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"DYNAMIC COMMODITY VALUATIONS"

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Dynamic Commodity Valuations

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Introduction

Although the trading of commodities can be traced back to Ancient Babylon, until recently the pricing of these markets was rather complex and opaque. Valuations evolved from long-term fixed price regimes to arcane bilateral markets. Over the years, a host of reporting agencies played a critical role in identifying pricing benchmarks and facilitating trades. According to Johnson (2018), there are presently over 100 organizations — both private and public — throughout the world that produce a wide array of commodity benchmarks. These "price reporters" generate in excess of 100,000 assessments of commodity prices every week and thousands of fundamental data points per day across a vast range of global markets. This paper proposes that in today's information age it is possible and necessary to construct a globally consistent investment framework that integrates all available fundamental data and technology into dynamic stocks-to-use ratios to assess commodity valuations in near real-time.

What is the Value Factor for Commodities?

Upon identifying and tracking structural premia like carry, momentum, and volatility across different asset classes, traders and analysts use mean-reversion as a proxy for commodity value. That is to say, mean-reversion is the current observed price relative to an average (deflated) price over an extended lookback period. In contrast, the equities market is informed by a row of transparent basic measures for computing the value factor. For example, MSCI draws on sales, earnings, cash flow, and book value. Irrespective of one's favorite metric, it is worth noting that all balance sheet data adhere to Generally Accepted Accounting Principles (GAAP), thereby ensuring a modicum of consistency and transparency. Whereas any yardstick is subjective and perhaps even biased to some extent, investors can assume that the numbers are indeed directly comparable for all publicly traded stocks.

Mean-reversion is certainly a documented structural premium for commodity price dynamics that can be observed over the long haul. However, following this statistical metric is hardly indicative of fundamental analysis. Therefore, mean reversion should not be deemed a fitting substitute for value.

Commodity Supply and Demand Analysis: Theory and Practice

While equity instruments are forward-looking, commodities can be viewed as spot assets that reflect current fundamentals of supply and demand. Commodities are typically priced in relation to the marginal cost of supply and the marginal willingness of consumers to pay. As such, the price is grounded on both fluctuations in and the levels of supply and demand. More often than not, the fundamentals changes are on a sequential basis. At other times, though, the price can abruptly shift due to weather or other events.

Table 1
The Classical Balance Sheet for all Major Commodities Sectors, Including Energy, Metals, and Agriculture

Annual Balance Sheet	Energy	Metals	Agriculture
Beginning stocks	Global stocks	Known exchange & off exchange stocks	Prior season crops in storage
Production	Local/global aggregated production	Global mine supplies adjusted for disruptions	Aggregate of regional acreage, yield
Global trade (imports - exports)	Producer & consumer countries: exports & imports	Producer & consumer countries: exports & imports	Producer & consumer countries: exports & imports
Consumption	Global and local industrial and consumer consumption	Global and local industrial and consumer consumption	Global and local industrial and consumer consumption
Ending stocks	Beginning stocks + production + imports - exports - consumption	Beginning stocks + production + imports - exports - consumption	Beginning stocks + production + imports - exports - consumption

Challenges with Traditional Commodities Balance Sheets

Historically speaking, commodities balance sheet entries were not observable in a timely fashion. Data was typically published by government agencies and often substantially revised in later releases. The classical balance sheet for all major commodities is shown in Table 1.

Reporting agencies and organizations adopt different accounting standards. A case in point are the varying estimates released for corn stocks held by the People's Republic of China (PRC) in February 2021. The United Nations Food and Agriculture Organization (FAO) lowered Chinese corn reserves by 54 million tonnes to 139 million tonnes. Conversely, the United States Department of Agriculture (USDA) raised its estimate by 4.5 million tonnes to 196.18 million tonnes in their monthly World Agricultural Supply and Demand Estimate (WASDE). Both of these numbers sharply diverge from local sources and surveys that put reserves at significantly lower levels. According to IPI estimates, China accounts for over 25% of global corn consumption (a projected 295 million tonnes in 2020/21). Consequently, the different model assumptions can have a material impact on decision makers. These disparities stem from the lack of generally accepted commodity accounting principles governing the sundry reporting agencies, public organizations, and buy-or-sell side analysts. Hence, each body adopt its own conventions and guidelines. This lack of uniformity severely hinders the efforts to gauge international commodities balances and compare individual commodities to other tightly linked markets.

Dynamic Stocks-to-Use Ratios as a Valuation Factor

For the sake of overcoming this informational discord, the author champions the *dynamic* stocks-to-use ratio as a global measure of commodity values. More specifically, this ratio should be used to measure ending stocks/consumption for a particular annual or seasonal global commodity balance sheet and

importantly it should be dynamically modified as each component is updated. To facilitate a direct comparison and ranking of all commodities via their stocks-to-use ratio, a consistent and global analytical framework should be established. Let us expound on this proposition by delving a bit deeper into the corn market.

Recent advances in technology and data science enable us to deploy a single global framework across all global commodities and parse supply and demand in near real time. As a result, analysts can monitor shifts in commodity valuations at a higher frequency than traditional methods.

Case Study: 2020/21 World Corn Balances

Table 2
Global Corn Balances

Beginning Stocks	Prior Season	303.0 Mt
Harvested Area	Acreage Analysis	196.8 MH
Yield	Yield Analysis	5.76 tonnes per hectare
Production	= Acreage * Yield	1132.7 Mt
Total Supply	Beginning Stocks + Production	1435.7 Mt
FSI Use	Food, Seed & Industrial	424.2 Mt
Feed & Residual Use	FSI & Residual Use	720.1 Mt
Total Use	FSI, Feed & Residual	1144.3 Mt
Ending Stocks	Total Supply - Total Use	291.4 Mt
Stocks to Use	Ending Stocks/Total Use	25.50%

Sources: IPI, USDA.

Notes: Mt is an abbreviation for million tonnes, and MH is an abbreviation for million hectares.

Table 2 presents a concrete example of the inputs used in calculating the stocks-to-use ratio by showing the global corn balances for marketing year 2020/21 as of February 2021. This balance sheet is aggregated by IPI from single country balances and includes major exporters such as the U.S., Argentina, Brazil, Ukraine, Russia and E.U. and major importers such as China, Japan, South Korea, and Mexico. Single country exports and imports play a key role in determining supply and demand.

A globally consistent and dynamic framework for global commodity balance sheets should be comprised of databases and models that comply with the same guidelines, principles, and models. In the next section, we shall briefly review the key models for our case study, continuing with the international corn market.

Corn Supply Side Production Analysis

Model 1: Acreage Analysis

The aggregate survey analysis incorporates macro and micro surveys. The former involves multiple visual field surveys of numerous random spots throughout the crop development cycle. Plantings are a function of the weather and economics. Price advantages of one crop over another in a particular season might derive from weather conditions that allow for a greater share of total plantings. Alternatively, the micro surveys consist of visits to a smaller number of individual fields at set intervals.

Model 2: Yield and Crop Conditions Analysis

Yield-and-crop-conditions models focus on aggregated real-time indices of bearish/bullish conditions, which are highly dependent on the specific time of year, crop, and region. For instance, dry weather may be favorable during planting or harvest season, but otherwise deleterious. Therefore, it is incumbent upon observers to account for this seasonality. A combination of, say, hot and arid weather in the U.S. during July would place more stress on corn growth than a cool and dry spell.

As a rule, models should factor in daily raw inputs from individual weather stations of maximum and minimum temperature, precipitation, and subsoil moisture as well as Normalized Difference Vegetation Index (NVDI) data. Shorter term weather models such as the American and European models should be incorporated along with long term teleconnection models. (The American model is also known as the Global Forecast System (GFS) model and is operated by the National Weather Service. The European model is also known as the European Center for Medium-Range Weather Forecasts (ECMWF) model.) For the sake of consistency, forecasts are to be performed on a single crop weighted by region of production. In other words, all the producing countries should be identified along with the key regions of the major players – the United States, China, and Brazil. The crop calendar for each region should be closely observed and may differ for all the key crop stages, namely planting, silking, and grain fill.

Model 3: Global Trade Imports and Exports Analysis

Tracking maritime shipping of grain via satellite allows for a granular analysis of global ship types by port, terminal, and berth. Data from premium vendors and public sources can be molded into an up-to-date and comprehensive database tracking the flow of commodities. Likewise, keeping tabs on physical loadings, movements, and discharges provides insights into actual progress *vis-a-vis* announcements and general market talk. Under this heading, we can include analyses of single and aggregated vessel performance; congestion and delays at major ports, terminals, and berths; vessel berthing activity; commodity flows and trends. All this information can be obtained ahead of official publications.

Before proceeding to the next model, let us touch upon a pertinent development in the global corn market. In 2020, China was a major buyer of corn on the world market for the first time in many years. This spawned a major global expansion in the demand for this commodity, not least U.S. corn. Demand for the latter picked up thanks to a lack of or tepid competition from the Ukraine, Brazil, and Argentina. In fact, the United States now has the lowest priced corn in the world. This state of affairs will probably last until the next harvests of the two Latin American rivals.

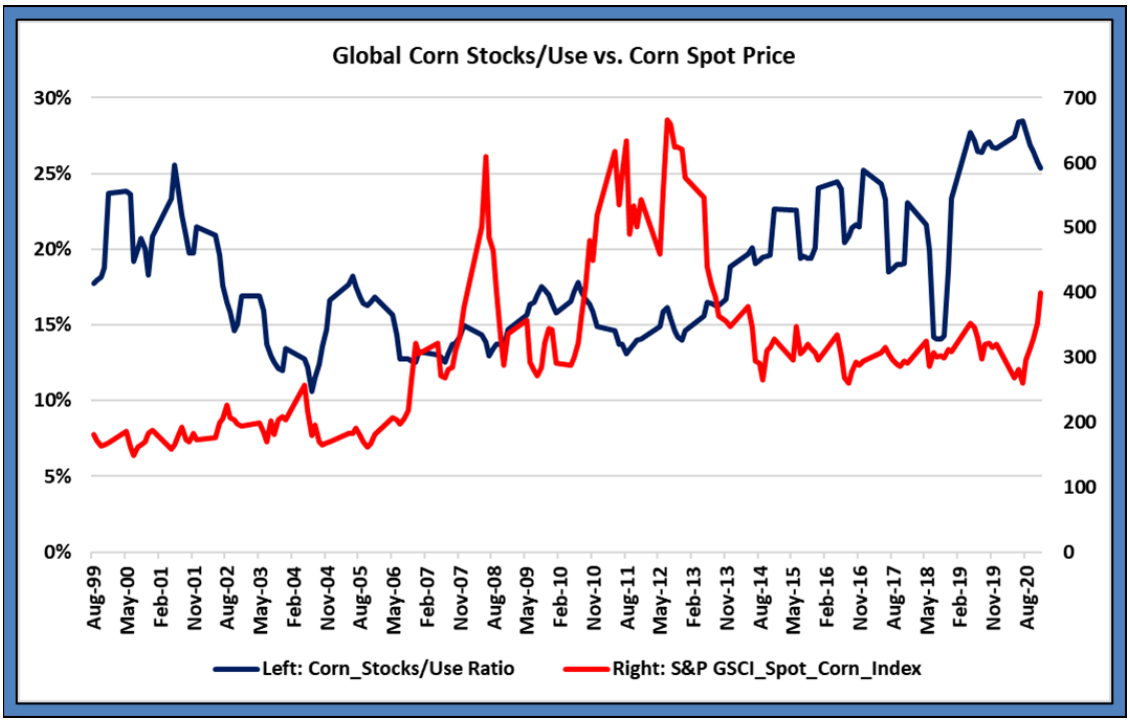
Model 4: Consumption Side Analysis

With respect to ethanol production and margins analysis, the corn ethanol grind estimate is a key model for domestic consumption. The same can be said for the food, seed, and industrial use of high-fructose corn syrup (HFCS), glucose, and dextrose. Nowcasting, econometric models, and surveys further help observers understand deviations in the aforementioned macro variables.

The net result of employing the above four models is to create an updated global corn balance sheet with which to calculate a current global stocks-to-use ratio.

Historical Corn Stocks-to-Use Ratios and Corn Prices

Figure 1
Global Stocks-to-Use Ratios and Corn Prices Between August 1999 and August 2020



Source of Data: Bloomberg.

When the level of stocks-to-use increases, this is usually accompanied by a surplus and price dips. Conversely, signs of global shortages tend to command a bullish price reaction. As Figure 1 demonstrates, the spot corn price is sensitive to both the level of and fluctuations in the stocks-to-use ratio. During the fourth quarter of 2020, a drop from record highs for this ratio was followed by a spike in corn prices. The main catalyst behind this *volte-face* was the surge in Chinese demand.

Conclusions

Market Efficiency Implications

An integrated and dynamic commodities balance sheet analysis is conducive to a more efficient market. When the balance sheet tightens due to acute commodity shortages, a near real-time analysis supports a long speculative position that pushes up prices, rations demand in a timely fashion, and encourages marginal supply before the onset of alarming shortages. By identifying deficits and shortages in advance, consumers and producers can prudently adjust their behavior. As a result, the market is better placed to avert serious disruptions.

Investment Management Implications

For asset managers, near real-time fundamental analysis provides an important potential edge. By swiftly discerning emerging fundamental imbalances, managers can net potential uncorrelated alpha returns to trend-following strategies with earlier position entries and exists. Trend-following strategies by comparison are backwards looking and lag the price action. As large investment funds enter the commodities market following popular trend-based signals, they are liable to create a structural positioning imbalance and a less desirable risk-reward to holding a mature position.

Observing a potential divergence in the relative stocks-to-use dynamics of commodities with tight fundamental linkages, such as corn and wheat or soybeans, can also provide critical insights into market-neutral relative-value opportunities that should exhibit reduced correlations to most common investment themes.

Reference

Johnson, 2018, The Price Reporters: A Guide to PRAs and Commodity Benchmarks, Abingdon (U.K.): Routledge.

Author Biography

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Mr. Nick Vasserman has over twenty years of experience in developing and deploying quantitative macro-oriented systematic programs globally. He has managed systematic macro trading portfolios in New York, London and Toronto since 1996 at major investment banks and is now offering 4th generation evolutions of the strategies and portfolio risk framework. Before launching Integrated Portfolio Intelligence (previously Momenta Capital), Mr. Vasserman spent several years at J.P. Morgan in a variety of senior trading and risk management roles. He founded and was Head of J.P. Morgan's Americas Cross Asset Quantitative Strategies business. Mr. Vasserman was previously Global Head of Index Trading, Quantitative Index Strategies

and Electronic Market Making within the renowned Global Commodities Group at J.P. Morgan. Prior to joining J.P. Morgan in 2009, he was Global Head of FICC (Fixed-Income Currencies & Commodities) Proprietary Systematic Trading at UBS Investment Bank. Mr. Vasserman has also held roles in Interest Rate Derivatives Trading as well as Exotic and Structured Derivatives Trading at UBS in New York and London. He holds a Bachelor of Administrative Studies (B.A.S.) degree from York University in Canada and a finance M.B.A. from Canada's University of Toronto, Rotman School of Management, where he conducted research with Professor John C. Hull on pricing and hedging exotic options.

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