Alternative Assets

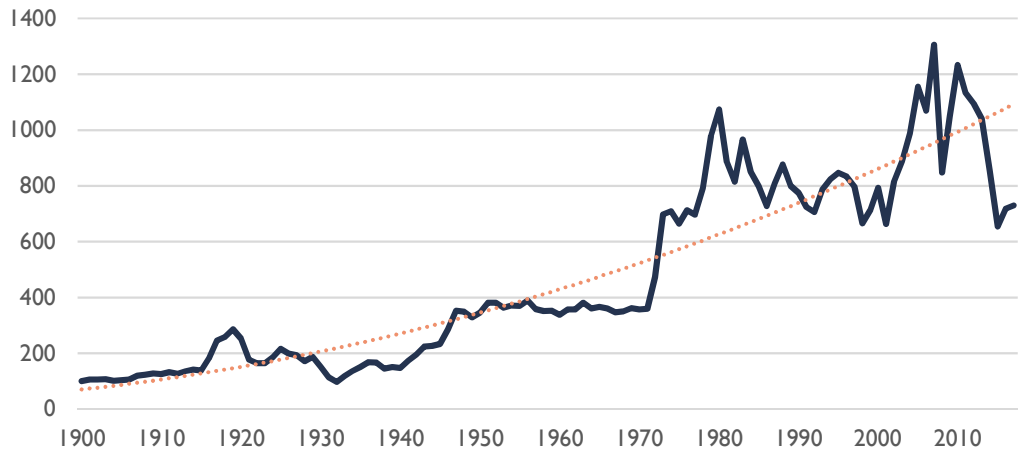
A Primer on Commodities

Commodities provide little return…

- Commodities prices are at a level first achieved in 1970; they are *75% below* their level of 1900 when adjusted for inflation.
- The role of commodities in a diversified portfolio for a long-term investor is non-existent with an exception for Oil since 1970.
- Opportunities in commodities arise for short-term investors with the ability to time the next commodity cycle.
- As a hedge for unexpected inflation, commodities may add efficiency to a fixed income portfolio while sacrificing significant return.

Exhibit 1: Spot Commodity Price Index

…and long periods of zero or negative returns.



Source: FRED, Bank of Canada, Bloomberg, CRB, CRM Calculations. Annual data 1900-2017.

Commodity prices enjoyed a historic advance before the Great Recession as global economic growth expanded. Despite a rebound in growth after the Great Recession, an index of commodity prices now stands at the same level as

it was in 1975. The natural question is to ask what the role of commodities is, specifically a commodity total return index, in a diversified portfolio. For long-term buy and hold investors, there is no role. Opportunities may arise, however, over shorter periods for investors with the ability to time the next commodity cycle.

Commodities and Strategic Asset Allocation

I. Introduction

Commodities offer little return or diversification benefits in the long run.

The main arguments for the inclusion of commodities in strategic asset allocation are the diversification benefit and the real returns that protect against inflation. The latter case is only partially applicable: commodities account for only 30% of the CPI index and thus provide just a partial hedge of inflation. Further, the cost of diversifying the portfolio with commodities is high: an average return that is between 300 and 800 bps lower than the other asset classes. There are exceptions to these conclusions: crude oil and gold have performed well compared to other commodities, however, their risk is higher and the returns lower than equities. While oil may provide a leading indicator of equity market performance (Angelidis, Degiannakis, & Filis, 2015), the low efficiency of oil and gold makes market timing a critical element for successful investing with them. For long-run investors, the conclusion is clear: buy the business, sell the commodity.

Notable in the annual data from 1900 the following observations[1]:

Cyclical opportunities may exist.

- Commodity returns are cointegrated with real per capita economic growth and return -1.3% in real terms.
- Commodity price volatility ranks between long bonds and equities.
- Real GDP per capita leads CRB implying growth drives prices
- Commodity prices lead changes of inflation
- Short-run dynamics in commodity prices lead to significant deviations from the trend that may provide cyclical investment opportunities

[1] See Appendix A for data sources and index construction.

Productivity does more with less and Is a poor omen for commodities.

The observations follow the intuition of how the supply and demand forces work in the real economy. Increased growth leads to increased demand for primary commodities. The natural lags in production and capital investment drive demand to exceed supply in the short-run, which causes cost-price pass-through to the final consumer. Price increases moderate demand, while increased production capacity augments supply. These actions result in a down cycle side with falling prices and commodities. Thus, the cyclical fluctuations in commodities are a function of *elastic demand meeting inelastic supply*. While this dynamic can provide cyclical opportunities, the long-run conclusion is stark: productivity enables the ability to do more with less. To the extent that productivity will remain positive, then commodity returns will be negative. If the promise of alternative energy and additive manufacturing deliver, an even direr price decline may result.

Who will drive demand If China fades?

Global growth is moderating; specifically, the Chinese growth rate falling from 10% to sub 7, and commodity prices are in a significant retreat from their previous highs. This outcome is a material event since China (and to a lesser extent India) augmented global economic growth and increased the demand for commodities. Beneficiaries of the heightened commodity demand were Brazil and Russia in the emerging economies, while the developed country leaders were Australia and Canada. The diminished demand has mainly exposed the lack of economic diversity in Brazil and Russia and may lead to lower economic growth (Drechsel & Tenreyro, 2018). While Australia and Canada have survived due to more diversified economies, the sky-high property prices and reliance on energy commodities leads one to ask whether it is a question of when, not if, their growth will slow. They will almost certainly face higher economic volatility (Joëts, Mignon, & Razafindrabe, 2017). Only time will reveal the answer.

The critical question to address is what will be the secular picture for commodities? China's goal is to maintain domestic growth between 6-7% to sustain its urbanization plans and provide the basis for domestic consumption growth. Since China's economy accounts for roughly 25% of the global

demand for primary commodities and commodity prices are linked to global growth, then the argument begins with China's growth prospects.

I. The Case for Commodities

The notion of commodities as an asset class is becoming increasingly a part of the strategic asset allocation process, especially the long-term horizons pension and endowment portfolios. The argument for adding commodities in the portfolio include the following:

Who will drive demand If China fades?

- An inherent return in the asset class,
- Lower correlation to the traditional asset classes, and
- A real return asset that protects investors against the ravages of inflation.

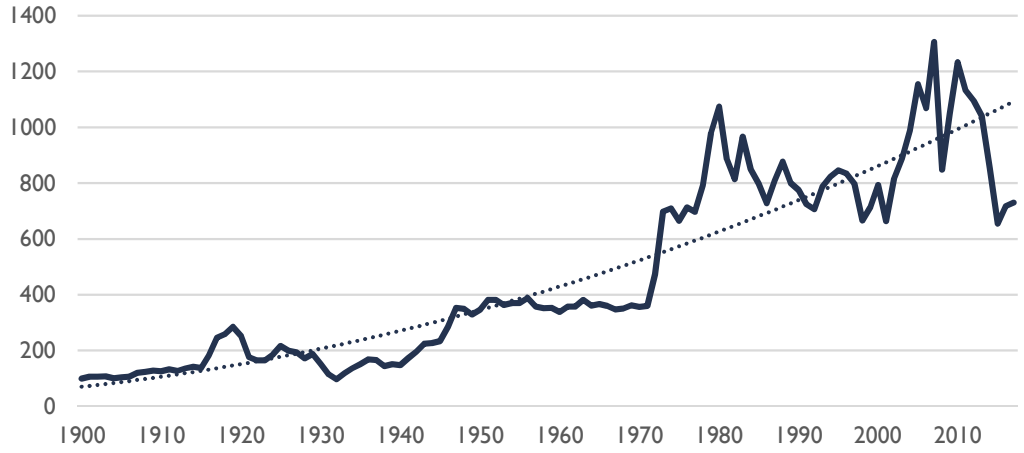
Accordingly, the simplest place to start is testing these prior statements for validity using long-term historical commodities price data.

A spot Commodities Price Index ("SCPI") Index since 1900 shows the reality of return performance (exhibit 2). Long-dated historical commodity prices exhibit an upward trend, with several 20-year periods of pricing plateaus, each followed by roughly ten years of rapid price appreciation. The question is whether this price behavior earns them a place in the strategic asset allocation process? To answer that question, analysis of the historical data needs to determine the following:

1. What are the primary drivers of returns in commodities?
2. Do commodities improve efficiency in an investment portfolio?

Exhibit 2: Spot Commodity Price Index (1900-2017)

Spot prices go decades without gains.



Source: FRED, Bank of Canada, Bloomberg, CRB, CRM Calculations. Annual data 1900-2017.

A brief overview of the strategic asset allocation process and the standard context for the inclusion of commodities in the portfolio will help frame how to answer these questions.

II. Strategic Asset Allocation

The traditional view of asset allocation is in the context of two broad financial asset classes: equities and bonds. A broader definition of asset classes was suggested by Greer (1997), who argued for the interpretation of assets in three ways:

Where do they belong in the asset allocation?

- **Capital assets** provide cash-flows (e.g., interest and dividends) that are measurable for magnitude and timing, (e.g., liability matching).
- **Consumable/Transformable** assets offer control over the realization of the cash-flow. If it's not needed, it can be left in the ground (e.g., timber) or stored (e.g., grains).
- **Store-of-value** assets provide cash-flow certainty in real-terms, irrespective of what's happening in the market or with inflation (e.g., TIPS or Gold)

Institutional investment portfolios manage multiple objectives, including the generation of current income to service near-term financial commitments,

capital appreciation to fund longer-term obligations, and the preservation of future value against unexpected inflation through real return maintenance. As such, assets comprising elements of the three class definitions above are all significant contributors to success.

Are commodities a store-of-value or transformable good?

The traditional allocation of Equities and Bonds provide varying degrees of participation in these three asset classes definitions. Bonds provide cash flows through their interest and have a store-of-value component for expected inflation. Equities provide cash flows through dividends, provide control over the realization of capital gain/losses, and can act as a store of value to the extent the business has pricing power. Thus, traditional asset classes are incomplete matches to these prior definitions of asset classes. The implication is that the strategic portfolio may benefit by the inclusion of a more targeted asset class to address the store-of-value and consumable/transformable definitions. In this context, understanding the characteristics of commodities to determine their role in the strategic asset allocation process is critical.

III. The Reality of Commodity Returns

No Inherent growth and dismal returns.

Commodities offer no inherent growth prospects above real GDP per capita growth or yield. They provide a singular cash-flow realized upon their disposition, whose price reflects the current supply and demand functions in the market. Since they are indicative of current market conditions that can instantaneously adjust, they provide a return characteristic that parallels a real-return or inflation hedge asset class.

The cross-section of commodity returns over different sub-periods shows their dismal performance (table 1). The performance of commodities in nominal terms is minimal and is negative when accounting for inflation (the 1970's supply shock to oil notwithstanding). Commodities provided nominal returns since 1900 that are roughly in-line with the US per Capita GDP growth over the same period. Their real returns, however, have worsened in the post-1950 US economy.

Table 1: Commodities Nominal and Real Annual Return (%)

Return	Period	SCPI	Copper	Corn	Lumber	Oil	Wheat	Gold	CPI
Nominal	**1900**	1.7	2.7	1.8	4.1	3.6	1.2	3.6	3.0
	1950	1.1	4.2	0.8	2.8	5.1	0.3	5.3	3.5
	1970	1.5	4.3	1.4	4.7	6.8	1.1	7.9	4.0
Real	**1900**	-1.3	-0.3	-1.2	0.6	0.5	-1.8	0.6	
	1950	-2.3	0.7	-2.6	-0.7	1.6	-3.1	1.8	
	1970	-2.3	0.3	-2.5	0.7	2.7	-2.7	3.7	

Crude Oil and Gold offer small real returns.

Source: FRED, Bank of Canada, Bloomberg, CRB, CRM Calculations. Annual data 1900-2017.

Commodity prices are risk without return.

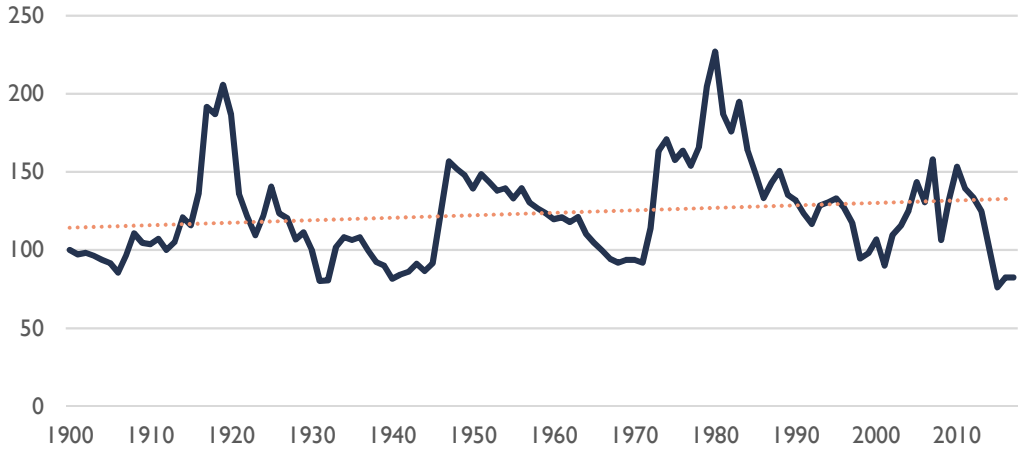
These results are in striking contrast to the current perceived view of commodities, in particular, the performance of a commodity total return index. The primary source of return for a commodity index-linked note is the collateral return and the corresponding futures roll strategy. Regarding efficiency, receiving a cash return with volatility somewhere between bonds and equities does not seem palatable. Furthermore, we can find no significant difference between the spot index and future index, which gives serious doubt to the return generated by the futures roll process, particularly when futures prices over long-periods increase volatility versus spot prices (Holmes & Otero, 2017). In the final analysis, excess returns attributable to a commodity index are likely the result of sample period bias, rather than an inherent return premium.

Demand Growth Drives Commodity Prices

The demand side of the equation drives the price process for commodities in the short-run. In the long-run, supply increases, substitutes for commodities emerge, or utilization improves to rebalance the market. Since demand is the principal driver of performance, the natural place to look for the internal growth in commodities is with the growth of the economy, as measured by real GDP per capita.

Exhibit 3: Ratio of the Commodity Index to Real GDP per Capita

Commodity returns are linked to real GDP per capita growth.



Source: FRED, Shiller, Bank of Canada, Bloomberg, CRB, CRM Calculations. Annual data 1900-2017.

Risk comes from demand shocks (e.g., wars).

A comparison of the ratio of the SCPI and US Real GDP per Capita in exhibit 3 visually demonstrates that, in the long run, commodity prices follow the same path as the growth of the economy. A comprehensive statistical analysis of the price relationships shows that these time series share a common trend that explains the majority of their movements and that increasing GDP (Demand) leads Commodity prices[2]. Further, supply shocks are shown as decreasingly relevant to commodity prices, while demand shocks are the primary driver (Jacks & Stuermer, 2018). While supply-side shocks can occur during wartime (or collusion as in the 1970s), we can expect that the return embedded in commodities will *closely parallel that of the growth in the real economy, since there are no inherent growth prospects or yield in the commodities themselves*.

The Unexpected in Commodities

Commodities are viewed as real assets since their traded price reflects the actual cost at the time of disposition. The question is whether their role as a real growth asset also protects against inflation, and more specifically,

[2] The time series were tested for cointegration and Granger causality with the two series cointegrated and GDP growth leading commodity prices.

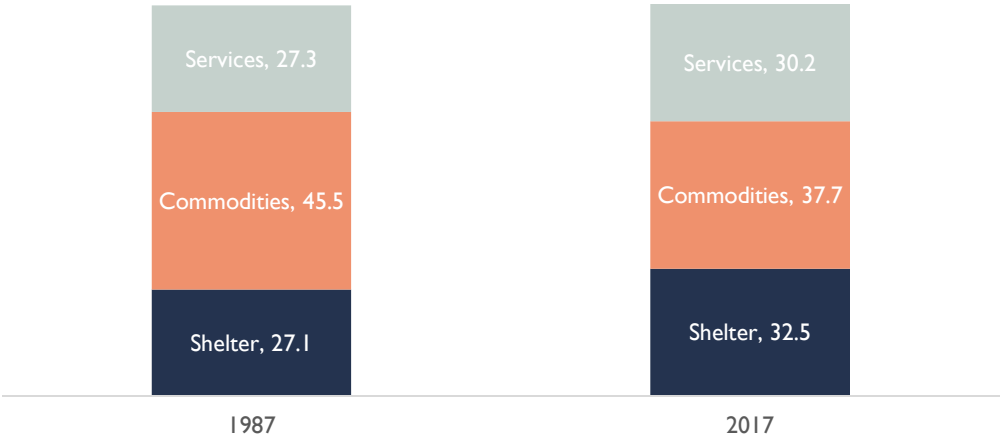
Commodity prices capture unexpected Inflation.

unexpected inflation. This outcome is a crucial distinction, fixed-income assets provide an embedded expectation of inflation for their respective term but are sensitive to unexpected inflation that occurs when the realized inflation varies from the expected inflation. With this context, exhibit 3 displays the relationship between the SCPI Index and the US CPI Index.

While the relationship between inflation and commodity prices was stable before the 1970s since then overall inflation expanded at a rate higher than commodity prices. This outcome is likely the result of the decreasing proportion of commodities in CPI, as services and housing increased in significance over the period (exhibit 4).

Exhibit 4: Consumer price Index Composition 1987 and 2017.

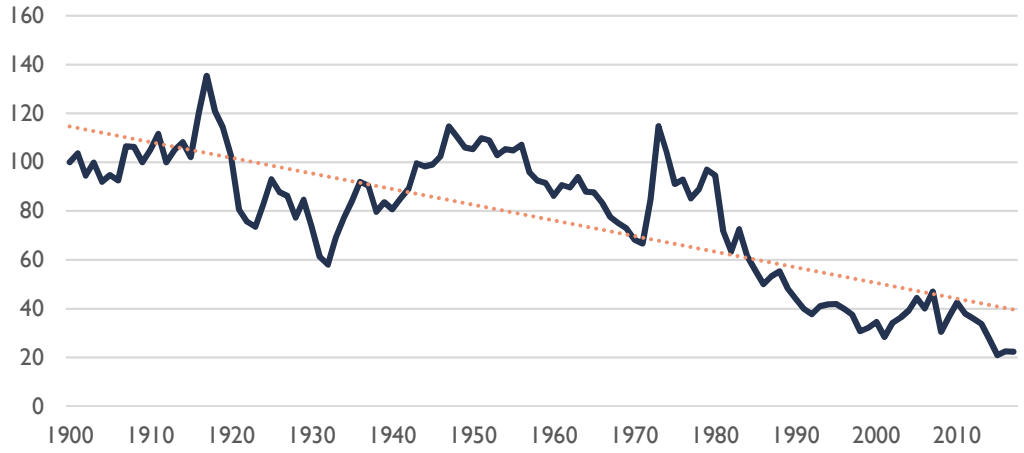
Commodities contribute less to overall Inflation.



Source: Bureau of Labor Statistics, December 2017.

If commodity prices capture expected inflation, then the ratio of CPI to spot commodities in exhibit 5 should appear flat. The downward sloping nature of the CPI/SCPI ratio demonstrates that commodities only partially reflect headline inflation. The crucial question is whether it is capturing unexpected or expected inflation.

Exhibit 5: Normalized Ratio of the CPI Index to the Spot Commodity Price Index



Source: FRED, Shiller, Bank of Canada, Bloomberg, CRM, CRM Calculations. Annual data 1900-2017.

Commodities are less effective hedging inflation since 1980.

Commodities have one cash flow and trade at the current price level. While they have no embedded expectation of future inflation, they can dynamically adjust to unexpected inflation. An analysis of the SCPI and the CPI shows that the time series share a similar long-term trend and that the SCPI leads the CPI[3]. Thus, commodities do not act as a hedge against *expected* inflation. Parallel to US TIPS, commodities provide a level of protection against unexpected inflation and act as a diversifier in a fixed income portfolio.

Does the commodity cycle provide opportunities?

From the previous analysis of commodity prices with GDP and CPI, each of the factor pairs share a common long-term trend. The relationship, however, is subject to short-term deviations related to the unique features of each factor. The question is whether these short-term properties provide diversification to the portfolio over the long-term, thus implying grounds for a strategic role in the portfolio.

[3] The time series were tested for cointegration and Granger causality with the two series cointegrated and commodity prices leading CPI.

Table 2: Correlation of Assets and Economic Indicators

	Commodities	Inflation	GDP	Bonds	Bills
Equities	0.09	0.05	0.21	0.08	0.02
Bills	-0.14	0.17	-0.16	0.45	
Bonds	-0.12	0.05	-0.11		
GDP	0.28	0.22			
Inflation	0.52				

Correlation analysis indicates diversification benefits exist.

Source: FRED, Shiller, Bank of Canada, Bloomberg, CRB, CRM Calculations. Annual data 1900-2017.

The traditional measure of diversification, correlation, shows that commodities seem to provide an excellent means of incorporating a diversifying asset class into the portfolio (table 2). Of note:

- Cross-correlations of commodities to the traditional asset classes of equities, bonds, and bills range from positive 9% to negative 14%.
- Bonds and bills correlations with commodities are negative, which reflects expected inflation in bonds and unexpected inflation in commodity prices.
- CPI and bills have a surprisingly low positive relationship given the short time horizon over which bills must estimate expected inflation.
- The correlation of commodities to CPI and GDP is positive, corroborating the prior observations on their relationships.

What is the cost of diversifying with commodities?

The conclusion from the analysis is that commodities can help reduce the volatility of the fixed income component of a portfolio since it catches unexpected changes in inflation, while traditional fixed-income assets contain expected inflation only. The question is at what cost is the diversification benefit delivered?

Commodities in an Optimal Portfolio

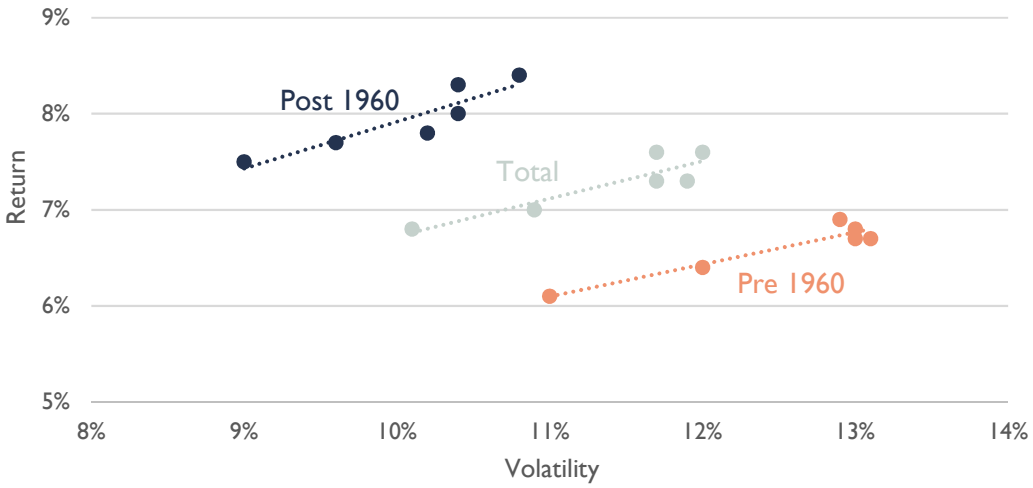
Portfolio construction seeks the most efficient combination of assets based on the mean-variance relationship (Markowitz, 1952). While commodities as a whole provide poor long-term returns in nominal and real terms, they may have a role to provide in portfolio risk reduction. Benchmarks for comparison are required to test the hypothesis, which are as follows:

1. *Commodity Benchmark:* 55% Equity, 25% Bonds, 10% Cash, and 10% Commodities
2. *Traditional Benchmark:* 60% Equity, 30% Bonds, and 10% Cash
3. *Substitution Benchmarks*: where 10% is moved from one of the three primary assets classes and allocated to the commodity index.

The portfolio's results under different conditions of economic growth and inflation show the importance of the regime (exhibit 6). The quick conclusion is that portfolio return has increased, and risk decreased from the first 60-year period to the latter.

Exhibit 6: Portfolio Efficiency by Total & Subperiod (Pre- & Post-1960)

Post-1960 portfolio returns have increased.



Due to the two different regimes, the focus here is on the post-1960 period; however, the conclusions drawn remain applicable to the total period. The

average risk and returns combinations for the various portfolios (table 3) result in several observations worth highlighting:

Commodities do not improve portfolio efficiency.

- The traditional 60/40 of Equity and bonds is the highest return portfolio.
- The balanced portfolio of Equity/Bonds/Cash (60/30/10) is the most efficient benchmark portfolio.
- Commodities can improve portfolio efficiency by reducing risk when substituting for equity at the cost of lower returns.

Table 3. Portfolio Performance by Total & Sub-period (Pre- & Post-1960)

	Total Period			Pre-1960			Post-1960		
Index	Return	Risk	Ratio	Return	Risk	Ratio	Return	Risk	Ratio
Commodity	7.0%	10.9%	0.64	6.4%	12.0%	0.53	7.7%	9.6%	0.80
Balanced	7.6%	11.7%	0.65	6.9%	12.9%	0.53	8.3%	10.4%	0.80
Traditional	7.6%	12.0%	0.63	6.8%	13.0%	0.52	8.4%	10.8%	0.78
CMDTYxBond	7.3%	11.7%	0.62	6.7%	13.0%	0.52	7.8%	10.2%	0.76
CMDTxBill	7.3%	11.9%	0.61	6.7%	13.1%	0.51	8.0%	10.4%	0.77
CMDTxEquity	6.8%	10.1%	0.67	6.1%	11.0%	0.55	7.5%	9.0%	0.83

The cost of commodities is 60-80 bps of portfolio return.

These results highlight an essential outcome: allocating to commodities serves long-horizon investors poorly because of a materially lower return expectation of between 60-80 bps for the portfolio. Compounded over a decade, the investor will sacrifice between 6.2% and 8.3% of terminal value to reduce the volatility during the period about 3% (e.g., a two standard deviation move). This outcome requires the investor to ask whether their portfolio liquidity can withstand the marginal 3% exposure. While each investor has different investment objectives, the higher risk may be underperforming their return objective.

The Commodity Cycle

Commodities do not appear as a component of a long-term buy-and-hold strategy; however, they may provide opportunities in the short term. The

previous analysis established flow from GDP growth to commodities prices to inflation (CPI). Segmentation of commodity performance during periods of above/below the median performance of GDP and CPI shows the impact (table 4). When GDP growth is above median, commodities perform well and poorly when GDP is low, which reflects the importance of demand. Inflation parallels this finding: when CPI is above the median, commodity prices are higher, while they are lower when CPI is below the median. This outcome is intuitive: expanding economies increase demand on the finite supply of commodities and thus drive up prices. As commodities are a component of CPI, they naturally passed-through to headline inflation (CPI).

When growth is high, so are commodity prices.

Table 4: Spot Commodity Index Performance Above/Below Median GDP

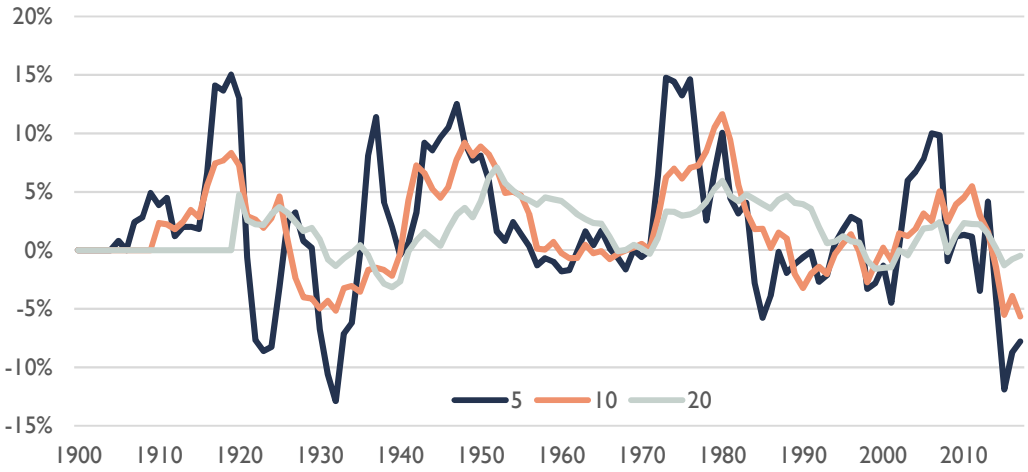
	Real GDP PC		Inflation (CPI)		Commodity Index	
	Above	Below	Above	Below	Above	Below
Return	2.6%	-0.7%	1.7%	1.3%	2.2%	-0.4%
Risk	3.5%	3.5%	3.1%	3.1%	8.1%	8.1%
Ratio	0.76	-0.21	0.55	0.42	0.26	-0.05

Source: FRED, Shiller, Bank of Canada, Bloomberg, CRB, CRM Calculations. Annual data 1900-2017.

The historical performance of commodity returns over rolling 5-, 10- and 20-year horizons shows their cyclical nature (exhibit 7). On balance, the chart shows that a buy-and-hold approach to commodity investing over long periods has not been well rewarded and is a volatile pursuit. While the average realized return (~1.2%) for each of the rolling times periods is the same (as one would expect over any finite sample period), the volatility is more significant over shorter horizons.

Timing the commodity cycle is critical to success.

Exhibit 7: Rolling Commodity Performance over 5, 10, 20 Years



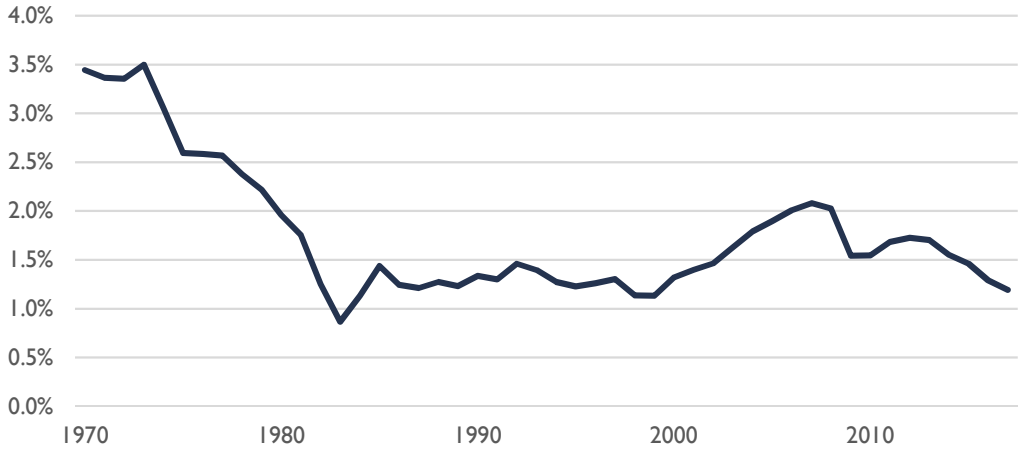
Source: FRED, Bank of Canada, Bloomberg, CRB, CRM Calculations. Annual data 1900-2017.

While short-term opportunities may exist, the buy-and-hold approach for commodities as an asset class *does not improve portfolio performance in the long-run.* The principal reasons for this outcome are that real returns are indirectly embedded in the portfolio via the equity exposure with a higher expected return, while the bond portfolio has a component to capture expected inflation with a higher expected return. The poor relative returns and higher risk ensure that commodities are not a permanent fixture of the long-term portfolio. To the extent that an investor can time the investment, cyclical outperformance can occur.

IV. The Future of Commodities

There is a direct link between spot commodity prices (SCPI) and Real GDP growth in the long-run and reflect aggregate productivity growth. The challenge is that world growth is slowing (exhibit 8). Supply and demand shocks can lead to a divergence in the relationship in the short-run but will eventually converge as consumers reduce demand via substitution and conservation, and technology improves utilization rates. The implication is that periods of subpar performance will follow historically high commodity returns as mean reversion dominates.

Exhibit 8: World Real GDP Per Capita Growth (Rolling 10-year Average)



Source: FRED

Demand growth Is slowing.

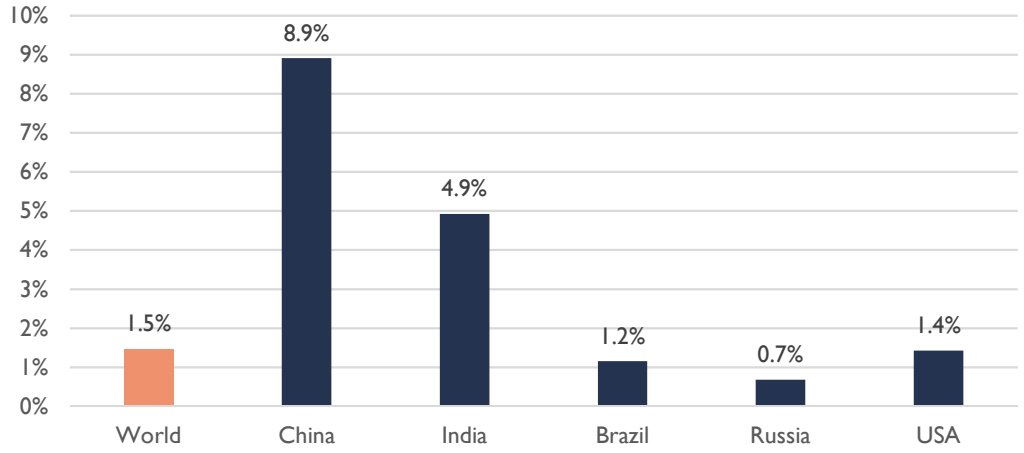
Out-performing commodities requires slower productivity.

A further relationship exists between commodity prices and inflation (CPI). Price increases in commodities partially pass through to CPI, but not entirely as housing and services are increasingly the drivers of inflation. Thus, commodities provide only a partial hedge with *decreasing effectiveness*. Since US inflation shows an expanding tendency that drives it upward independent of commodity prices, it remains doubtful that the two factors will converge: *it requires the belief that productivity growth will cease, an unlikely occurrence.*

Based on the historical record, the merits of commodities in the strategic asset allocation are not strong in "non-extraordinary" economic times and require significant prior insight to deliver the required market timing. Since global demand drives the expectation for the future of commodities, the question to address is whether it is prudent to include commodities in the broader asset allocation process given the powerful secular changes occurring globally.

The relative growth in world GDP since 1990 emphasizes the increasing role played by emerging countries such as China and India (exhibit 9). While world GDP will continue to expand at a more moderate pace, the marginal demand will increasingly come from the developing countries.

Exhibit 9: Real GDP Per Capita Growth by Country/Region



Source: FRED, Annual data 1990-2017 in 2010 US dollar terms.

Chinese demand drove commodity prices.

The transformation of China and India (collectively 40% of the world's population) from primarily agrarian nations to industrial manufacturing and service centers will continue to play out over many years. In the case of China, the government has demonstrated its commitment to transforming its population from rural farms to industrial based cities. Annually, an average of 1% of the population (~13 million people) relocates to urban areas over the past 15 years. This "urbanization" has profound implications for global demand of base metals, energy, and agricultural commodities. Given that the G-7 nations have experienced similar demographic migrations in modern times, it's possible to postulate the nature of forthcoming changes.

Chinese growth Is unlikely to continue to pull commodity prices.

The GDP per Capita in China now stands at roughly $7,300 in US dollar terms and expanded at double-digit rates for many years. At this level, China's economy is analogous to the US in 1910. Commodity prices and Chinese real GDP per capita growth have a similar relationship to that of the US data.[4] While the political structures are different and the sheer number of people strikingly larger, this comparison is relevant for one singular reason: historically

[4] The time series were tested for cointegration and Granger causality with the two series cointegrated and GDP growth leading commodity prices for the period from 1960 to 2017.

a middle class emerges at this level of development that migrates the growth from investment to consumption-based.

Alternative energy will reduce future commodity demand.

The middle class will make the transition into a more consumer-based economy, which will require more goods to meet their expanding needs. Social infrastructure in the forms of roads, railroads, airports, bridges, housing, water systems, and waste systems are also required. These goods and services require primary commodities to construct the products. Two critical questions arise: has China already built the infrastructure it needs and what impact will the development of alternative energy and additive manufacturing have on their future growth?

The expansion of alternative energy that decreases demand for fossil fuels is beneficial for China as they would reduce demand for external energy commodities, and thus improve their terms of trade. Conversely, additive manufacturing would decrease the need for their primary advantage, people. This outcome would imperil the development of their middle class, particularly one that has not yet completed the jump into domestic services (e.g., medical services, education, and professional services). A similar transition took the US nearly a century to complete. The challenge for China is which will arrive first: domestic consumption or technology. The most likely outcome is a bit of both.

India may replace China, but do they have a command economy?

A parallel situation exists in India, where McKinsey and Co. estimates that the middle class in India will explode from 50 million to some 583 million people by 2025. Even if this estimate is overstated by 100%, it nevertheless conveys the enormity of the demographic shift in the making. For context, the US has a middle class of about 150 million. If either the Chinese or Indian population achieves one-quarter our proportional middle class, either one will provide a middle class comparable in absolute terms to that of the US.

The challenge is that alternative energy and additive manufacturing will lessen the burden on the world by reducing the energy needs for transportation, packaging, storage, and delivery of goods to the end consumer. This result will further weaken the commodity-driven inflation pressures both in the US and in

the emerging economies. While there is some hope for agricultural commodities and the land they are grown on, there is a risk there as well.

Agriculture Innovations may Increase productivity and reduce prices.

The US remains one of the leading producers of agricultural products, and they are a leading export. The challenge is that places like California heavily subsidize agricultural with cheap water and transport it over vast distances, which is done to take advantage of the sunshine and fertile land. The inefficient use of water magnifies the problem and the products require transportation to the final consumer. Innovations in agriculture are showing that even a farm in a shipping container can produce food dramatically more efficiently concerning energy and water usage. If this is the case, then agricultural commodities may continue to meet demand by merely replicating the productivity they achieved in the past century.

V. Conclusion

The increased demand from China and other emerging economies for commodities is slowing. Both statistical and fundamental analysis indicates that the primary pricing relationship is positive between commodities and economic growth. Though cyclical fluctuations can impair this development in the short-run, the long-run relationships are stable. The challenge is whether the past is a prelude, or the future will deliver a different outcome. As always, the most expensive words in finance are "this time is different."

Buy the business of commodities, not the commodity.

An allocation to commodities focused on a business that efficiently deliver industrial commodities, with some ability to adjust supply to market conditions, will continue as a productive investment. They can "sit' on their land and enjoy inflation protection via their real estate value and generate real income as necessary by supplying their resources to the market. As long as global productivity progresses, marginal aggregate demand will persist, and commodities as a business are attractive. Unless timing the opportunistically, a passive investment in commodities is not attractive. Thus, **buy the business, sell the commodities**.

Appendix A: Spot Commodity Price Index

Index	Period
Bank of Canada Commodity Price Index	1900-1957
TR/CC Commodity Research Bureau Total Return Index	1958-2017

Bank of Canada Index normalized to the CRB index level as of 1957. Canadian prices adjusted to US dollars.

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