*Colburn Update: Notes*

*Generally I tried to reshape the introduction to have a more rigid structure, so that topics were fully explored when they arose, and did not have to be explained later on. This elimininated some repetitiveness/redundancy and shortened the introduction to make room for the USO example*

*Structure:*

* *Introduction to ETFs*
* *Advantages of ETFs*
  + *Access to difficult*
  + *Specifically Commodity ETFS*
* *Risk of ETFS*
  + *Price Risk*
  + *Liquidity Risk*
  + *Tracking error*
* *Relevancy* 
  + *USO*
* *What this paper will cover*

*I also adjusted some of the language to reflect some finance specific terminology*

Exchange traded Funds started trading in the United States in 1993 with the launch of the S&P 500 Trust ETF (‘SPDR”) by State Street Global Investors and have become some of the most popular investment vehicles over the last 25 years. Initially created to provide institutional investors the ability to executive sophisticated trading strategies ETFs now provide financial advisor, portfolio managers, and individual investors investment options to satisfy a variety portfolio objectives. The ETF market has continued to grow in the size of assets under management, the types of funds being offered, and the complexity of offerings. In 2002 the first bond ETF was introduced followed by the first commodity ETF in 2004, which was formed as a non-1940 Act legal structure. By 2008, the first actively managed ETF was created, opening the door for greater market offerings According to Global X Funds using Bloomberg and Morningstar data, U.S ETF assets under management increased from under $500 billion to over $2.5 trillion from 2003 to 2016. Today investors can trade active or passive ETFs, gaining inexpensive exposure to equity indexes or sub-indexes and strategies, fixed income markets, as well as commodities or other alternative assets.

There are several advantages to investing in Exchange Traded Products (ETPs), including ETFs and Exchange Traded Commodities. ETFs provide investors with access to markets which they otherwise may not have access. For example, many small investors do not the capital required to construct diversified bond portfolios given the minimum size of those bonds. By holding a bond ETF, investors own a small percentage of a bond portfolio. Additionally, for equity investors, it is difficult and expensive to recreate a market-weighted index such as the SP-500. By buying an ETF, investors avoid hassle and expense associated with rebalancing their portfolios to mimic the index. The abundance of specialized ETFs make it easy for investors cheaply construct portfolios based on their investment opinions and objectives.

The need for commodities-backed exchange traded products are especially acute due to the leveraged nature of futures, the need to “roll” contracts as they expire, the large contract size, and uncertain cash flows of a marked-to-market margin account. For example, one corn futures contract is equivalent to trading 5,000 bushels of corn while one CORN ETF Share represents a percentage of the corn futures assets held by the Fund. As seen in Table 1, the value of one ETF share for the Funds in this study is considerably less than the value of one futures contract which gives investors a greater opportunity to gain exposure to commodity markets. Owning shares of a commodity ETF with futures market asset baskets allow investors to gain commodity exposure without being subjected to potentially expensive margin accounts that are marked-to-market daily.

Apart from gaining access to a plethora of investment products and access, ETFs offer another important advantage: liquidity. Often ETF’s offer deeper liquidity than the underlying asset. As with indexes, sometimes a market for the underlying product does not exist directly. Other times, the large size of the underlying assets mean trading is limited. Additionally, unlike mutual funds, ETFs are not limited to end of day transactions, and trade throughout the trading day. This leads to responsive, accurate, and liquidity and pricing.

Investing in ETFs are not without risk. As with any financial asset, price risk is of primary concern. Though ETF liquidity can be better than the underlying, liquidity depends on the size and popularity of the ETF. Less liquidity tends to widen the bid-ask spread, increasing trading costs. ETF investors face the risk of the issuer of the ETF facing financial difficulty, as many ETFs, including the ones in this study, have no bank guarantee and are not FDIC insured. Many ETFs are structured through trust vehicles or other objects of financial engineering to protect investors. This paper investigates an additional risk, that of the ETF failing to track it’s underlying product, either through divergence between the market price and the Net Asset Value (NAV), or by failing to replicate the exposure of the underlying asset.

In late April, 2020, volatility in the oil markets due to the COVID-19 pandemic illustrated the importance of considering tracking error when investing in commodity ETFs. The United States Oil Fund (USO) is a large commodity ETF which aims to recreate exposure to front month WTI oil futures. As the lack of storage pushed front and near month futures lower, the ETF lost more and more of it’s value. As the close to expiry May contract went deeply negative, USO held up to 30% of all June contracts, concerning futures investors. “Super-Contango” prompted the managers of USO to repeatedly adjust their roll dates and holdings further out along the curve. The ETF lost considerable value, and on April 28 instituted a 1:8 reverse split. On May 29, it was reported that both the SEC and CFTC had opened probes into the ETF, considering whether investors were properly informed of the risks of investing in the ETF.

USO illustrates the need to look at tracking error with respect to price and asset basket value, as well as with price and NAV. Investors structure portfolios of ETFs based on the ETF’s stated objective and benchmark. In the case of USO, the ETF was unable to follow their benchmark and investor’s portfolios may have suffered.

Unfortunately, academic literature provides little guidance on the extent of tracking errors and mispricing issues in commodity ETFs as much of the literature analyzed stock index ETFs. The objective of this study is to examine the ability of selected agricultural and energy commodity ETFs in tracking the movements of their respective futures-based asset baskets. Specifically, the study will focus on the performance of CORN, SOYB, and WEAT in the agricultural sectors and on USO and UGA among energy ETFS over the period of January 2012 through October 2017. CORN, SOYB, and WEAT track a weighted basket of corn, soybean, and wheat futures, respectively, listed on the Chicago Mercantile Exchange (CME). USO and UGA track the movements of front month WTI crude oil and RBOB gasoline futures listed on the New York Mercantile Exchange (NYMEX).

Tracking ability for this study is defined as the ability of the ETF to replicate the returns of the respective asset basket held by the Fund. Specifically, we will look at the mean absolute difference in tracking error, bias, systematic risk, and an OLS regression to examine how various factors impact the size of tracking errors. Additionally, this study will conduct a mispricing analysis as an alternative measure of tracking ability.

Analyzing the tracking ability of ETFS is an important issue as any deviations in tracking could have adverse impacts on portfolio returns. The findings of this study will provide much needed evidence on the tracking ability of commodity ETFS that is currently not available in the academic literature. Our investigation of factors that affect tracing performance will provide guidance for potential improvements and arbitrage opportunities. This study will be particularly useful for institutional investors, portfolio managers, and individual investors/traders trying to gain exposure to commodity markets and looking for ways to improve decision making in regard to trading this relatively new asset class.