Astoria Portfolio Advisors LLC. ("Astoria") designs **Multi-Asset ETF Model Portfolios**.

WHO WE ARE

Astoria is an investment management firm that specializes in the construction, management and model delivery of tactically constructed, cross asset ETF managed portfolios. Our research driven portfolios are stress tested through various quantitative risk models in order to best understand our portfolio risks and to help determine when risk budgets should be expanded or contracted.

We utilize a **disciplined, cross-asset quantitative investment process** to participate in **upside exposure** while hedging **downside risks** during stressed markets.

Our investment management process is a **constant feedback loop** between **research**, **portfolio construction**, and **risk management**.

Investment decisions are made using **strong economic** and **quantitative rationale** backed by **data**.

"When you get too far off course, your internal compass tells you something is wrong, and you need to reorient yourself. It requires courage and resolve to resist the constant pressure and expectations confronting you and to take corrective action when necessary" – Bill George, Discover your True North, 2015, John Wiley & Sons.

Astoria employs **ongoing research assessment** of these models to **manage** to determine when risk budgets should be **expanded** or **minimized.**

Game Theory is an important and, we believe, a distinguishing factor into our investment process.

When selecting ETFs for our portfolios, we leverage our **ETF selection model** which is based on **rigorous testing** and **research.**

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ASTORIA'S MULTI ASSET RISK STRATEGY (MARS)

What's the ETF Playbook for 2018?

- Astoria believes that this **late cycle, pro-cyclical rally** persists, *for now*, until either (1) liquidity starts to **deteriorate** (2) inflation **materially rises** (3) the synchronized global earnings recovery **collapses**. In the second half of '18, higher dispersion will set in as Fed rate hikes, a decline in liquidity, and further yield curve flattening will have distinct portfolio implications. Hence, our bullish ideas are centered around the first 2 quarters.

- Throughout all our portfolios, we want to be **long beneficiaries of yield curve flattening & late cycle economic environment** (US energy, US financials, Global ex US equities, oil sensitive equities, and commodities) and hedge out our market risk.

- Astoria has advocated **owning the entire world** but there will be a time next year where investors will need to pick and choose their equity markets. When **dispersion rises**, active management and hedge fund sponsorship should get a boost. This year, the **unstoppable force of low-cost, passive**, **risk premia**, and **systematic quantitative strategies** proved too powerful for the majority of active managers and hedge funds in a **rock bottom volatility environment**.

- **Aggressive Fed rate hikes** could cause the **US yield curve to invert**. Historically, an inversion has been the ultimate kiss of death for equities. While this year hedging portfolios may have been **wasted premium**, we think **hedged strategies** will fare better in '18. We advocate starting 2018 with a small amount of hedges given the US tax reform bid and the usual Santa Claus rally. If **financial conditions materially deteriorate**, we plan on significantly increasing our hedging exposure.

- The **2 biggest risk factors** which we don't think are **either consensus** or **priced in** are:

    - (1) **liquidity**, which **on the margin**, will begin to **deteriorate** next year as the Fed hikes rates, facilitates their QT program, and there is potential for other Central Banks to slow their QE purchases. Liquidity has been the biggest driver of risk assets in recent years, so we would expect a reduction in liquidity to have negative implications.

    - (2) Astoria believes that **reflation** which has been talked about for the past 2 years manifests itself into inflation in 2018. Starting next year, it will be prudent to **incorporate commodity-based strategies within a portfolio**. Investors have excluded commodities **at large** since 2008 but we think they **now** warrant attention. After all, commodities are uncorrelated, severely under-owned, and serve as a call option on inflation.

- Another overarching theme in our portfolio is that we want to ***mix*** **international value and international momentum**. There's tons of ink spilled on US factors, but investors **should be looking abroad** as **factor investing is a global phenomenon.**

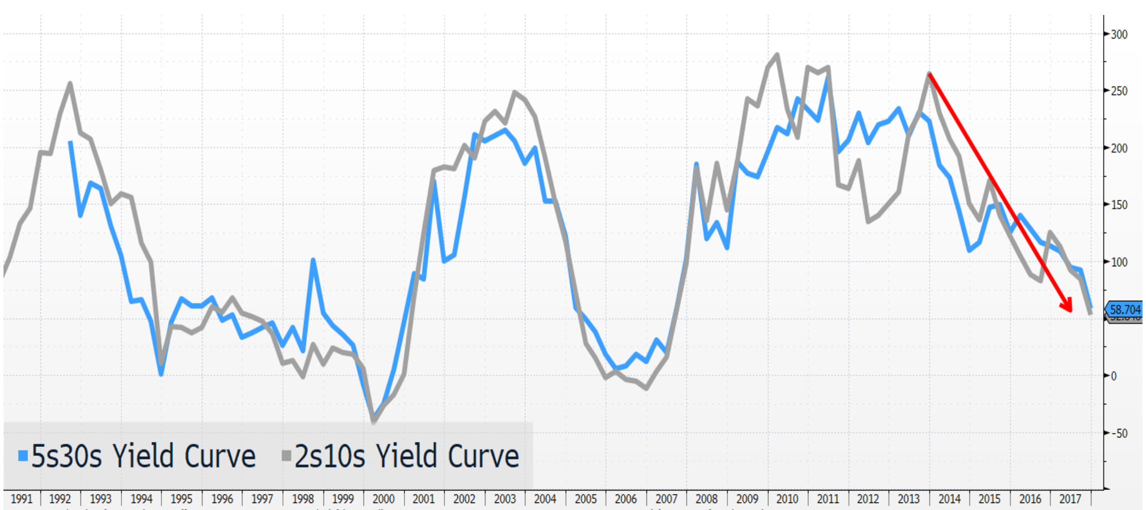
- **Timing factors is similar to picking a market top or bottom** – a low probability event of having repeatable success. **Pick the factors you like and stick with it**. Growth is **crowded** and **expensive** based on almost any measure you look at. Be careful with growth. If you don't already own it, it's probably **too late**. And if you do, it could be a significant **source of funding risk**. Just look at how US technology stocks perform anytime the market pulls back. If that makes you uncomfortable, it's not for you to own.

- **Be extremely careful with Fixed Income.** Historically, this asset class provided income, diversification, hedging, and carry. **That is no longer the case**. Common sense would tell you that anytime $**2 trillion dollars** go into an asset class over an 8-year period, **all the historical attributes it once possessed are long gone**. We are *cautiously* using select fixed income assets for yield. We are using **alternatives** to hedge our portfolios. Tactically, we will use the **long end of the curve to hedge a decline in the economy given its asymmetric properties**. Otherwise, we **prefer as little fixed income exposure as possible** across all our portfolios.

Key Theme #1: Long *Beneficiaries* of Yield Curve Flattening & Hedge Out Market Risk

- **Our top investment theme for the first 1-2 quarters**, is that we want to be **long *beneficiaries* of *yield curve flattening & late cycle cyclical assets***. Historically, oil, energy equities, financials, commodities, and Global ex US equities have relatively outperformed when the yield curve has flattened and the economy has entered into latter stages of the economic cycle. 2017 saw relentless flattening and, in our view, the probability that more flattening occurs is reasonably high. Additional rate hikes in 2018 will put more pressure on the curve. At this point, it's too late in the cycle for that trend to revert. Astoria believes ***beneficiaries* of *yield curve flattening*** will be an **overarching theme across asset classes in 2018**. If the yield curve inverts, earnings fall apart, or inflation materially rises, we would significantly reduce our exposure to risk assets and increase our exposures to alternatives.

What's Driving the Curve Flattening? Demand from Overseas or a Signal of a Recession? We Think the Former.



Source: Bloomberg, Astoria

Key Theme #2: Reflation Turns To Inflation. Begin To Allocate To Commodities.

- For the past 8 years **investors shunned commodities**. We think, given where we are in the cycle, **it's time to begin to allocate to this under-owned asset class**. There are numerous **signs that inflation is increasing**. Commodity products are probably the most challenging to analyze. You need to pick the right solution so you can benefit from the commodity's (1) price appreciation (2) roll yield (3) carry characteristics.

Key Theme #3: Don't Get Too Cute With Factor Based ETFs. Also, Look At International Factors.

- **Timing factors is similar to timing the market top or bottom** – a low probability event of having repeatedly success. Our view is that investors should to **pick which factors they like** (and for whatever reason they like them) and to **stick with it.**

- **Growth stocks are crowded, expensive, and vulnerable.** Many have called for a rotation into value and have failed. We are not making a call – we are **simply looking at all the distribution of outcomes and weighting the probabilities accordingly**. We **prefer owning Value** stocks given their **margin of safety** and the difficulty of timing a rotation out of growth. All the equities we have highlighted have value characteristics. Just look at US technology price action anytime the market sells off. If this price action makes you uncomfortable, then you shouldn't own growth as they represent a **huge funding risk**. If you don't own growth now, the probability that you will successfully earn a high risk/reward is low.

- **As far as momentum, its simple.** The US equity market has exhibited momentum for the first 7 years post the credit crisis while the Rest of the World finally caught on after Brexit. We prefer to be **long momentum in Global ex US equities** at this juncture.

- Style factors, such as value and momentum, have **gained in popularity** thanks to the popularity of Smart Beta. Adoption rates of these broad and persistent strategies have seen significant growth, but concentrated in the US. **Style factors drive dispersions within asset classes**. As such, the same benefits associated with US factors (return enhancement, risk management and diversification) are observed outside the US. Perhaps part of the reason factors have not been implemented in international equities is that factors behave differently dependent on the phase of the business cycle. Therefore, one must properly understand the business cycle and risk characteristics for a given country or region to effectively capture the risk premia.

Key Theme #4: Own the Entire World *For Now*

- **2017 was as good as it gets for equities.** We wrote in October, that the environment was perfect. Why? (1) earnings were **inflecting higher globally** (2) central banks were **accommodative** (3) and **realized inflation** was relatively muted. Things **will change on the margin in 2018** but our research suggests another 1-2 quarters where you can be **long the entire world**. Afterwards, you will **need to selective as dispersion kicks in**.

- While International DM and EM equities are this year's biggest winners, keep in mind that US equities have dominated for the past 8 years.

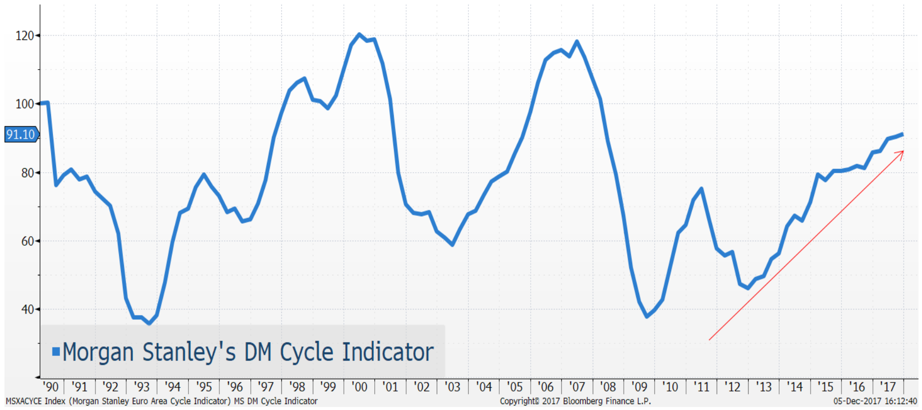
International Equities Are This Year's Biggest Winners But The US Dominated for the Past 8 Years

Source: Bloomberg, MSCI, Astoria

- This **synchronized bull market** comes once every few decades, so investors needed to make it count. We see a lot of *investment spaghetti* in investor's portfolios. Most investors will utilize up to 10 ETFs to play a global equity rally but in reality, all you need is one ETF. We utilize the **VT** (**Vanguard Total World Stock**) which is big, liquid, and inexpensive to own. It's much easier to risk manage 1 ETF as opposed to 10 ETFs plus you aren't paying bid/offer and commission many times over.

- In our view, you **can stay long risk assets until** (1) liquidity begins to decline (2) the yield curve inverts (3) inflation materially rises or (4) financial conditions weaken. However, the synchronized equity rally will fizzle out at some point in '18 so investors need to be prepared to pick and choose the winners.

Morgan Stanley's Developed Markets Cycle Indicator Remains Upward Trajectory



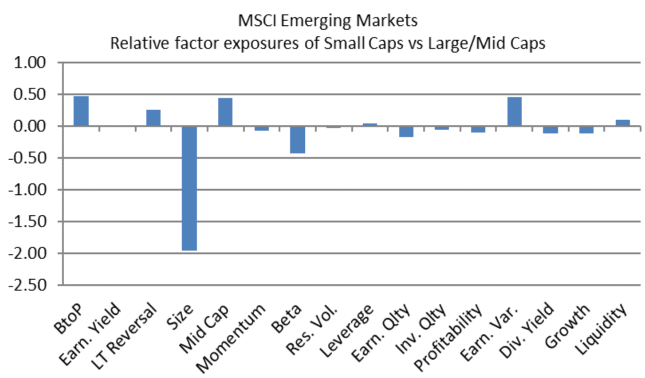
Source: Bloomberg, Morgan Stanley, Astoria

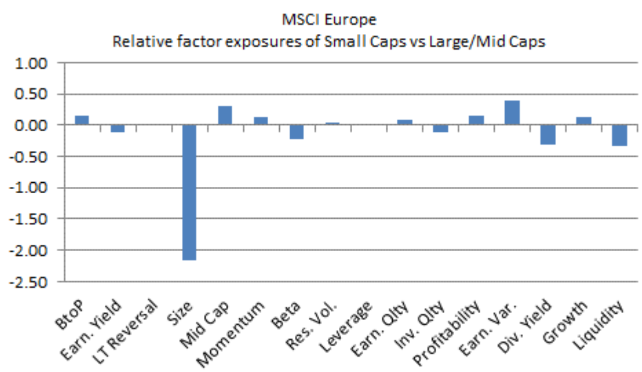
Key Theme #5: Buy International Small Caps.

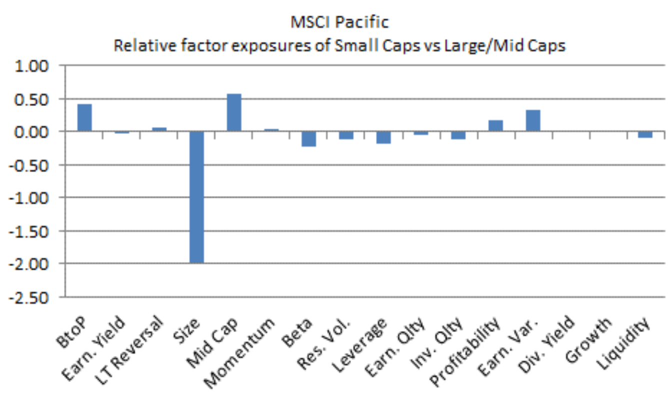
- How many research reports do you read on International Small Caps? Get our point?

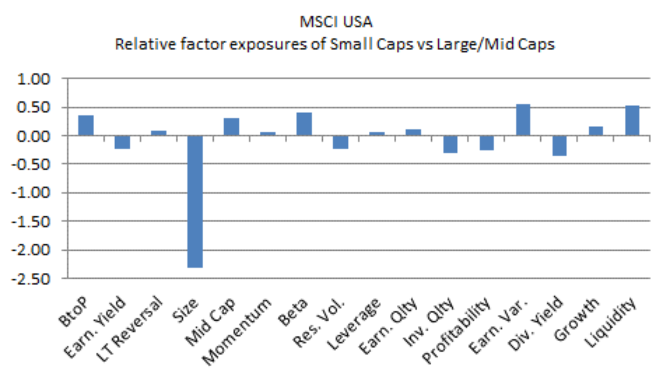
- **Small Caps are another risk factor which is well documented with decades of academic research.** While this cycle persists and liquidity is abundant, we think it's prudent to **go down the risk curve and invest in global small caps.** We would unwind this trade as soon as financial conditions deteriorate given the strong linkage between liquidity and small cap stocks. We are utilizing **VSS (Vanguard FTSE All World ex-US Small-Cap).**

- We wrote about our bullish outlook on International Small Caps in September. Simply put, they **are call options on domestic economic growth around the world**. Moreover, they carry some interesting and valuable portfolio characteristics. Compared to Large Caps, International Small Caps have **lower correlations and** have **varying factor and sector exposures.** Refer to the four charts below.









Source for above charts: MSCI Barra. Based on MSCI Barra's GEMLT average active factor exposures from Dec. 1998 to June 2017.

Key Theme #6: Short US High Yield Credit

- When I first started in the industry, I was an Equity Derivatives Analyst and I sat nearby the High Yield Credit Strategist. I recall the strategist complaining that high yield was only yielding 10% at the time (the year was

2000). Just a short while before, investors were receiving 12-13% of income. Now High Yield Credit is offering only a 5% yield. The irony!

- The bottom line is this – investors have poured a tremendous about of money into High Yield credit and **this isn't the part of the cycle where you want to own this asset class**. Fed tightening cycles have historically coincided with **credit spreads widening** and **valuations are extremely rich**.

- Investors **need to remember** that High Yield credit is a **very illiquid asset** regardless of how good HYG and JNK facilitates liquidity. If the asset class goes down because of poor fundamentals or Fed tightening, the superior ETF liquidity won't stop the price from falling.

- **Credit has equity like characteristics**. In 2008, junk bonds fell by **25**%. And there are **a lot more sellers now** then back in '08. JNK has a lower quality credit quality compared to HYG so we would lean on the former for a short.

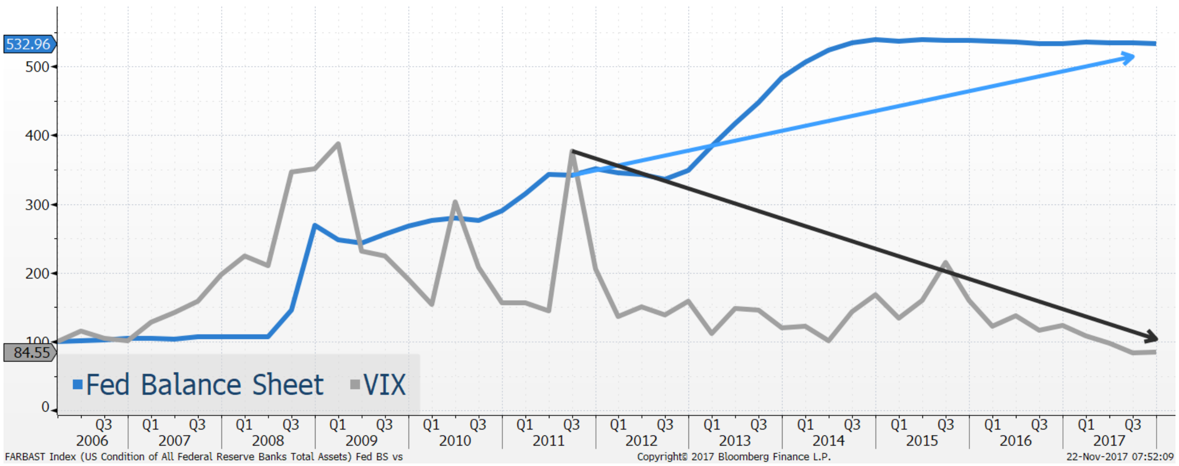
Key Theme #7: Hedge Your Risk Assets With Strategies That Carry Well

- **Everyone wants to own risk assets right now**. Bitcoin is up approximately 1000% this year and pretty much every major asset class and region of the world has produced positive returns in 2018 – **this is rare**! A piece of fine art recently sold for nearly half a billion dollars – wow! Cranes are dominating the skylines across most metropolitan regions of the world. Are we surprised? Nope. This is all typical of **late cycle investor and economic behavior**.

- Timing the market top is virtually **impossible**. If the biggest and smartest hedge funds and asset managers have a difficult time doing it with all the resources they have (Big Data, Artificial Intelligence, Machine and Deep Learning), the probability that others can do it with repeatable success are low to moderate at best. To that end, investors should hedge their risk assets by **owning uncorrelated assets that carry well** with an ETF portfolio construct. Astoria is utilizing **IAU (iShares Gold Trust)**, **QAI (Index IQ Hedge Multi-Strategy Tracker)**, cash, and a combination of **TLT (iShares 20+ Year Treasury Bond) / ZROZ (PIMCO 25+ Year Zero Coupon US Treasury).**

- This year, we have seen ***$2.2 trillion USD*** in central bank balance sheet expansion globally (approx. 15% of the aggregate balance sheet across the ECB, BOJ, and Fed). Right now**, capital markets are swimming in an ocean of liquidity** thanks to central banks flooding the system. Abundant liquidity is a key driver for rock bottom volatility (along with overwriting funds and higher sector dispersion causing realized volatility to be low).

The Fed Balance Sheet and VIX Index Have Been Inversely Correlated

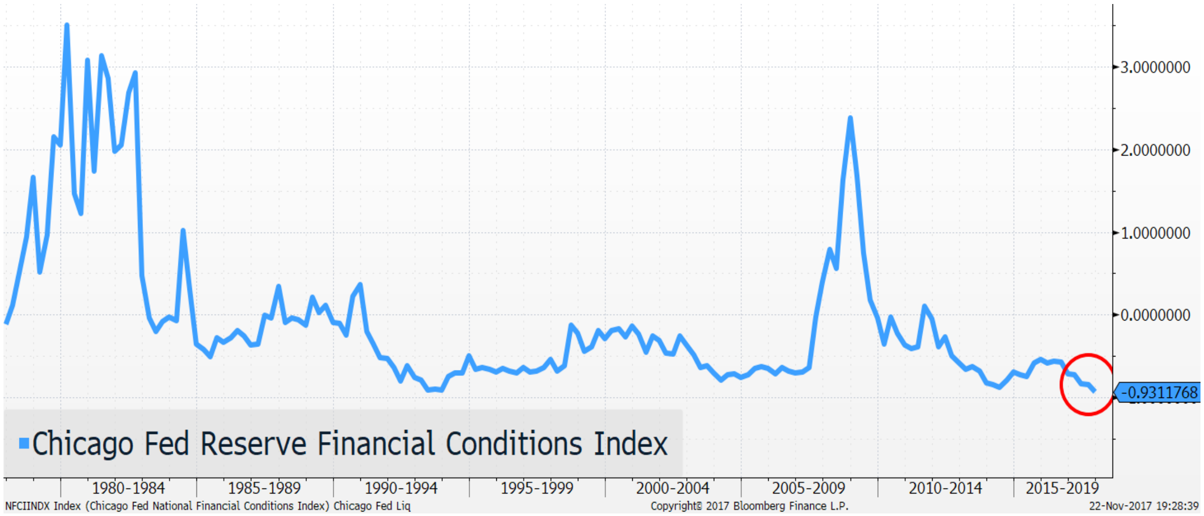


Source: Federal Reserve, Bloomberg, Astoria.

- **The markets, however, trade on the margin** and 2018 will begin to see liquidity decline in the US. The Fed has started to raise rates, will hike more, and quantitative tightening will further reduce liquidity. Eventually other central banks will end their QE programs as well, right? The repercussions of a decline in liquidity can be **quite significant** – especially **on the margin**.

- As you can see from the chart below, the Federal Reserve Bank of Chicago's National Financial Conditions index is **near half a century low!** If, on the margin, liquidity begins to decline in 2018 there is a reasonably high probability that risk assets will suffer. **We doubt this "liquidity risk" is either consensus or built into the price.**

The Chicago Fed Reserve Financial Conditions Index is Near 50 Year Lows!



Source: Federal Reserve Bank of Chicago, Bloomberg, Astoria.

- **Why we utilize IAU (iShares Gold Trust):** Gold is a **low delta call option** on (1) the bitcoin bubble blowing up (2) hedge against other unknown unknowns surfacing (3) inflation rising. Gold **carries well**, **positioning is relatively light** (particularly when compared to cryptocurrencies) and remains **uncorrelated**.

- **Why we utilize QAI (Index IQ Hedge Multi-Strategy Tracker):** The benefit of QAI is that it manages the downside in a liquid, systematic, and rules based framework. Whereas our Multi Asset Risk Strategy fund does what QAI does, we utilize the ETF in several of our core models. In the worst 10 months for the S&P 500 index since 2008, the underlying index for QAI was down a total of **18%** while the S&P 500 collectively was down **57%** (downside capture ratio was 32%).

Historically, QAI has Provided Downside Protection in a Rules Based, Systematic, and in a Liquid Wrapper

S&P 500 - 10 Worst Months	IQ Hedge Multi-Strategy Index	HFRI Fund of Funds Index	Bloomberg Barclays US Aggregrate Bond Index	S&P 500 Index
October 2008	-7.50%	-6.22%	-2.36%	-16.80%
February 2009	-1.29%	-0.37%	-0.38%	-10.65%
January 2009	-1.75%	0.71%	-0.88%	-8.43%
May 2010	-4.24%	-2.60%	0.84%	-7.98%
November 2008	-0.41%	-2.64%	3.25%	-7.17%
September 2011	-2.11%	-2.79%	0.73%	-7.03%
August 2015	-1.50%	-2.00%	-0.14%	-6.03%
May 2012	-1.30%	-1.72%	0.90%	-6.01%
August 2011	-1.07%	-2.64%	1.46%	-5.43%
June 2010	-1.26%	-0.89%	1.57%	-5.24%
Total	**-18.44%**	**-19.37%**	**5.00%**	**-57.21%**
Downside Capture	**32.23%**	**33.85%**	**-8.73%**	**100.00%**

Source: Bloomberg, Index IQ, Astoria

- Why we utilize **TLT (iShares 20+ Year Treasury Bond) & ZROZ (PIMCO 25+ Year Zero Coupon US Treasury).** If you think calling a market top or bottom was hard, forecasting a recession is even worse. How many people have tried to call a recession and have been wrong? However, as we are in the business to assigning probabilities and to invest accordingly, we advocate **owning a small amount of long dated treasuries**. The good news is that **TLT** and **ZROZ doesn't bleed excessively as options. Moreover,** there is **tremendous demand for the back end of the curve by foreigners**. We believe this **asymmetric price action** in the long bond is attractive.

- Plus, what was the only major asset class that outperformed in 2008 during one of the greatest recessions in the US history? The long bond was up **33%** in 2008.

Key Theme #8: Be Incredibly Selective In Fixed Income

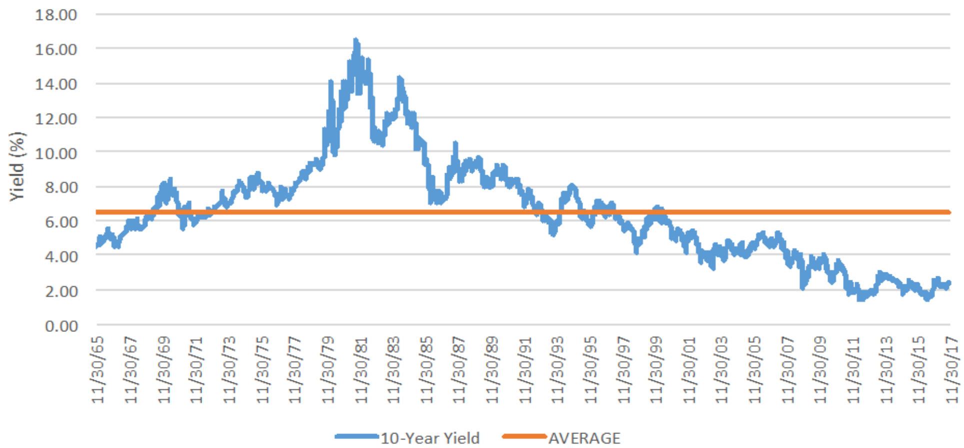
- Bonds were a tremendous asset class to own in the 70s, 80s, and 90s. All you needed to do is buy the Aggregate Bond Index and you got (1) high income (2) diversification (3) hedging (4) carry. What more can you ask for? Hence, a spectacular bubble forms.

- Unfortunately, in recent years because of the apparent "**low growth & low return world**" that we **"supposedly"** have been living in since the Credit Crisis, investors flocked into bond funds to the tune of **$2 trillion** of inflows.

Sadly, in doing so, the **vast majority of the equity bull market was missed by investors** (at least from 2009 to 2016; post Trump's election positioning has changed significantly).

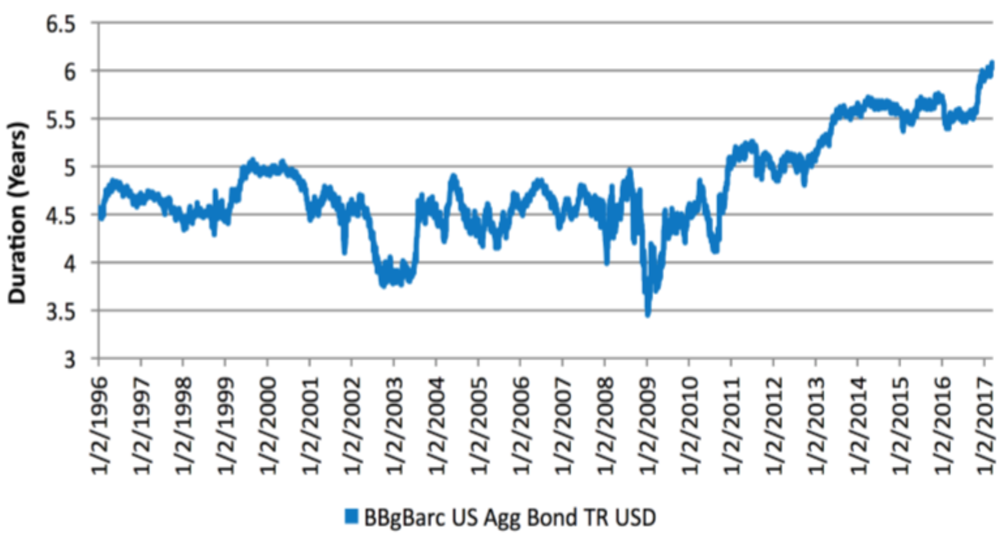
- Buying the Aggregate Bond index now **is neither a risk reduction tool** (duration has increased & correlations to stocks have increased) **nor an income play** (yield is only 2.5%). As far as diversification, common sense should tell you that if **$2 trillion of inflows** goes into any asset class, it **no longer will provide the diversification benefits it may have done several decades ago**.

Bonds Are No Longer the Risk Reduction, High Income, & Uncorrelated Asset They Were Decades Ago



Source: Bloomberg, Astoria

The Duration of Bloomberg Barclays Aggregate Bond Index Has Increased in Recent Years



Source: Bloomberg, Index IQ, Astoria

- Astoria has written extensively why we utilize **PFF (iShares U.S. Preferred Stock), SRLN (SPDR Blackstone/GSO Senior Loan), EMB (iShares J.P. Morgan USD Emerging Markets Bond)**, and **HYD (Van Eck High Yield Municipal)**. None of these are providing the opportunities they did years ago but they offer a modest margin of safety and their yields are double that of the Aggregate Bond index. For inflation protection, we prefer **TIPs** and **commodities**. And for hedging market risk, we prefer going outside of fixed income.

- The pushback we get on owning the long end of the curve is that the Fed owns a ton of long dated maturities. However, from our perch the Fed isn't selling those bonds but instead allowing them to roll off. **The real risk for backend is if inflation picks up significantly**. The **long end isn't priced for inflation** as forward rates all top out around 3% which is the Fed's long-term dot in the SEP. If inflation picks up, then the long-term dots should go up. Subsequently, the market inflation expectations can rise which will raise nominal rates and term premiums.

- The back end of the US curve is **<u>still</u>** significantly higher yielding then most other developed bond markets. In Astoria's view, the demand for the back end will continue until other Central Banks stop their QE programs and international yields back up.

Background on the 8 ETFs for 2018

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1) This is not an offer or recommendation to buy or sell any security.
2) This isn't meant be a portfolio an investor buys and holds for the entire year.
3) Astoria may or may not own any of the ideas presented now or anytime in the future throughout any of our strategies.
4) Any ETF holdings discussed are for illustrative purposes only and are subject to change at any time.
5) This note is meant to shed light on Astoria's investment framework and our thought process. Investors are welcomed to follow our research, blogs, and social media updates to see how our portfolios are shifting throughout the year. Refer to www.astoriaadvisors.com or @AstoriaAdvisors.
6) Refer below for more disclaimers.

Best, John Davi,
Founder & CIO of Astoria

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