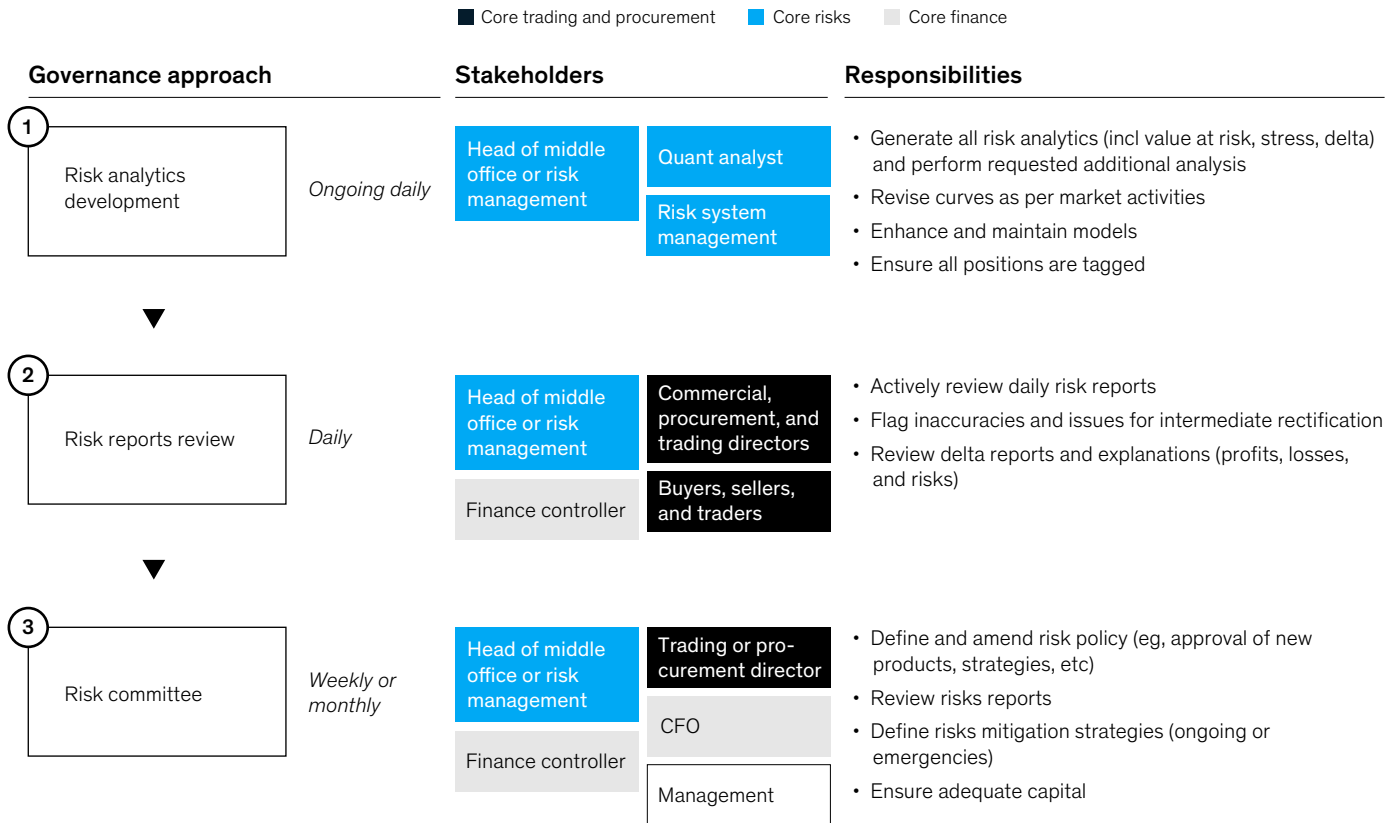
<sup>6</sup> Collars are options strategies designed to protect against large losses, though they may also limit large gains.

<sup>7</sup> Liquid commodities are commodities that are widely traded at large volumes by players from institutional investors to day traders. Because of the frequency of market activity, the prices of liquid commodities tend to reflect a majority of the information the market has.

<sup>8</sup> Backtesting is an approach to analytics that applies a strategy or model to past scenarios to assess how well the model or strategy would have predicted historical results. the frequency of market activity, the prices of liquid commodities tend to reflect a majority of the information the market has.

Exhibit 5

**Strict governance must be in place to manage risk.**



In a volatile environment in which increased fluctuations in commodities prices can materially erode margins, industrials must rethink their approach to managing the risks associated with commodity feedstock prices. Almost by default, a well-chosen hedging approach can help beat the competition. But the execution of this approach requires cross-functional collaboration and in-depth

analysis. The rewards are worthwhile: a thoughtful, comprehensive approach to hedging can protect margins, and companies that skillfully manage their hedging practices can turn their bottom-line stability into a competitive asset.

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