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# Investing in Commodities at Global Endowment Management

Stephanie Lynch and Hugh Wrigley walked briskly to Global Endowment Management's (GEM) annual company offsite in Charlotte, North Carolina. It was July 2016, and the sun blazed as Lynch and Wrigley contemplated the agenda for the day.

The GEM investment team conducted a comprehensive review of the portfolio every three years. Every team member had a voice at the table as they had an exhaustive discussion on every investment and position, debating its contribution, sizing, and risk to the greater portfolio. The conversation today, focusing on commodities, would be heated. Commodities had been part of the portfolio since inception, but now the team questioned what role they played in the portfolio. Did a separate commodities exposure belong in the portfolio at all? And if so, how should it be implemented?

## Global Endowment Management

GEM was founded in 2007, by Thruston Morton, Wrigley, and Lynch. Morton and Wrigley had worked together at the Duke University Management Company (DUMAC), where Morton had been the CEO and chief investment officer (CIO) and Wrigley had been the head of private investments. DUMAC oversaw the Duke University Endowment as well as Duke employees' retirement pool and the university health system's investments. Lynch had been CIO of The Duke Endowment, the family foundation of James B. Duke.

Formed in 1990, DUMAC had been a long-horizon investor from the start, willing to take illiquid, unconventional and often concentrated positions. In its second decade, it applied this unconventional mindset to develop creative ways to invest in what had by that point become conventional strategies for large endowments, like hedge funds, small start-up managers, and commodities.

GEM was created to provide the same investment framework used at DUMAC to other institutions that did not have adequate scale or infrastructure. It offered a full suite of investment office services for institutional investors, assuming the responsibility for asset allocation, manager selection, risk management, and investment reporting. GEM's long-term oriented, diversified investment program aimed to generate a minimum 5% real return over the long term — enabling its investors to fund

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operations and to preserve purchasing power. While the firm was grounded in the disciplined investment approach pursued by large university endowments, it brought a creative and scrappy mindset to sourcing investment ideas. As Morton noted, “We didn’t want to be in the same funds every other endowment was in. Then we’d just look like our peers with high fees.”

GEM won its first investor, a \$400 million Seattle-based entity, soon after inception in 2007, and had grown to 35 investors and \$8 billion in AUM in ten years. (See **Exhibit 1** for a history of the firm’s returns; see **Exhibit 2** for a history of the firm’s assets.) GEM sought like-minded institutions to allow them to invest with a long-term orientation. “We are selective in choosing long-term partners,” noted Morton. “Many of our investors have outsourced their entire investment portfolio to us, and given the nature of our investments, that decision is not easy to unwind.” Indeed, GEM managed 100% of endowment assets for nearly 80% of its investors, charging them a management fee of 60 basis points (bps) flat.<sup>1</sup> (**Exhibit 3** provides a breakdown of GEM’s investors.)

The GEM investment team focused on asset allocation, picking managers, and implementing internal smart beta strategies to allocate risk and mitigate fee drag. The firm invested in 92 total managers, with allocations ranging from 0.5% to 3.7% of the portfolio. “Our edge is our research process and our temperament,” reflected Wrigley. In 2010, Mike Smith, who was previously CIO of the University of Florida Management Company, and had previously worked with Morton and Wrigley at DUMAC, joined GEM. “Having three CIOs as part of the team highlights our edge,” said Lynch. “It helps ensure we have an unbiased view of the landscape. Our team structure forces us to debate and question our investments and their role in the portfolio.” **Exhibit 4** lists the organization chart of the firm.

## Role of commodities in a diversified portfolio

For GEM, the first step in deciding if commodities belonged in the portfolio was to formulate capital market assumptions. Capital market assumptions about expected returns and volatility of different asset classes and the pair-wise correlations between asset classes were the foundation of long-term investment policy. **Exhibit 5** shows GEM’s 2016 capital market assumptions.

Historical analysis was a starting point in making capital market assumptions for all asset classes, and commodities were no different. “Commodities are a particularly interesting case because technological advances mean that most commodity prices fall in real terms over time,” noted Smith. See **Exhibit 6** for historical commodities prices over the last century.

Smith elaborated: “We believe that estimating the future return on commodities is extremely difficult. While individual commodity prices tend to converge to their marginal cost of production over long horizons, that cost can change dramatically over time given technological advances.” The difficulty in estimating returns on commodities was reflected in the wide dispersion in estimates across market participants. In a survey of 35 investment advisors, estimated expected returns on commodities over ten years ranged from 1.8% to 6.8%. In contrast, estimated returns on US equities ranged from 5.1% to 8.0%.<sup>2</sup>

A key motive for including commodities in an investment portfolio stemmed from the diversification benefits they provided. Despite low average returns from commodities, historically, they also had low correlation with stocks and bonds, which meant that including them in the portfolio could increase expected returns and reduce risk. In particular, commodities offered a hedge against unanticipated inflation, which tended to hurt other financial assets while raising commodity prices.

(See **Exhibit 7** for return projections in different economic scenarios and **Exhibit 8** for a history of inflation in the U.S.)

“We recognize that stocks are essentially real assets,” said Smith. “When inflation is high, prices are rising, so earnings will rise too. But we think inflation uncertainty has real, negative impacts on earnings predictability, and ultimately equity valuations. Just because inflation has been low and stable doesn’t mean it always will be, and when you get unanticipated inflation, that’s when commodities are most valuable in a portfolio context.”

GEM assumed that long-term commodity returns would not vary meaningfully from cash returns, around 2.5%. Despite a cash-like return with high volatility, Smith valued the hedging properties of commodities: “We think of this low-expected return, high-volatility asset class as a form of insurance against inflation uncertainty.”

## Implementation options using futures

If GEM decided to include commodities in the portfolio, a variety of questions remained. How should the exposure be implemented? Which commodities should be included? Did they want passive exposure or an active manager? How should GEM benchmark their performance? What type of liquidity terms were they comfortable with?

### *Commodities futures*

Institutions like GEM had historically gained their exposure to commodities via futures, a financial contract in which one party agreed to buy a particular commodity from another at a predetermined price – the futures price – on a specified maturity date. At maturity, the seller of the futures contract would pay the buyer the difference between the futures price agreed to on the initiation date and the spot price – the price of the underlying commodity – on the maturity date.<sup>a</sup>

Futures were liquid and easily accessed by sophisticated investors, making them a particularly attractive way to gain exposure to commodities. However, the return from investing in futures was not the same as the return from investing directly in the underlying commodity. In particular, the futures return was determined by the futures price on the day the contract was initiated, and the spot price on the maturity date. This could be decomposed into the spot return – the change in the spot price between the initiation date and the maturity date – and the roll yield – the difference between the spot price and the futures price on the initiation date. Thus, the roll yield was the difference between the futures return and the true spot return on the underlying commodity.

Future prices for short-maturity contracts tended to be close to the spot price. However, commodities futures prices for longer-maturity contracts could be substantially above or below the spot price depending on supply and demand conditions in the market.<sup>b</sup> When longer-maturity futures prices were below the spot price, the futures market was said to be “in backwardation,” and the roll

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<sup>a</sup> Some futures contracts involved so-called physical settlement, meaning that the commodities would actually be delivered to the buyer of the futures contract. However, most contracts were cash settled, so that the buyer and seller simply exchanged cash at maturity. Investors like GEM favored cash-settled contracts because they sought exposure to the asset class and did not want to hold the physical commodity. In practice, few investors had the ability to take delivery of commodities and manage the significant storage and insurance costs involved.

<sup>b</sup> In futures markets where the costs of storing the underlying asset were negligible (e.g., S&P 500 futures or Treasury futures), futures prices were pinned down by an arbitrage – a virtually risk-free trade that ensured that futures prices moved in lock step with spot prices. In these markets, the return on futures was simply the spot return minus the risk-free rate. In markets where storage costs were high, like commodities markets, the arbitrage was costly to execute, and thus futures prices could diverge more significantly from spot prices.

yield was positive – if prices remained fixed, investors would receive at maturity more than they paid and thus earn profits. When the futures price was above the spot price, the market was said to be “in contango,” and the roll yield was negative. (See **Exhibit 9** for a graphical depiction.)

The roll yield was strongly positive until the middle of the 1990s, averaging 3.6% per year from 1970 to 1992.<sup>3</sup> Thus, over this period, investing in commodities through futures was both convenient and provided a substantial return boost over investing directly in the underlying commodities. However, after the creation of the Goldman Sachs Commodities Index (GSCI), an index of commodities futures, in 1992, the amount of institutional capital investing in these futures increased dramatically. The growth in their popularity resulted in the roll yield turning negative. Smith reflected, “Financialization killed the roll yield, which was one of the very reasons institutions invested in commodities in the first place.” (**Exhibit 10** shows the historical roll yield of the GSCI index.)

In addition to the roll yield turning negative, the correlation between commodities and equities increased after the 1990s, diminishing the positive diversification effects. Smith elaborated: “Given the dramatic change in the relationship between spot and forward prices since commodities became an institutional asset class, historical analysis is not sufficient today. Overall, we believe our assumptions are conservative, which is prudent given the uncertainty.”

### *Index Products*

Implementing a commodities exposure directly through futures involved trading expertise to manage the roll process. Since most futures contracts had maturities of less than one year, long-term investing in commodities through futures involved reinvestment. A long-term investor would have to take the proceeds from expiring futures contracts and reinvest them in new contracts. However, there were a variety of commodity index exchange-traded funds (ETFs) that simplified the process for investors. These ETFs would invest in futures themselves and manage the roll process.

A key issue with investing in commodities index products was that, unlike equities or fixed income, there was no universally agreed-upon benchmark. The weights of the underlying commodities in different indices varied widely, exposing investments in different indices to very different risks over the long run. The S&P/GSCI index was one of the earliest indices and was production weighted – the higher the total global production of a commodity, the larger the index’s exposure to that commodity. As Smith commented, “The analogy to a production-weighted index would be an S&P 500 sales-weighted index.” In practice, this meant that the S&P/GSCI index had an extremely high allocation to energy futures (approximately 80%). In 2010, a reduced-energy version of the index was introduced that halved the weight given to energy production and reduced the overall energy futures allocation to approximately 50%.

The Bloomberg Commodity Index (BCOM) was another popular index. The BCOM was designed to minimize concentration in any one commodity or sector. The weights for each commodity were set by rules designed to reflect the global economic significance and market liquidity of that commodity. GEM used BCOM as its benchmark. Said Lynch, “We recognize the limitations of all these indices, but we wanted an index that investors could understand, track, and replicate.”

### *Better Beta*

So-called “better beta” strategies were an alternative to simple index exposures. They sought to implement an essentially passive strategy, mostly tracking an index but tactically pursuing active trades at certain times. GEM had an internally-managed better beta program, GEM Select Commodities (GSC), which was designed to outperform the BCOM with minimal tracking error. The strategy

avoided commodities where the roll yield was particularly negative and over-weighted commodities with positive roll yields. It did not take active views on prices, but simply focused on minimizing the costs associated with negative roll yields. “Besides outperforming the conventional indices, GEM Select Commodities allows us to dial exposure up and down while minimizing costs,” expanded Wrigley. “Why pay someone a fee and abdicate risk-management responsibilities when we can do this for ourselves in-house?” added Lynch.

## Implementation options using equity

Rather than using futures markets, GEM could instead hold equity in firms with commodities exposures. For instance, GEM could buy equity in an oil and gas production firm or a gold mining firm. Such exposures could be implemented in public or private markets.

### *Public Equities*

Buying stock in publicly traded commodity-based companies was one option. GEM found two main challenges with this approach. First, GEM was not in the business of picking stocks full time. “Our edge is picking managers, not individual firms’ stocks,” said Ryan Henderson, Director of Real Assets. Still, GEM could get exposure to commodities through public equities markets by buying a broad stock market index of public commodities firms. For instance, the S&P Energy Index was an index of all public stocks for firms that were classified as energy companies. Alternatively, GEM could hire an active manager that selectively invested in such stocks.

The second challenge was more fundamental: the stocks of public commodities companies tended to have low correlations with the prices of the underlying commodities. “We know the correlation of the S&P 500 with commodities prices is about zero,” noted Henderson. “But the correlation of the S&P Energy Index with the S&P 500 is only about 0.6.” (Exhibit 11 shows correlations between the GSCI, the S&P 500, the S&P Energy Index, and several spot commodities prices.)

Beyond the reduction in diversification benefits that came with investing in public commodities firms, there were also concerns about long-term value. GEM observed that many public resource and energy companies demonstrated poor capital allocation over time. GEM believed this was the result of short-term focused growth requirements imposed by the stock market, which at many points in the cycle were at odds with solid discounted cash flow based project investing. “Some public company management teams suffer from ‘man with a hammer’ syndrome,” said Henderson. “They are compensated based on production growth and therefore invest in production even if market conditions don’t warrant it. For instance, some public fracking companies drilled their best wells as oil prices were falling precipitously in 2015.”

### *Private Equities*

An alternative to purchasing stock in public commodities firms was to take equity stakes in private commodities firms. Smith did not see many differences in underlying firm economics between public and private investments: “The only source of comparative advantage for any individual firm, public or private, is being a low-cost producer.” In addition, private firms often offered better values. “Private commodities firms tend to trade at lower multiples than public firms because you don’t typically pay for growth with private assets,” said Smith.

A natural way for GEM to get exposure to private firms was through private equity funds. While this option was potentially attractive, GEM questioned whether the private equity structure was

appropriate for commodities businesses. “Private equity funds have ten-year lives, and they need to reinvest the capital in a four- to six-year cycle,” noted Henderson. “We worry that imposing a fixed investment schedule can accentuate the risk of capital impairment, given the volatility of commodities businesses.” Furthermore, the fixed lifetime could distort investment selection: “Some private equity funds may pick businesses geared towards quick flips and short-term gains, rather than sustained long-term value creation, because they want to earn higher IRRs and crystallize incentive fees,” Henderson explained. And as with many private equity fund investments, GEM was mindful of the layers of fees to overcome before the investors earn a return.

### *Direct-to-Operator Investing*

An alternative to investing in private commodities firms through a private equity fund was to try to partner directly with operational experts. These experts, supplied with capital by GEM, could purchase and operate commodity-generating assets like oil and gas reserves or mines. By clearly defining the business plans best suited for DTO and concentrating its sourcing efforts with operators skilled at executing such strategies, GEM believed it offered a unique proposition to the market: a long-term oriented capital base well-aligned with the longer-lived nature of the assets owned. If successful, this direct-to-operator (DTO) investing model would create substantial fee savings over other alternatives.

GEM viewed selecting operators as a natural extension of its core business. “We spend all our time underwriting asset managers in terms of execution and ability to allocate capital efficiently,” explained Henderson. “DTO is similar. We target repeatedly successful management teams and are directly underwriting them on the same dimensions, execution and capital allocation, all the while cutting out the myriad fees incurred if we invested in these companies through a private equity-type structure.” Moreover, the DTO arrangement could provide control rights unavailable in public markets: “In DTO, we control, or can have a hand in negotiating, the compensation package for our operating partners to ensure proper alignment,” noted Henderson. “We don’t pretend to control the investment outcome, but we can put in checks and balances that help mitigate the uncertainty of investing in a single company and enhance our alignment with management.”

GEM had experimented with the DTO approach in 2015. The challenges were significant. GEM needed a way to sort through the 8,274 producers in the U.S. and highlight those that were both promising and willing to talk to a relatively unknown asset allocator. “Day to day, we live in very different worlds. With no track record and no previous relationships, why would they even speak to us, let alone partner with us?” asked Henderson.

At a previous annual review, every team member had read Robert Cialdini’s *Influence: The Psychology of Persuasion*, and the team had come away struck by the idea of “signaling rather than persuasion.” Henderson and his team decided that they would signal their seriousness to potential partners through a letter-writing campaign, individually hand writing letters to each operator. After narrowing the list of operators, GEM sent 100 individual letters to potential partners. “It was brute force plus an old-world touch,” said Henderson.

Venus Explorations was one company who wrote back. Venus was a private oil and gas company specializing in the acquisition, exploitation, and production of onshore, conventional assets. “They reported it was ‘differentiating and refreshing, and just nice to see people write letters,’” remembered Henderson. Venus had been founded in 2012 by the former senior leadership team of a large, public, independent oil and gas company following their multi-billion dollar merger with another large, public company. The team included the founder/Chairman, CEO, President and Executive Vice President,

and CFO. Collectively they invested a material percentage of their net worth in Venus to properly align interests around long-term value creation.

GEM invested in 2015. “We were impressed by the team,” said Henderson. “They had assembled a portfolio of high-quality assets offering resilient, low-cost production capable of generating positive free cash flow, net of maintenance expenses, in all commodity price environments. While it is too early to evaluate the success of this type of investment, we are very pleased with it so far.”

A key strength GEM brought to the partnership was the patience of their capital. “Private equity invests on a multi-year schedule, but we can be truly long term,” noted Henderson. “We understand it’s a very volatile business and can profit from being aggressive when others are fearful.”

Of course, GEM did not take the patience of its capital for granted. Investors relied on cash from the investments in GEM to fund their operating activities and therefore required regular access to their funds. “We plan for and provide up to an annual 7% distribution to our investors, though in any given year some take less,” said Lynch. Investors had to notify GEM by September 1 if they wish to withdraw more than 7%. There were no termination fees or lockup provision, however. If an investor wished to withdraw their funds, GEM has 60 days to distribute 90% of liquid investments based on the net asset value (NAV) of the investments on December 31. The remaining 10% was held back for NAV adjustments, and fees, and was distributed after an audit was completed in June.

Illiquid or hard-to-value investments could be placed in a capital sub-account, or “side pocket.” For such investments, investors owned a pro-rated share and received proceeds as the underlying investment liquidated. For Venus specifically, redeeming investors maintained their interest in Venus until GEM decided to exit. A redeeming investor could only exit early if new investor inflows could be used to purchase the positions from them. “We do not accelerate the liquidity for redeeming investors, which is important as we represent ourselves as long-term investors, and putting management teams through frequent sales processes would cause serious friction,” said Lynch. “The GEM model, the combination of great investors and prudent terms, gives us the freedom to go into commodities through DTO; the common link was our strength in nontraditional sourcing.”

## Decision

As Lynch and Wrigley strode into the annual review, they knew it would be a lively conversation. Did a separate commodities exposure belong in the portfolio? Was inflation insurance valuable in this day and age?

If they opted to maintain a separate commodities exposure, implementing that exposure also raised a variety of issues. Alternatives involving futures and public equities were liquid and easy to manage but had low expected returns. DTO had promising returns but was harder to scale and significantly illiquid. How should scalability, expected returns, and liquidity be traded off? What was best for GEM’s investors?

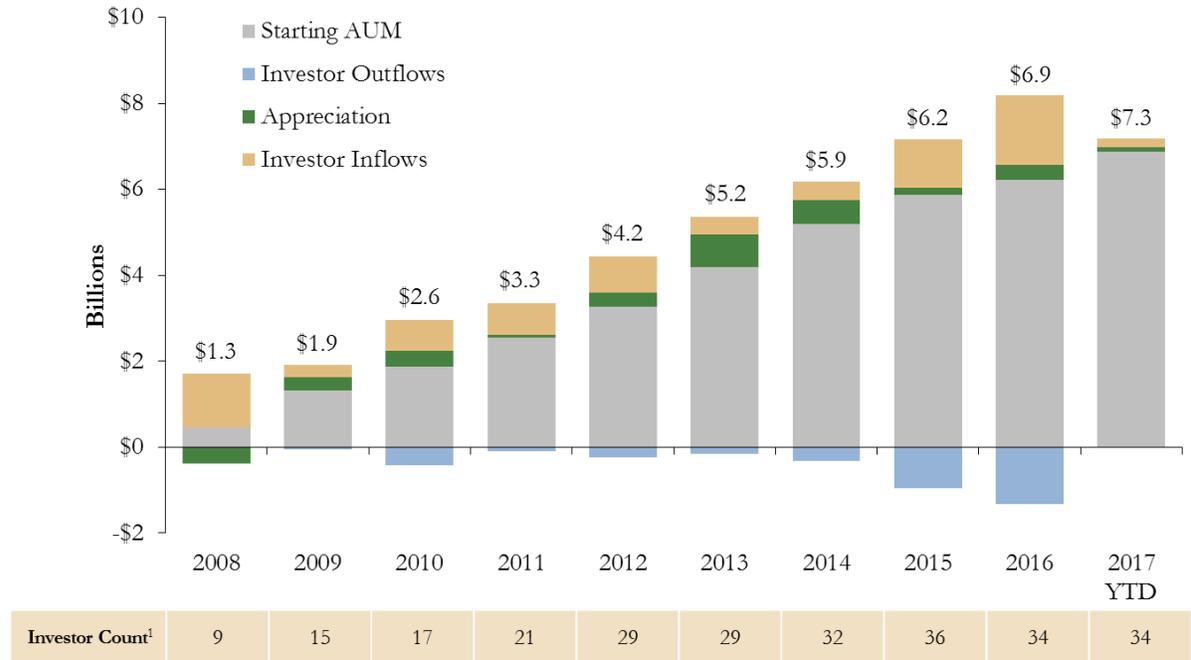
**Exhibit 1** History of Firm Returns

<b>Returns as of 3/31/2017</b>	<b>1 Year</b>	<b>3 Year</b>	<b>5 Year</b>	<b>7 Year</b>	<b>Since Inception<sup>c</sup></b>						
					<b>Annualized</b>	<b>Std. Dev.</b>					
Endowment Pool <sup>d</sup> (est.)	10.7%	5.8%	7.8%	8.4%	6.1%	7.0%					
Policy Portfolio	9.3%	4.5%	6.4%	6.6%	4.3%	9.7%					
Difference (est.)	1.4%	1.3%	1.4%	1.8%	1.9%	-2.7%					
5% Real Return	7.2%	6.0%	6.2%	6.6%	6.6%	N/A					
<b>Calendar Year Returns</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>	<b>2011</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007<sup>e</sup></b>	
GEM	6.3%	2.3%	9.9%	16.2%	9.1%	2.2%	14.9%	20.1%	-22.8%	6.2%	
Policy Portfolio	6.0%	0.3%	5.4%	13.2%	10.9%	-2.3%	12.0%	18.9%	-23.8%	3.8%	
5% Real Return	7.1%	5.7%	5.8%	6.5%	6.7%	8.0%	6.5%	7.7%	5.1%	N/A	

Source: Company documents

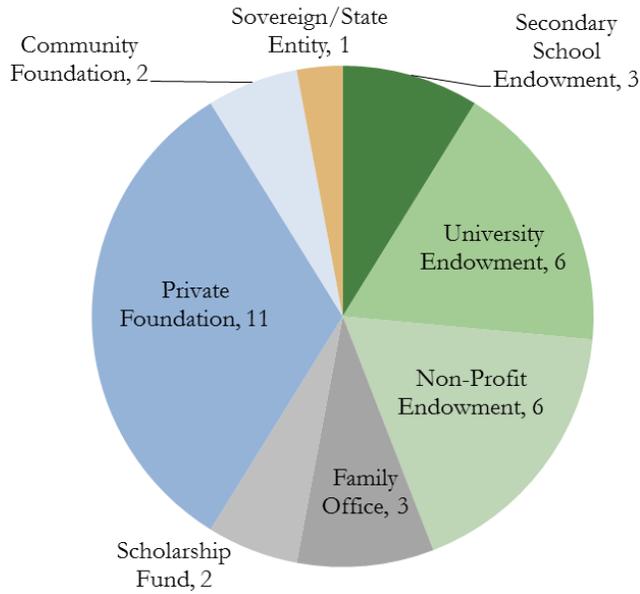
<sup>c</sup> 2007 is a half year; GEM inception date 07/01/2007.<sup>d</sup> GEM's Endowment Pool is comprised of Global Endowment Funds I and II.<sup>e</sup> 2007 is a half year; GEM inception date 07/01/2007.

**Exhibit 2** History of Firm AUM through April 1, 2017



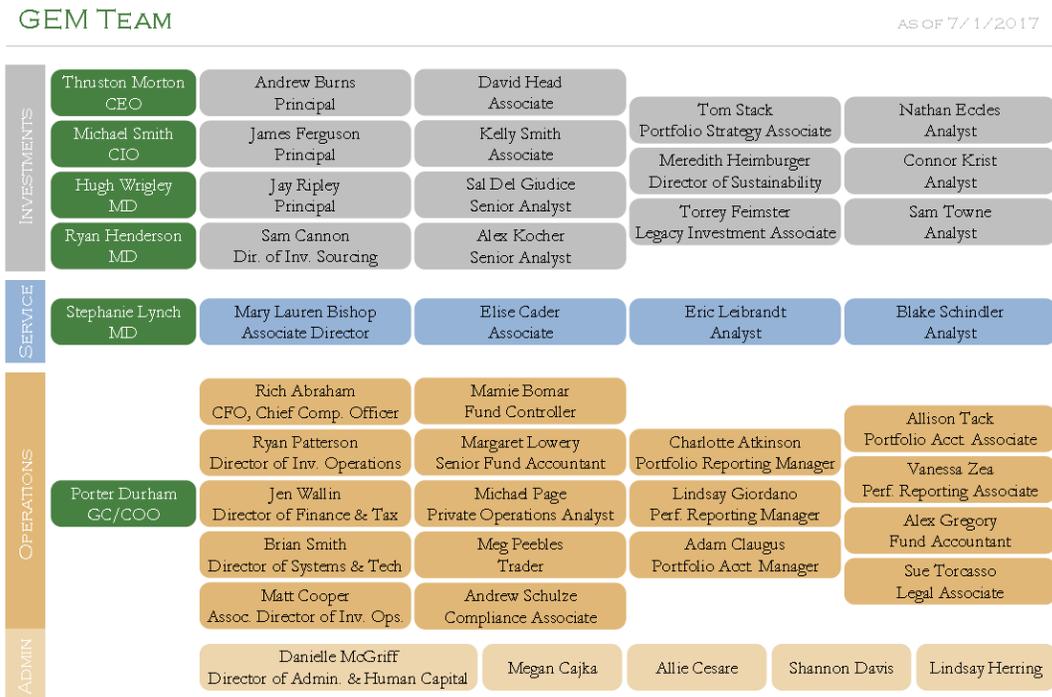
Source: Company documents

**Exhibit 3** Investor Type Breakdown



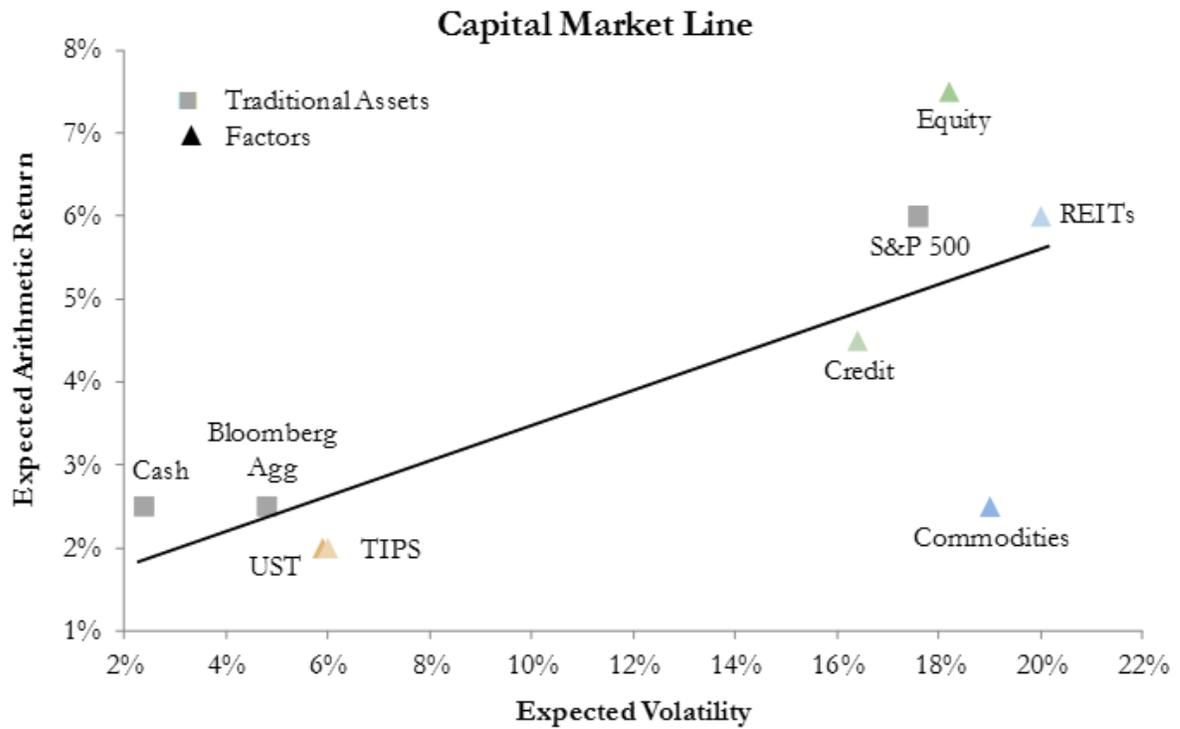
Source: Company documents

**Exhibit 4** GEM Organizational Chart



Source: Company documents

Exhibit 5 GEM Capital Market Assumption, 12/31/2016



Asset Class	Expected Return	Expected Volatility	Sharpe Ratio
Equity	7.5%	18.2%	0.27
Credit	4.5%	16.4%	0.12
Commodities	2.5%	19.0%	0.00
REITs	6.0%	20.0%	0.18
Treasuries	2.0%	5.9%	-0.09
TIPS	2.0%	6.0%	-0.08
Cash	2.5%	2.4%	0.00
S&P 500	6.0%	17.6%	0.20
BCAP Agg	2.5%	4.8%	0.00
Inflation	2.0%	1.2%	

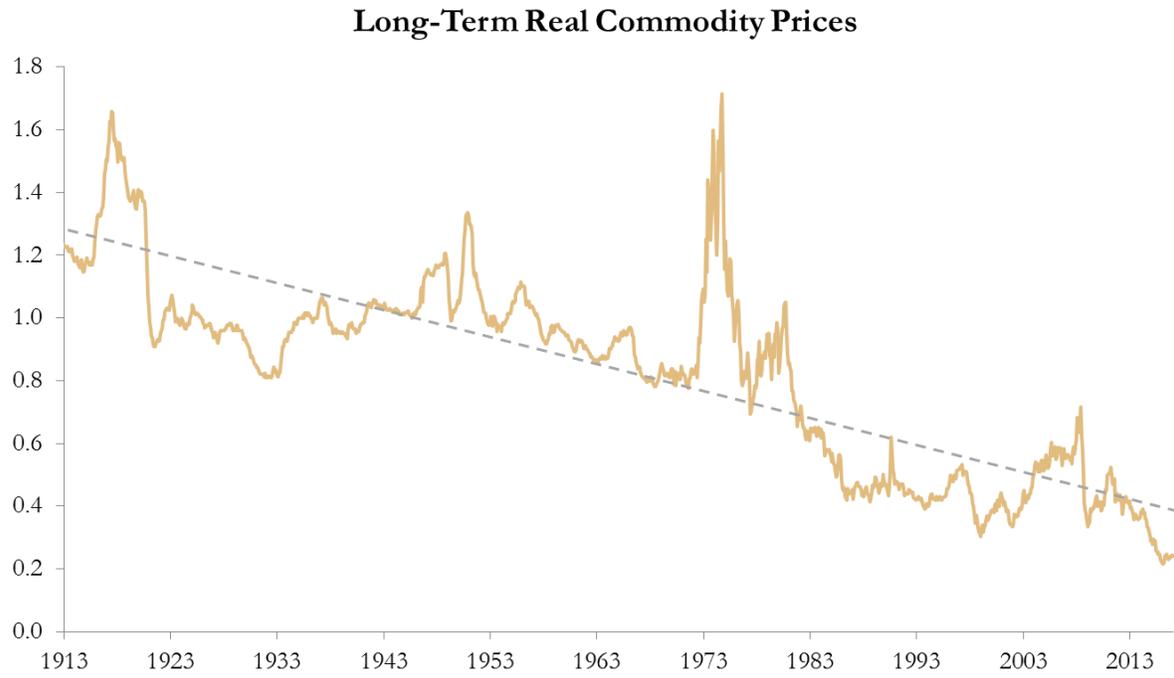
## Historical Asset Class Return Correlations

	Equity	Credit	Commodities	REITs	Treasuries	TIPS	S&P 500	BarCap Agg
Equity	1.00							
Credit	0.58	1.00						
Commodities	0.29	0.17	1.00					
REITs	0.55	0.55	0.17	1.00				
Treasuries	0.05	0.27	(0.07)	0.07	1.00			
TIPS	0.16	0.39	0.20	0.19	0.71	1.00		
S&P 500	0.87	0.56	0.20	0.56	0.08	0.13	1.00	
BarCap Agg	0.18	0.47	(0.01)	0.17	0.95	0.72	0.21	1.00

Note: Although GEM produced a correlation matrix as a part of their Capital Market Assumptions, their modeling process was more sophisticated. This was because static correlations did not accurately reflect real-world market dynamics. In particular, assets tended to become more correlated during stressful periods, and a static correlation assumption would overstate assets' diversification benefits. GEM used a technique known as "t-copula" to model the dependency amongst assets, allowing them to capture such correlation convergence, and create more robust diversified portfolios.

Source: Company documents

**Exhibit 6** Historical Value of Commodity Prices, 1913-2015

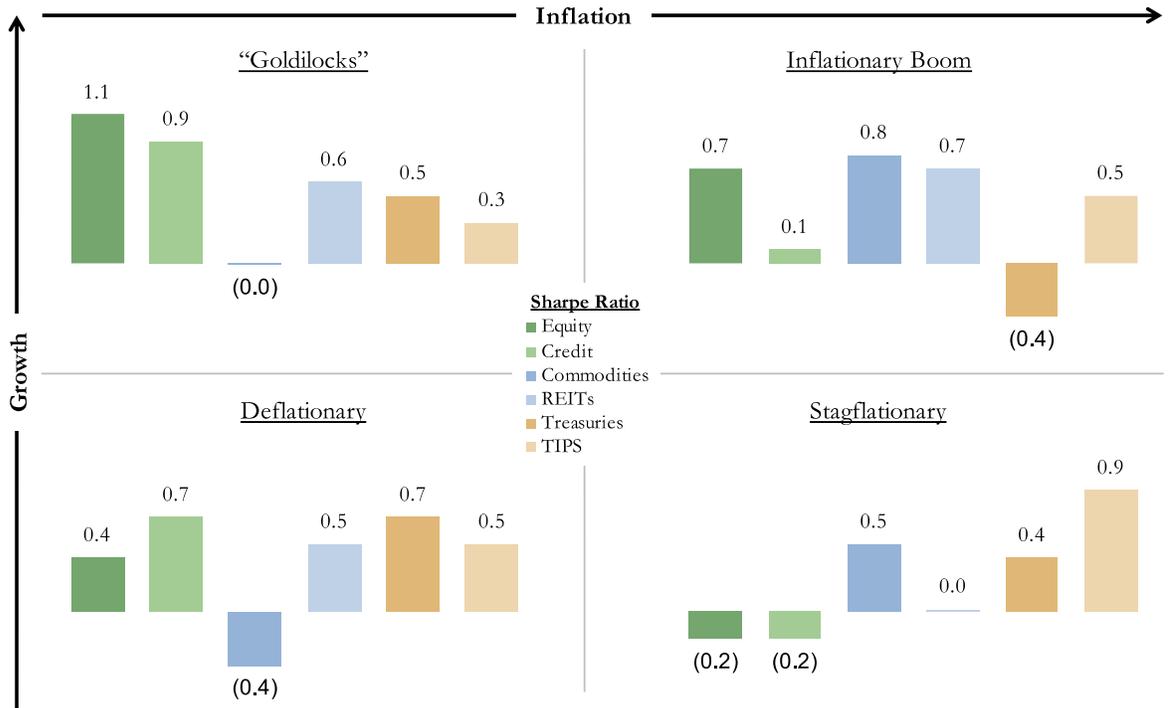


Source: Company documents

Exhibit 7 Asset Class Risk and Return Projections in Different Environments, 9/30/2016

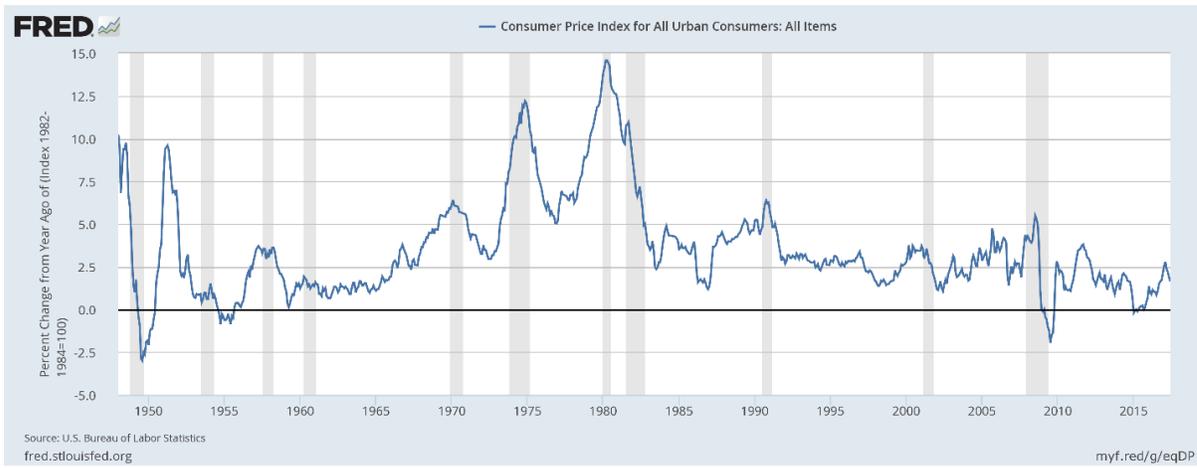
RETURN VS. RISK IN DIFFERENT ECONOMIC ENVIRONMENTS

AS OF 9/30/2016



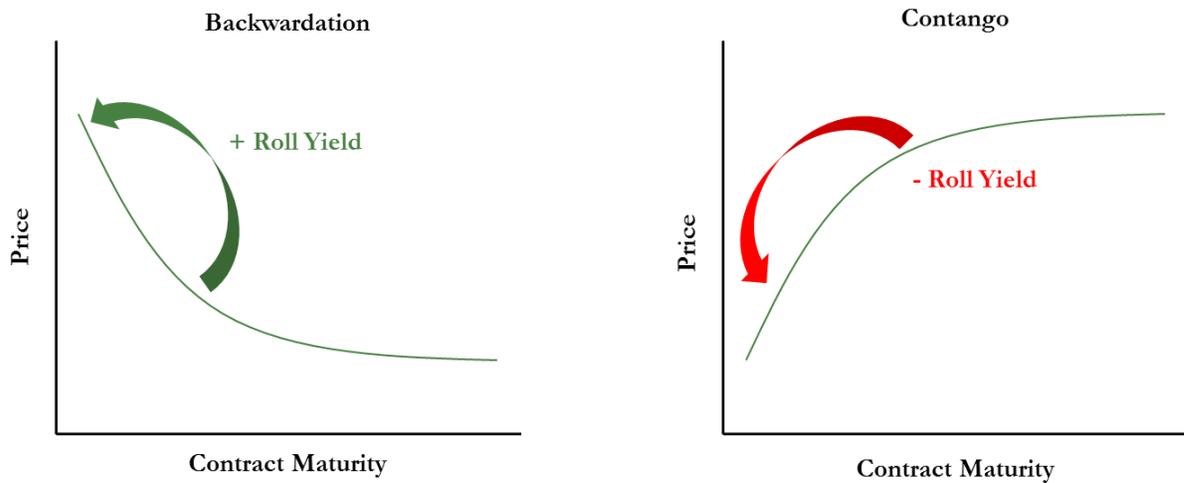
Source: Company documents

**Exhibit 8** History of Inflation, 1948-2016

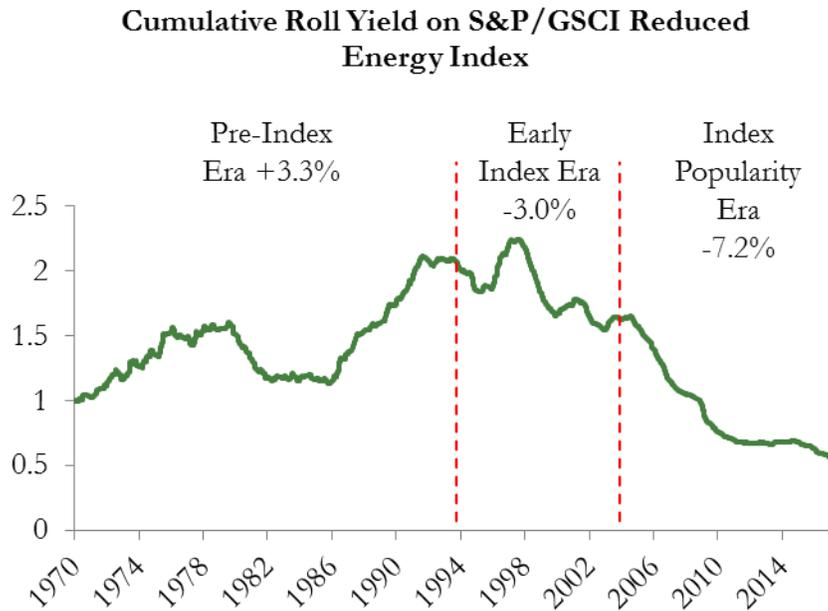


Source: Bureau of Labor Statistics

**Exhibit 9** Backwardation and Contango



Source: Company documents

**Exhibit 10** History of Roll Yield, 1970-2016

Returns for each era are annualized.

Source: Company documents, Bloomberg.

**Exhibit 11** Historical Correlations

	<u>Inflation</u>	<u>Oil</u>	<u>Gold</u>	<u>GSCI</u>	<u>S&amp;P 500</u>	<u>S&amp;P Energy</u>
Inflation	1					
Oil	0.29	1				
Gold	0.30	0.21	1			
GSCI	0.21	0.57	0.22	1		
S&P 500	-0.21	-0.27	-0.09	-0.27	1	
S&P Energy	0.02	0.18	0.09	0.11	0.62	1

Source: "An Introduction to Commodities," Cambridge Associates.

## Endnotes

<sup>1</sup> Effective date 1/1/18

<sup>2</sup> Survey of Capital Market Assumptions, 2016 Edition, Horizon Actuarial Services, LLC.

<sup>3</sup> Inker, Ben. "Back to Basics: Six Questions to Consider Before Investing," GMO Whitepaper, October 2010.