WHITE PAPER

The Importance of Real-Time Forward Curves

Leveraging Technological Advances to Manage Risk

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Commodity Technology Advisory

CTRM Market Research, Analysis and Insights

INTRODUCTION

The ability to manage and utilize accurate forward price curves has always been an important aspect of commodity trading and risk management – indeed, it is at the very heart of price risk management. Despite this, the collection of price time series data and the creation, validation and maintenance of curves, has also always proven to be somewhat problematic – particularly in illiquid, thin and/or real-time markets.

In the last several years, as market oversight by regulators, stakeholders and financiers increased in scope and intensity, forward curve development and use has become even more critical to those trading and/or managing commodity portfolios, particularly as profitable trading opportunities become more difficult to find. Coupled with a dramatic increase in the quantity and velocity of price and related data, the use of new tools and solutions is required to ensure accuracy, completeness, consistency and auditability.

This paper examines these issues in depth and analyzes potential solutions that will aid traders, analysts and risk managers in addressing their needs for real-time and easy-to-use price curve tools.

MARKET DYNAMICS

A New Era of Risk Management and Controls

With increased market oversight following the financial crisis of 2008, the practice of risk management and enforcement of trading controls have become organizational priorities for most, if not all, commodity trading companies around the world. While facing a suite of wide-ranging regulations in a number of jurisdictions aimed at ensuring market stability via increased visibility and the elimination of market abuse, traders must also continuously adjust their strategies and practices to address increasingly complex and globally influenced markets. Addressing and complying with regulatory mandates, while simultaneously ameliorating market risk and properly valuing positions, is an essential capability for any company seeking to maintain a profitable business in today's commodity markets.

Developing and maintaining adequate risk controls, including proper valuation processes, is not only a regulatory mandate, but also a requirement of stakeholders who have become far more adept at understanding the inherent risks and exposures in commodity trading - and the measures necessary to mitigate those risks. Financing banks, in particular, are much more sharply focused on understanding the risk controls and systems in place within their customers' trading organizations, and they have developed the expertise and ability to audit and verify that such measures are adequate, properly utilized and effective. Any perceived weakness in risk management, either in risk processes or systems, that is identified by the banks can and will result in a reduction of available credit, higher credit costs or even elimination of credit facilities altogether.

Structural changes are mandating new approaches

Structural market changes, including globalization, shifting supply and demand patterns, and technological changes have encouraged, or in many cases forced, market participants to evolve their business strategies and market roles. For example, larger traders and merchants, facing lower trading margins, are seeking to leverage and monetize their trading and risk management infrastructures by offering forms of direct market access to smaller producers and consumers (similar to those available via many of the exchange venues). This strategy of incorporating third-party positions requires a more systematic, coherent, and rigorous approach to risk management than would otherwise be required for a proprietary portfolio.

Asset holders, from generators to oil terminal operators, are facing reduced competitive advantages as regulators demand greater operational transparency to ensure those assets are not employed to manipulate market prices. Addressing these concerns, some markets have

seen the emergence of "virtual assets," financial products that allow companies to gain some of the advantages of physical asset ownership without the burdens of owning hard assets, including regulatory oversight, debt service and the inherent operational risks. One such example is the ability to arbitrage between oil forward contracts and storage value using CME instruments that represent physical oil storage.

Renewable energy mandates are also driving significant changes in the power and gas markets as increasing reliance on unpredictable sources of renewable generation (such as wind and solar) has created both opportunity and challenges. As operational variability creates increasing price volatility, energy traders are finding new opportunities in the intraday, real-time, energy markets. However, given the highly granular pricing and operational data generated by these markets, market participants have had to develop new programmatic trading approaches and risk capabilities that can quickly identify opportunities, and limit down-side risks, within vast amounts of high-velocity data.

New data sources and increasing volumes

Regulations mandating increased transparency, the growth of market-focused social media sources, and a move to automation, including IOT sensors, have resulted in massive increases in the amount and diversity of data available in today's commodity markets. Traders are, in turn, called upon to make faster decisions, despite the need to consider more data points than ever before in that decision-making process. As such, commodity trading companies are, by necessity, seeking out more sophisticated technologies that can aggregate, analyze and present real-time visualizations and rich analytic tools on their traders' desktops.

Risk managers, facing similar challenges in terms of data velocity and volume, require similar tools but, equally important, also require a consistent approach to position management and valuations throughout the trading organization. Often, different valuation methods and tools will be in use across front, mid and back offices that can result in discrepancies in positions and valuations that result in improperly valued positions and inaccurate hedges – increasing risks and requiring constant reconciliation and explanation. Despite these challenges, spreadsheets remain more or less ubiquitous in the industry, being used as ad hoc and sometimes even primary tools for a wide range of data aggregation, position management and risk activities. Despite the usefulness and familiarity trading staff may have with Excel, companies are recognizing its use poses any number of risks – including potential abuse, errors in data entry, capture or calculation, and lack of auditability – and are seeking alternatives to ensure adequate control, auditability and consistency of methodologies.

While trading organizations are forced to consume a plethora of new data sources as noted above, the practice of risk management is still defined by prices – historical prices, spot prices and forward curves; and increasingly, this information is needed closer to real-time and from a greater number of sources to support a wide variety

of different trading strategies, including cross-commodity and intermarket plays. These strategies will often include smaller, illiquid markets in which little reliable price information or standardized forward price curves exist. In these cases, it's incumbent upon risk managers to develop and derive forward curves based on analogous markets and/or any number of factors, including derived or estimated basis numbers that can be associated with any appropriate and available exchange data. In all such cases, the models and approaches utilized to develop those curves must be transparent and consistent within the context of the market to which they are being applied; and, as these price curves will often require external review and validation, the methods and data used in their development must also be transparent and auditable.

FORWARD PRICE CURVES

As noted, price data is key to price risk management and valuation; however, prices come from a wide number of different sources of variable quality, reliability and specificity to individual markets, including any number of trade intervals, units of measure and currency types. For example, some sources may be real-time, such as intraday power markets, or they may lag actual trades by days or even weeks, as is often the case in illiquid markets. Cross-border trading can introduce differing currencies or units of measure, and the development of forward curves for those transactions requires that FX curves be incorporated as well. Here, new price curves may be derived using FX and UOM conversions.

When it comes to consuming price data, three things are needed more than ever as a result of the changing market conditions described in Section II above – automation, visualizations and real-time capabilities.

Leading data management tools can be used to collect and verify price data. Combining rules-based automation with audit trails provides the ability to programmatically capture and transform prices while maintaining a comprehensive log of any issues, manipulations, or omissions. Various rules or edits can be specified and used to validate price data automatically by the data management software identifying and flagging potential data issues - for example, to check that a price is within an acceptable range of values. Manipulations and transformation can also be automated to create derived curves or to ensure price curves are calculated in the correct currency or unit of measure. Without such tools, users are subject to the risk of missing, erroneous or inaccurate data and/or the need to manually construct derived curves using insecure tools such as Excel. Furthermore, without a programmatic approach, it will be significantly more difficult and time-consuming to convince stakeholders and others that the data is accurate and verified.

With massive increases in volumes of disparate data types being available to traders and risk managers, the ability to visualize data on the desktop in readily consumable ways is an increasingly critical aspect of price risk management. Incorporating rich graphical views and easily sortable data on the desktop has become a "must have" capability for traders and risk managers alike. This is particularly true in intraday trading where the growth in near real-time data and information can overwhelm a trader's or risk manager's ability to maintain an accurate view of the market and make fully informed decisions.

Finally, a coherent set of integrated tools to perform the data management and visualization of both end-of-day and real-time forward prices and curves is a distinct advantage for personnel on the trading floor. Ensuring front, mid and back office staff are operating from a common set of curves ensures valuations and reports are created on the same basis with the same up to the minute prices, reducing reconciliations and accelerating decision making. The ability to mark prices faster based on intraday snapshots or achieve earlier end-of-day settles also provides competitive market advantage and allows more accurate risk management and trade decision making.

MARKET SOLUTIONS

CurveBuilder and MarketView by Drillinginfo

With the acquisition of GlobalView, a leading provider of analytics and data management including the MarketView visualization and analysis tool, and DataGenic, a leading provider of data management software, Drillinginfo is in the unique position of being able to combine rigorous data management with desktop and mobile consumable information. Arguably, it now offers the only complete enterprise data management system and decision analytics platform. In continuing to develop and add value to these products, it recently also announced the addition of real-time forward curve construction capabilities to MarketView. As a result, MarketView is a tool that meets most, if not all, of the requirements discussed above, including:

- Comprehensive data management and price feed aggregation. Price data can be verified, modified, transformed and manipulated to produce any number of derived curves in an automated manner providing a full and complete audit trail in the process
- Price and related data can be displayed and manipulated in a readily consumable visual manner allowing traders to identify trends and spot opportunities, and risk managers to manage risk in a more effective and timely manner
- Both traders and risk managers (as well as others in a trading entity – such as treasury, for example) can utilize more accurate intraday, real-time prices and forward curves with the same level of automation, auditability and visual accuracy

The combination of these features helps to provide many benefits to both traders and risk managers including:

- Positions can be marked more accurately using real-time prices
- Traders gain greater visibility into markets and are able to spot opportunities that otherwise may have been missed
- Custom price curves can be created to solve illiquidity, seasonality, UOM or currency issues
- The curves can be shared across front, mid and back office for consistency
- The tool provides a full audit trail for compliance and stakeholders

Tools like MarketView and CurveBuilder from Drillinginfo tick many of the boxes in meeting the rapidly developing appetite for risk management and trade support in today's rapidly changing commodity markets. As markets continue to evolve and change under regulatory and stakeholder oversight, such tools are becoming essential not just to effectively manage risk, but to prove it too.

ABOUT DRILLINGINFO

Drillinginfo delivers business-critical insights to oil and gas industries through a state-of-the-art SaaS platform built on industry-leading data and energy analytics. Our solutions deliver value across the upstream and downstream supply chain empowering exploration and production (E&P), oilfield services, midstream, and financial services companies to be more proactive, efficient, and competitive.

As a critical component of energy customers' strategy, Drillinginfo offers a suite of products and services that provide the predictive tools and technology needed to drive exploration decisions, evaluate rapidly evolving opportunities, and achieve better, faster results.

Drillinginfo is uniquely positioned to deliver actionable intelligence over mobile, web and desktop platforms to analyze and reduce risk, conduct competitive benchmarking, and uncover market insights. As a trailblazer in the space, we are dedicated to constant innovation and to providing new ways for our customers to outpace their competition and lead their respective industries.

The company serves more than 2,500 companies globally from its Austin, Texas headquarters and has more over 400 employees.

For more information, visit info.drillinginfo.com.

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ABOUT

Commodity **Tech**nology **Advisory LLC**

Commodity Technology Advisory is the leading analyst organization covering the ETRM and CTRM markets. We provide the invaluable insights into the issues and trends affecting the users and providers of the technologies that are crucial for success in the constantly evolving global commodities markets.

Patrick Reames and Gary Vasey head our team, whose combined 60-plus years in the energy and commodities markets, provides depth of understanding of the market and its issues that is unmatched and unrivaled by any analyst group.

For more information, please visit:
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