Portfolio Management Final Project

Direxion Daily Gold Miners Bull 3x ETF (NUGT)

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Portfolio Management

Professor Whitelaw

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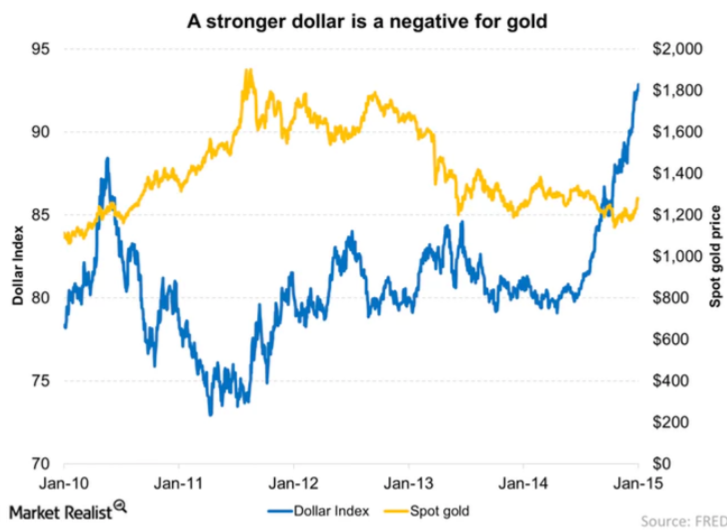
1 Product Overview

1.1 Description

The Direxion Daily Gold Miners Bull 3x ETF (NUGT) seeks to generate investment returns of 300% of the daily performance of the NYSE Arca Gold Miners Index (before fees and expenses). NUGT is particularly interesting because though it tracks gold miners rather than physical gold itself, it is generally also used by investors to gain greater exposure to the commodity.

Throughout most of history, gold has been a commodity of much fascination. Its price is perhaps just as influenced, especially in certain parts of the world, by its cultural significance as its economic value. Economically, the commodity is often viewed as a safe haven asset and as a long term store of value. It particularly gains a lot of attention as investors begin to lose faith in the dollar. The graph below shows the often inverse relationship between the strength of the dollar and the price of gold.



There is also a strong seasonal effect that can be identified with the commodity that can largely be explained by the start and end of festival seasons especially in Asia where gold is used most prominently for gifts and inter-generational transfers. While investing in an ETF that tracks gold miners rather than gold leads to a slightly different risk/return frontier given the effect of management and operations, gold mining companies, on the whole, largely still track gold prices and are simply another way of gaining exposure to the commodity.

1.2 Strategy

The product aims to invest at least 80% of its net assets in financial instruments that provide daily leveraged exposure to the index and/or exchange traded funds (ETFs) that track the NYSE Arca Gold Miners Index. The NYSE Arca Gold Miners Index is a market capitalization weighted index comprised of publicly traded companies that operate globally in both developed and emerging markets and are involved primarily in mining for gold. The major holdings and weighting scheme of the index can be seen below.

Index Top Ten Holdings %	
Newmont Mining Corp	10.32
Barrick Gold Corp	9.68
Franco-Nevada Corp	7.41
Newcrest Mining Ltd	6.55
Goldcorp Inc	5.79
Agnico Eagle Mines Ltd	5.41
Wheaton Precious Metals Corp	4.55
Randgold Resources Ltd	4.51
Royal Gold Inc	3.05
Kinross Gold Corp	2.87

Index Country Weightings %	
Canada	54.47
United States	16.25
Australia	13.36
South Africa	5.71
Jersey	5.71
Peru	1.91
China	1.55
Monaco	1.04

Index data as of 09/30/2017. Source: Bloomberg. Index country weightings and top holdings are subject to change.

The financial instruments in which the fund normally invests includes swap agreements and future contracts; on a day to day basis, the fund is expected to hold money market funds and/or short term debt instruments that have terms to maturity of less than 397 days. The top three holdings of NUGT include VanEck Vectors Gold Miners ETF (46.35% of assets), Solactive Cust Gld Miners (2.51% of assets), and Ve Vectors Gld Miners (1.90% of assets).

NUGT is a mid-cap, growth fund as categorized by Morningstar's Style Box. The fund likely attracts sophisticated retail investors and day traders who understand the effects of leverage and are seeking to invest in an alternative investment asset that would diversify their portfolios. Given the volatility of the fund, it is likely that the ETF is not typically used as a buy and hold fund but rather as a vehicle for shorter term trades based on market movements. It is very unlikely that the fund attracts institutional investors given that the volatility level is probably outside target risk limits. With a net expense ratio of 1.15% including management fees and $1.2bn in assets under management, it is amongst the top three gold miners ETFs.

Symbol	ETF Name	Asset Class	Total Assets ($MM)	YTD	Avg Volume	Previous Closing Price	1-Day Change	Overall Rating
GDX	VanEck Vectors Gold Miners ETF	Equity	$7,598.21	3.63%	36,274,816	$21.68	0.46%	
GDXJ	VanEck Vectors Junior Gold Miners ETF	Equity	$4,086.06	-3.87%	11,148,152	$30.33	0.97%	
NUGT	Direxion Daily Gold Miners Bull 3X Shares	Equity	$1,241.09	-17.60%	5,804,755	$25.18	1.00%	
JNUG	Direxion Daily Junior Gold Miners Index Bull 3x Shares	Equity	$697.20	-43.19%	10,720,067	$12.64	2.93%	
DUST	Direxion Daily Gold Miners Bear 3X Shares	Equity	$346.78	-37.42%	5,745,160	$30.27	-1.30%	
RING	iShares MSCI Global Gold Miners ETF	Equity	$326.49	0.98%	416,394	$17.27	0.35%	

2 Performance

2.1 Recent History

From December 2010 to June 2017, the annual excess mean of NUGT (109.83%) outperformed both the world market tracked by ACW (8.61%) and the ARCA index (-8.61%). NUGT's goal is to earn a 3x daily return on ARCA, which it largely achieves. NUGT and ARCA's returns differ only because of daily rebalancing and the compounding of each days' returns over time. The fund emphasizes to its investors that its investment target does not apply to any period of time longer than a single day. An extreme example is September 2015, when the returns on NUGT and ARCA were 636.10% and -2.43% respectively. The combination of the Greek debt crisis followed by a substantial devaluation of the Chinese yuan led investors to flee to safe haven assets, among those: gold. Due to the effect of compounding, NUGT was able to outperform ARCA that September. However, NUGT's performance over the seven year period comes with ample volatility of 334.55%. In comparison, the standard deviation of the market is only 12.38% and 38.35% for ARCA.

It is also perhaps interesting to note that the correlation of NUGT compared to ACW is essentially zero. This is not necessarily surprising and in fact is somewhat expected given that gold is largely viewed as an uncorrelated asset.

2.2 Regressions

We ran three separate regressions on the excess returns of NUGT against: (1) the factors of the Fama-French-Carhart Four Factor Model and the iShares 0-5 Year TIPS Bond ETF (STIP); (2) the factors of the Fama-French-Carhart Four Factor Model and the PowerShares DB US Dollar Index Bullish ETF (UUP); and (3) the factors of the Fama-French-Carhart Four Factor Model, STIP, and UUP. We will discuss our benchmarks and results for each regression below:

1. Fama-French-Carhart Four Factors and STIP

	NUGT		
	coeff	**std err**	**t-stat**
Alpha (annualized)	0.10	0.12	0.89
ACW	(2.97)	3.86	(0.77)
SMB	(3.98)	5.19	(0.77)
HML	(1.60)	7.49	(0.21)
WML	1.40	5.18	0.27
STIP	(48.96)	22.69	(2.16)
R-sq	8.28%		

In this regression, we regressed NUGT against ACW, SMB, HML, WML, and STIP. We used ACW as our market portfolio since we assume that investors are varied across regions and look to gold as a diversifying asset. STIP seeks to track the results of an index composed of inflation protected U.S. Treasury bonds with maturities of less than 5 years. Because gold is widely viewed as an inflation hedge, we also chose to regress NUGT against STIP expecting a large positive factor loading. In this construction, we view STIP as a proxy for inflation. While we found our results for the traditional factors used in the Fama-French-Carhart Four Factor Model were not statistically significant, the beta for STIP was significant and negative. This was driven by the correlation of NUGT and STIP (-0.2341) and the relatively large ratio of volatilities. It seems to indicate that gold did not act as an inflation hedge over the past seven years as would be expected by many investors.

2. Fama-French-Carhart Four Factors and UUP

	NUGT		
	coeff	std err	t-stat
Alpha (annualized)	1.36	1.42	0.95
ACW	(3.28)	4.03	(0.81)
SMB	(4.88)	5.26	(0.93)
HML	(4.24)	7.46	(0.57)
WML	2.85	5.19	0.55
UUP	(12.46)	6.48	(1.92)
R-sq	7.04%		

In this second model, we regressed the excess returns of NUGT against the Fama-French-Carhart four factors and UUP instead of STIP. UUP is an ETF that is long the US Dollar and short 6 major world currencies: the Euro, Japanese Yen, British Pound, Canadian Dollar, Swedish Krona, and Swiss Franc. Given that gold is traditionally priced in dollars, as we mentioned above, it tends to move opposite the US dollar. Thus, we expected a large negative factor loading on UUP. Our results confirmed this inverse relationship with the beta for UUP being the only significant factor.

3. Fama-French-Carhart Four Factor Model, STIP, and UUP

	NUGT		
	coeff	std err	t-stat
Alpha (annualized)	0.13	0.12	1.09
ACW	(5.20)	4.16	(1.25)
SMB	(4.25)	5.16	(0.82)
HML	(2.34)	7.46	(0.31)
WML	1.99	5.17	0.38
STIP	(40.89)	23.31	(1.75)
UUP	(9.05)	6.60	(1.37)
R-sq	10.64%		

Our third regression included the four factors again as well as both STIP and UUP. None of the results were statistically significant compared to our previous two models, indicating that there must be some degree of multicollinearity between STIP and UUP. One possible explanation for this may be that both treasury inflation-protected securities and the US dollar are driven by movements in interest rates.

2.3 General Regression Commentary

Based on our results, it seems as expected, NUGT is indeed affected by changes in inflation and currency rates. However, contrary to how the product is marketed, it does not always seem to serve as a hedge against inflation. We tested our regression and results over a shorter time period as well, and found similar results. It is important, though, to note that the results of the analysis above is limited only to the most recent 7 year period. It is plausible that the relationship may have changed over time (research and earlier studies done have indicated that the relationship between gold and inflation has varied over time and over specific time periods, it has indeed served as a hedge).

While there are a number of similar products to NUGT, each varies slightly in its construction and few are as leveraged. Perhaps the closest product is the CS VelocityShares 3X Long Gold ETF (UGLD) whose year-to-date performance has been 25.24% compared to NUGT's -7.26%. Although also a 3x leveraged fund, it tracks a different underlying index than NUGT: the S&P GSCI Gold Index ER. The index is comprised of futures contracts and reflects price fluctuations of the commodity itself, unlike ARCA that tracks the returns of miners involved primarily in mining gold and to a lesser extent, silver. Other competing products include the VanEck Gold Miners ETF and the iShares Global Gold Miners ETF, both of which are unleveraged and only seek to replicate a 1x performance.

3 Black Litterman Portfolio Optimization

NUGT operates in the world market because investors around the world generally consider gold to be a diversifying asset since it is uncorrelated with any local market movements. Therefore, we chose to optimize a portfolio that holds NUGT, ACW, and UUP. Note that we chose to include only UUP in our portfolio given the multicollinearity between UUP and STIP. Since our analysis found gold to be generally uncorrelated with the market, our view is that gold serves as a diversifying asset in this portfolio. Investors should turn to gold because it has a positive risk premium with low correlation to traditional asset classes.

3.1 Portfolio Optimization

Our inputs are the excess returns of ACW to track the world market, NUGT to track gold, and UUP to track the performance of the US dollar. The weights in each asset and results of our portfolio optimization can be seen below.

	Optimal Portfolio					
	w(ACW)	w(NUGT)	w(UUP)	E[rP]	SD[rP]	SR[rP]
Max SR	0.422	0.006	0.572	0.051	0.046	1.129

Roughly half of the portfolio is invested in UUP (0.572) with the other half comprised largely of ACW (0.422) and a tiny weight in NUGT (0.006). This allocation is reasonable given the historic returns and volatilities of the past seven years and the correlations between the assets.

	Annual Excess							
	ACW	NUGT	ARCA	SMB	HML	WML	UUP	STIP
Mean	8.61%	109.83%	-8.61%	-0.85%	-0.53%	5.75%	1.48%	0.028%
SD	12.27%	334.55%	38.35%	7.54%	5.81%	8.75%	7.18%	1.95%
SR	0.70	0.33	(0.22)	(0.11)	(0.09)	0.66	0.21	0.01
Skew	-0.3271	5.0884	0.6075	-0.0435	0.5120	-0.1256	0.5349	-0.0792
Kurt.	1.2271	29.2549	0.8971	-0.3767	-0.0460	-0.0342	0.1880	-0.1663
Corr. ACW	1	-0.0064	0.1614	0.2413	0.0369	-0.3029	-0.5696	-0.4779
NUGT		1	0.3981	-0.1071	-0.0910	0.0862	-0.1596	-0.2341
ARCA			1	0.0827	-0.0254	-0.1629	-0.3534	-0.4087
SMB				1	-0.0202	-0.0515	-0.1444	-0.0355
HML					1	-0.4694	-0.0810	0.1534
WML						1	0.24006	0.00390
UUP							1	0.4339
STIP								1

The heavy weight in ACW can be explained by its attractive Sharpe Ratio (0.7). Although UUP has underperformed during this time period, the majority of the portfolio is invested in the ETF because it has a large negative correlation with ACW (-0.5696) and therefore serves as a hedge for the world market. Gold, on the other hand, is not a hedge but a diversifying asset; it does not move opposite to the market or currency but just has low correlations with both ACW (-0.0064) and UUP (-0.1596). Due to NUGT's extremely high volatility (334.55%), only a small portion of the portfolio is invested into the 3x leveraged fund.

4 Appendix

Annual Fund Operating Expenses	
Management Fees	0.75%
Distribution and/or Service (12b-1) Fees	0%
Other Expenses of Fund	0.15%
Acquired Fund Fees and Expenses	0.25%
Total Annual Fund Operating Expenses	**1.15%**
Expense Cap/Reimbursement	0%
Total Annual Fund Op. Expenses After Expense Cap/Reimbursement	**1.15%**

References

[1] Direxion ETFs: http://www.direxioninvestments.com/products/direxion-daily-gold-miners-bull-3x-etf

[2] Yahoo Finance: https://finance.yahoo.com/quote/ugld?ltr=1

[3] ETFDb: http://etfdb.com/

[4] ETF.com: http://www.etf.com/UGLD