The Institutional Argument for Crypto

Thematic Insights

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The Opportunity

The opportunity crypto presents…

It's becoming increasingly clear the world is nearing a serious inflection point. Trust in governments (and their associated agencies) is at its lowest point in decades. Across both business and politics, power is seemingly concentrated in the hands of a few at the expense of many. After a decade of inflated asset prices and unprecedented central bank policy, the majority is arguably no better off than when we set out on this monetary experiment. The rise of populism or the widening polarization of today's societies is a direct result of people feeling like they've been left behind.

But times are changing. The masses are becoming increasingly aware of the stranglehold today's corporate giants have on them and they're taking a stand. The popularity surge in Bitcoin and crypto is part of that stand, and it's much more than just another millennial fad. It represents an entirely new paradigm shift in the ways people transact with one another, interact with applications, and contribute to movements or ideas they believe in. This revolution has the potential to provide far more than just financial freedom; it has the potential to provide significant returns for investors as well.

Risk assets have had a tremendous run the last ten years, but the next decade is unlikely to mimic the last. Against a backdrop of considerably lower expected returns for traditional asset classes moving forward, the asymmetric upside potential in crypto is extraordinarily compelling. Bitcoin and crypto assets can also serve as a hedge against underperformance in a world hungry for growth. We anticipate more institutional investors to wade into this market once they get a better grasp on its asymmetric risk-reward profile. The opportunity cost of a small allocation to crypto is substantial in this context, especially when future returns on more conventional assets are expected to be modest at best.

As with all emergent technologies, there's a non-zero chance Bitcoin fails. But if that moment comes tomorrow, all will not have been lost as the revolution it's put into motion has inspired millions of young women and men to question the downstream effects of everything from adverse monetary policies to centralized applications that know more about us than we know ourselves. Meanwhile, the world is grappling with unsustainable debt burdens and a slowdown in economic growth, making developed economies increasingly vulnerable when the next downturn finally arrives. The demand for a true non-sovereign, digitally-native store of value asset has never been greater as the risk of widespread currency devaluation grows.

In a world dominated by central bank intervention, history may not repeat itself, but we're willing to bet at the very least it's going to rhyme.

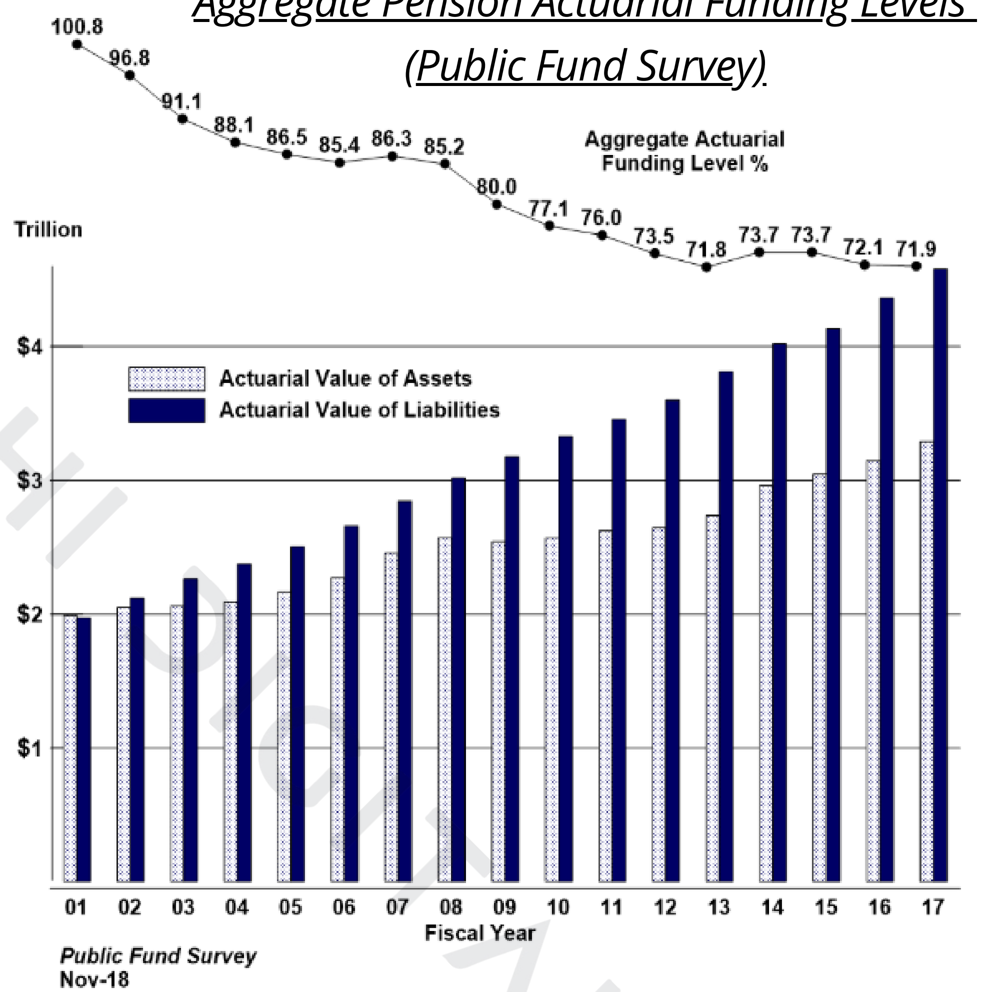
Case Study: Underfunded Pensions

Many institutions have benefited from the strong recovery in risk assets since the Great Recession, but the next ten years are unlikely to match the last decade if history serves as any guide. Pension funds are particularly important in the context of global institutional investors, given their purpose and downstream effects on many parts of the economy. Despite the significant gains in many financial assets over the last ten years, the funding status of many pension funds, both public and private, remain extremely vulnerable today. Part of this stems from inadequate contributions from plan sponsors. Another reason is the over-extension of future promises to retirees who live significantly longer today, on average, than just thirty years ago.

Regardless of how they got here, public pension funds in the U.S. are approximately 72% funded, in aggregate, according to The Center for Retirement Research at Boston College (CCR)[1], down significantly from nearly 90% roughly 15 years ago. Rising asset prices have boosted the actuarial value of public pension fund portfolios, but a combination of "market downturns, insufficient contributions (for some plans), and increased benefit levels (also for some plans) resulted in a decline in aggregate funding level between 2001 and 2012."

But if funding levels for pensions have fallen during the longest bull run in history for stocks, imagine their funding status once a market downturn strikes. **The looming pension crisis, which some argue is inevitable at this point, has some serious implications for the economy.** A reduction in promised benefits to retirees will force many to cut spending, weighing on GDP. If the government bails out many of these plan sponsors, like it did with the banks a decade ago, this will require even more money printing, which will drag on the U.S. dollar as its value is inflated away.

Aggregate Pension Actuarial Funding Levels (Public Fund Survey)



[1]Beginning with fiscal year 2001, the Survey contains data on public retirement systems that provide pension and other benefits for 12.9 million active (working) members and 9.3 million annuitants (those receiving a regular benefit, including retirees, disabilitants and surviving beneficiaries). At the end of fiscal year 2017, systems in the Survey held combined assets of $3.47 trillion. The membership and assets of systems included in the Survey comprise approximately 85 percent of the entire state and local government retirement system community.

Data as of November 2018

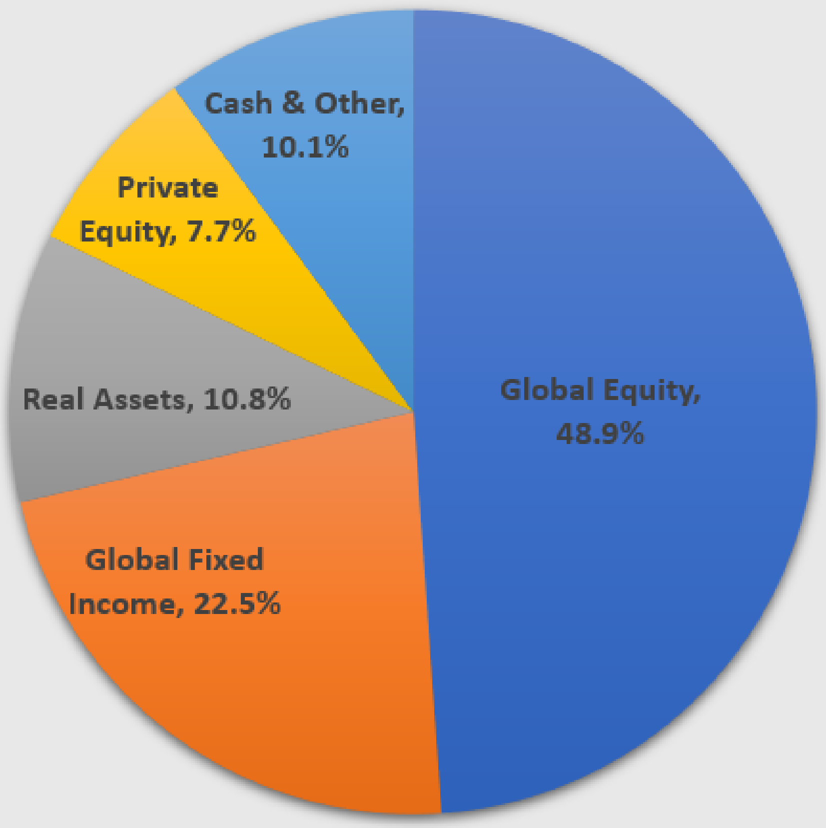
Sources: NASRA, The Center for Retirement Research at Boston College

Pension Fund Asset Allocations

According to the same report by CCR, current allocations indicate public pension funds have hefty exposure to global equities (roughly 50% of aggregate portfolios). Fixed income makes up the second largest bucket (22%), which combined make up almost three quarters of public pension fund assets. The California Public Employees' Retirement System (CalPERS), the largest defined benefit public pension fund in the U.S., has a similar allocation mix, with almost 80% of its assets falling into either global equity (50%) or fixed income (~30%). For that reason, much of our discussion will focus on these asset classes and the rising concerns around their returns going forward.

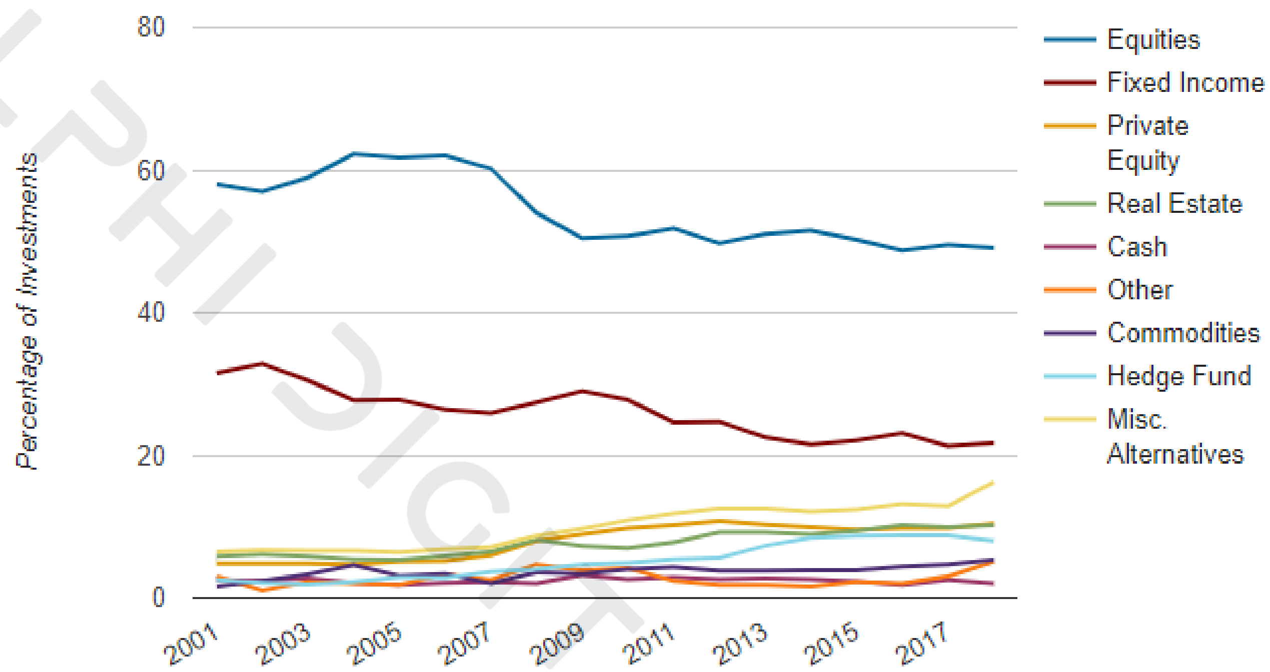
Pension funds also benefit from a longer time horizon when it comes to investing, so opportunities with compelling asymmetric upside over the next 10-20 years are exactly the types of assets these institutions should be exploring. It's no secret we strongly believe crypto assets present such an opportunity.

Average Public Pension Fund Allocation



**Source: Public Plans Database*

Asset Allocation for State and Local Pensions (2001-2018)



**Source: Public Plans Database*

Data as of November 2018

Sources: NASRA, The Center for Retirement Research at Boston College, Public Plans Database

Asset Class Expected Returns

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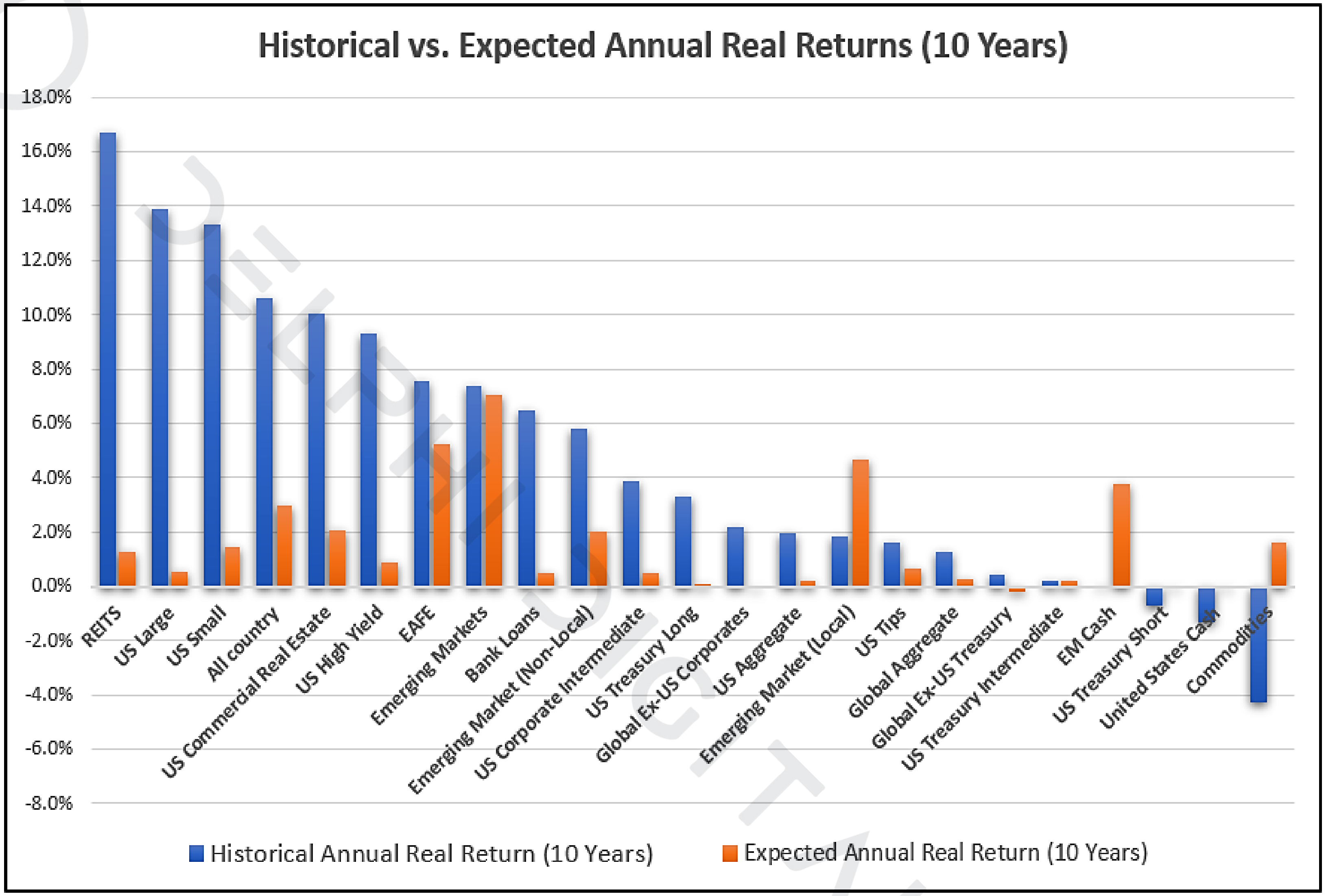
The last decade has been very kind to risk assets across the board. Real estate recovered, US equities dominated, and several asset classes saw double digital annual real returns. Suppressed interest rates amid lackluster inflationary pressures drove investors further out the risk curve in search of higher returns; and those who obliged were rewarded handsomely. If markets operated like childhood fantasy stories, this is where you'd insert "and they lived happily ever after" before closing your eyes for the night. Unfortunately, investing is never that simple as periods of excessive exuberance are often followed by more troubling times.

After a decade worthy of excessive celebration, we're creeping closer to such an inflection point. Expected real returns over the next decade look drastically different than the last ten years. This cycle's biggest winners (REITs, U.S. large & small-caps, global equities) are projected to have the largest moderation in returns going forward, according to proprietary analysis conducted by Research Affiliates, a globally renowned investment manager. Emerging market equities are one of the only asset classes with an expected annual real return over 7% in USD terms. **A classic 60/40 portfolio (60% U.S. large-caps, 40% investment grade bonds) is expected to produce just 50bps annually over the next 10 years, highlighting the difficult investing environment institutional investors face going forward.**



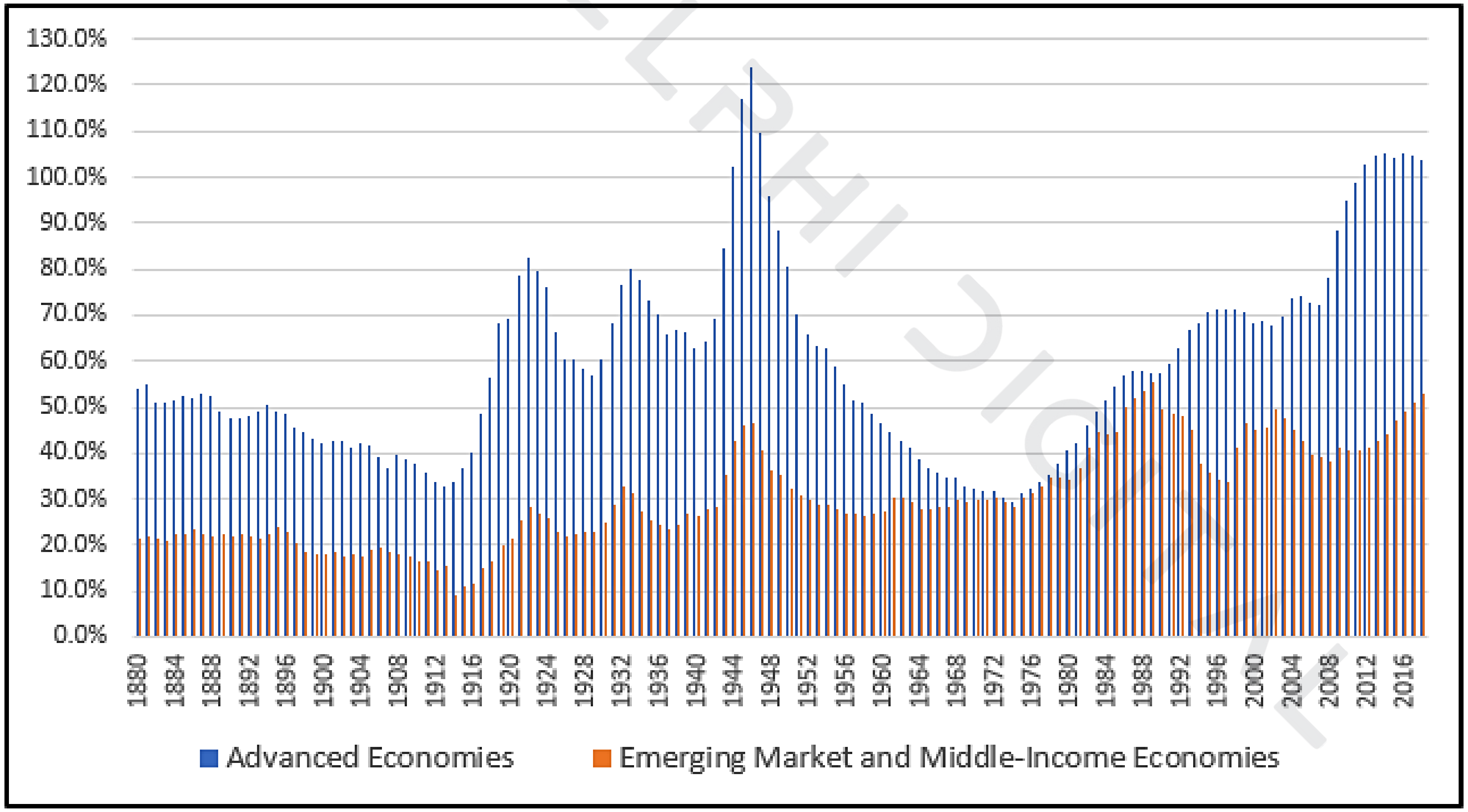
Data as of 03/31/2019

** "The Valuation Dependent model includes reversion toward the mean based on the expectation of changes in valuation metrics. These expected returns are based on a set of routines which model both expected cash flows and changes in asset prices, and not by extrapolating returns of the past."*

Global Debt Concerns

Rising public and private debt levels have become key concerns for economists, investors, and everyone in between as we approach the 10th year of this economic recovery. Assuming we get another quarter of positive growth, it will mark the longest economic expansion in U.S. history. While that's certainly an accomplishment worth celebrating, the outlook going forward for growth is more bleak. Global debt has reached $184 trillion in nominal terms, its highest level on record and roughly 225% the size of the world economy, according to data compiled by the International Monetary Fund (IMF). This comes amid a slowing global economic backdrop, raising serious concerns around the ability of the pubic and private sectors to service this swelling debt load. Some of the world's largest economies also happen to be the most indebted, evident in the rapid rise in debt-to-GDP ratios for developed countries this cycle. Couple this with unfavorable demographic trends in many advanced economies, and it spells significant headwinds for global growth long-term. **A weakening economic backdrop for much of the world also hinders the argument we can simply grow our way out of our debt problems. Widespread currency devaluation looks far more likely as inflation can help alleviate debt burdens by reducing the purchasing power of the dollar needed to repay its obligations.**

Average Debt-to-GDP Ratios (Advanced & EM/Middle-Income Economies)



Data as of January 2019

Sources: IMF

King Dollar's Dominance

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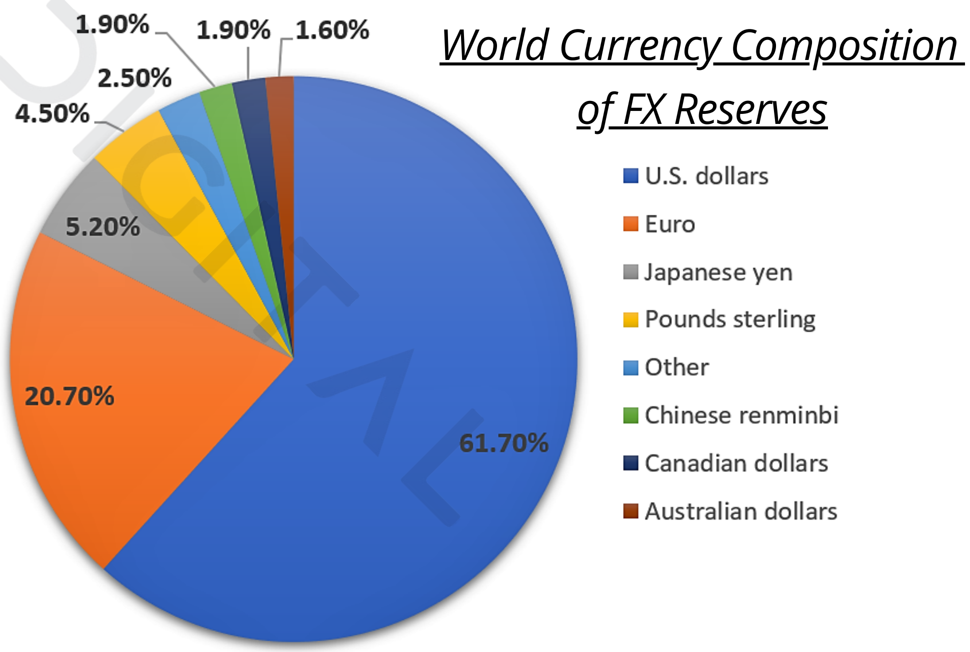
It's no secret the U.S. dollar is revered as the global reserve currency, much to the dismay of many global superpowers. The consequences of this title are less understood, however. Ironically, network effects are a large driver behind its status as the global reserve currency given its importance in the global financial system. It also gives the U.S. government significant influence over the world's economic activity as fluctuations in the greenback can cause ripples in both advanced and developing nations. Before discussing our longer-term concerns for the dollar, it's important to note the reasons behind the USD's status as the global reserve currency. Below are a few of the key reasons the dollar is viewed as the global reserve currency.

1. **Most of global trade is settled in USD.** One reason is for convenience, especially its role in facilitating trade between smaller nations with less liquid foreign exchange trading pairs. Dollar trading pairs are the most liquid in the FX market, making USD ideal for trade.
2. Likewise, **many commodities are quoted in dollars**, with oil being the most significant (large majority of the world's oil is priced in USD). China's introduction of petro-yuan contracts a little more than a year ago is one example of its efforts to dethrone the dollar's dominance.
3. One of the strongest reasons for the dollar's global reserve currency status is the **demand for U.S. Treasuries (UST) by global central banks as the reserve asset of choice.** This is a prime example of strong network effects. The liquidity and depth of the UST market make it an ideal reserve asset for central banks because when trouble arises, they can quickly buy or offload their UST holdings with minimal slippage costs compared to other sovereign bond markets. The constant demand for UST has acted as a moat for the dollar's reserve status as over 60% of the world's foreign exchange reserves are USD-denominated.

The first two create substantial demand for dollars, even for international transactions the U.S. is not involved in; the liquidity and accessibility of USD relative to other currencies makes the USD a staple in global commerce. Using an agreed upon stable currency helps alleviate FX risk, making global trade more seamless. The global demand for dollars and the perceived safety of U.S. Treasuries as the preferred global reserve asset keep borrowing costs low, while also allowing the U.S. to run substantial trade deficits with the rest of the world without the detrimental effects usually associated with such imbalances (higher interest rates, currency depreciation, etc.).



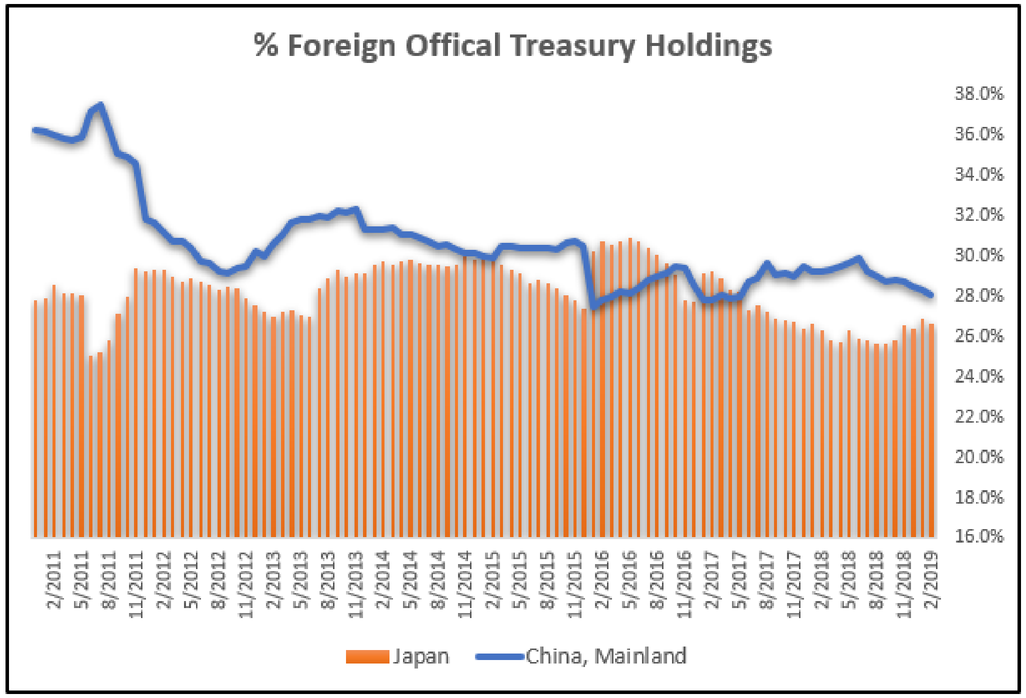
Data as of December 2018

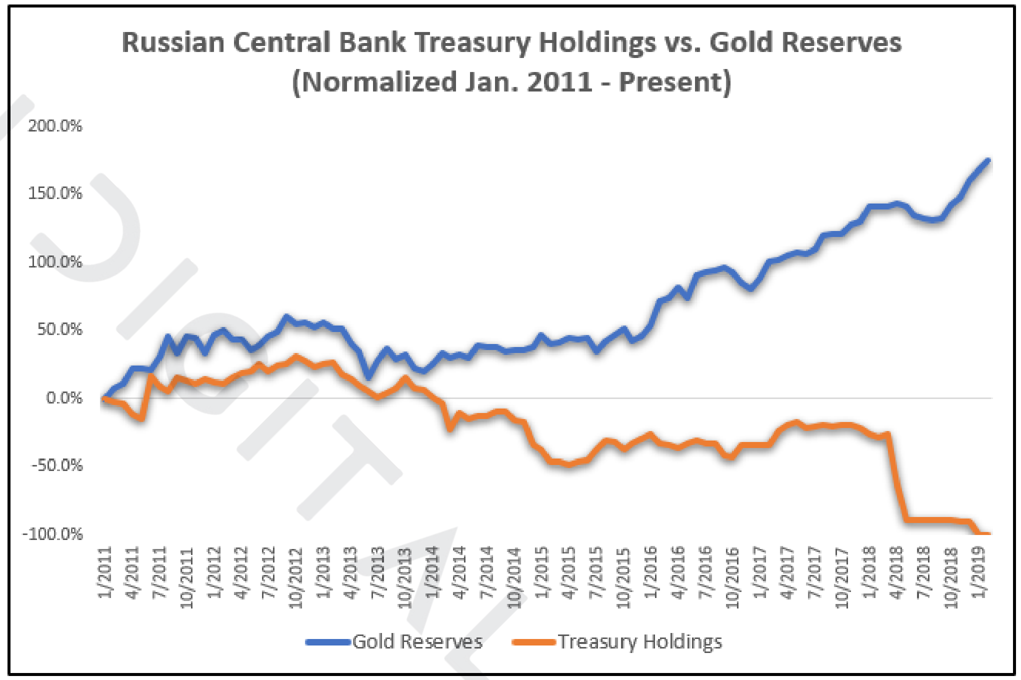
Sources: IMF

Dethroning King Dollar

There is much discussion around the long-term impact of a weaker U.S. dollar, but its road from riches to rags will not be overnight. There are a few notable catalysts for a stronger dollar in the short-term. The demand for dollars remains high given the sizable amount of USD-denominated debt outstanding. Treasuries are likely to catch a bid if economic data takes a turn for the worst, one of the reasons the dollar itself is often regarded as a safe-haven asset. The U.S. economy also appears to be on solid footing relative to other developed nations, so a more dovish stance from global central bank peers could drive interest rate differentials wider.

The longer-term outlook for the greenback, however, paints a rather dire picture. In my view, **the real key to the dollar unwind lies with the demand side of the argument much more than the supply side**, and in that regard, the dollar appears to be getting more vulnerable. Foreign governments are well-aware of their dependence on the U.S. dollar and, as a result, have been trying to thwart its dominance. Russia, for example, has been dumping its Treasury holdings in favor of other reserve assets like gold. China has been vocal about the risk the dollar poses, including the vast power it gives the United States. Notably, China is also the largest foreign holder of Treasury securities, according to data from the U.S. Treasury Department, though their holdings have fallen since the trade war with the U.S. broke out. Although unlikely, a sudden reduction in Treasury holdings by China constituents a threat to the dollar, though it's important to recall the reasons why China (and other foreign governments) hold dollar-denominated assets in their reserves. If China were to begin dumping its Treasury holdings, its currency would likely appreciate drastically, depending on the size of the position it offloaded. This would cause exports to become more expensive to foreigner consumers, weighing on its potential economic output.





Data as of February 2019

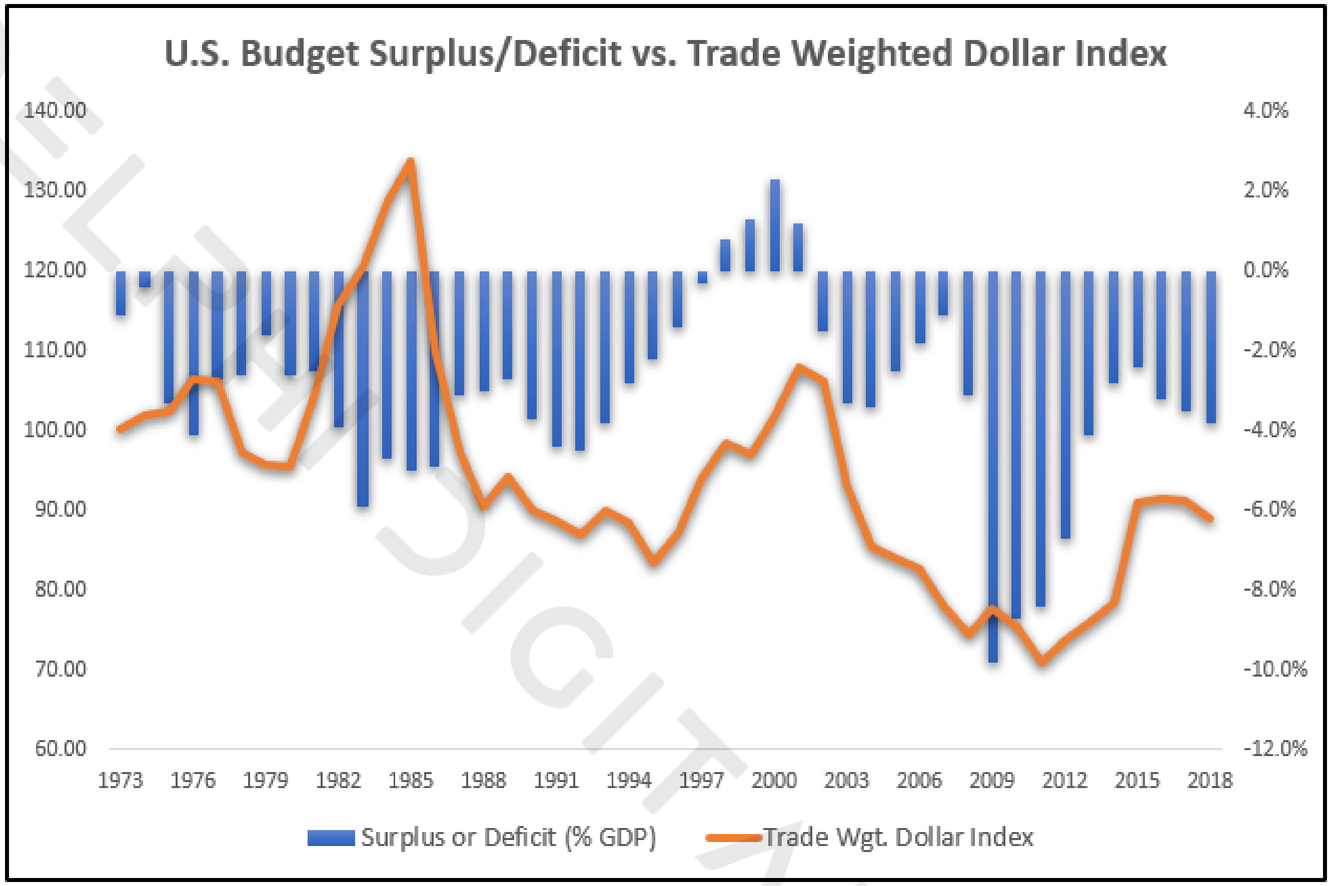
Sources: The Central Bank of the Russian Federation, World Gold Council, Treasury.gov

Deficits Matter in the Long Run

The "deficits don't matter" narrative is likely to prove true in the near-term because, until a better alternative interest-bearing global reserve asset comes along, the U.S. Treasury can continue to issue more debt as long as there is substantial demand supporting it. This puts the U.S. in a vulnerable position though as any shake in confidence around the ability of the U.S. to honor its obligations would strike a blow to the dollar. Interest rates would also climb higher as investor demand for "safe-haven" Treasury bonds dries up. **A reduction in demand for U.S. Treasuries abroad would cause yields on UST to rise, pushing down prices and increasing the government's reliance on domestic purchasers.** This comes at a time when the U.S. is issuing massive amounts of debt to help finance its growing budget deficit, driven largely by the recent fiscal stimulus enacted in 2018. This may also force the Fed to revive its bond buying program if the situation escalates and demand for U.S. government debt gets choked off.

It's unlikely the U.S. winds up defaulting on its debt given its track record[1], but that doesn't mean the world's largest economy will skate free and clear. The looming debt ceiling always sparks heated debates, but has failed to reverse the government's course. The more likely scenario in our view involves the Treasury issuing more debt to fund its operations, increasing the budget deficit and sparking an extended period of increasingly pessimistic sentiment towards the dollar (for all the reasons we've discussed).

The strain of servicing an increasing amount of public debt coupled with more coordinated efforts among foreign nations to undermine the hegemony of the U.S. dollar, however, could spell serious trouble for U.S. creditors in the coming years.



[1]The United States has *technically* never defaulted on its debt, though this point is highly debated given prior examples of it "restructuring" its obligations. For example, in 1933 President Franklin Roosevelt suspended the gold standard to combat chronic deflation and the economic fallout of the Great Depression. Had all the bondholders demanded gold payment rather than currency, the U.S. likely would have defaulted on its debts.

Data as of March 2019

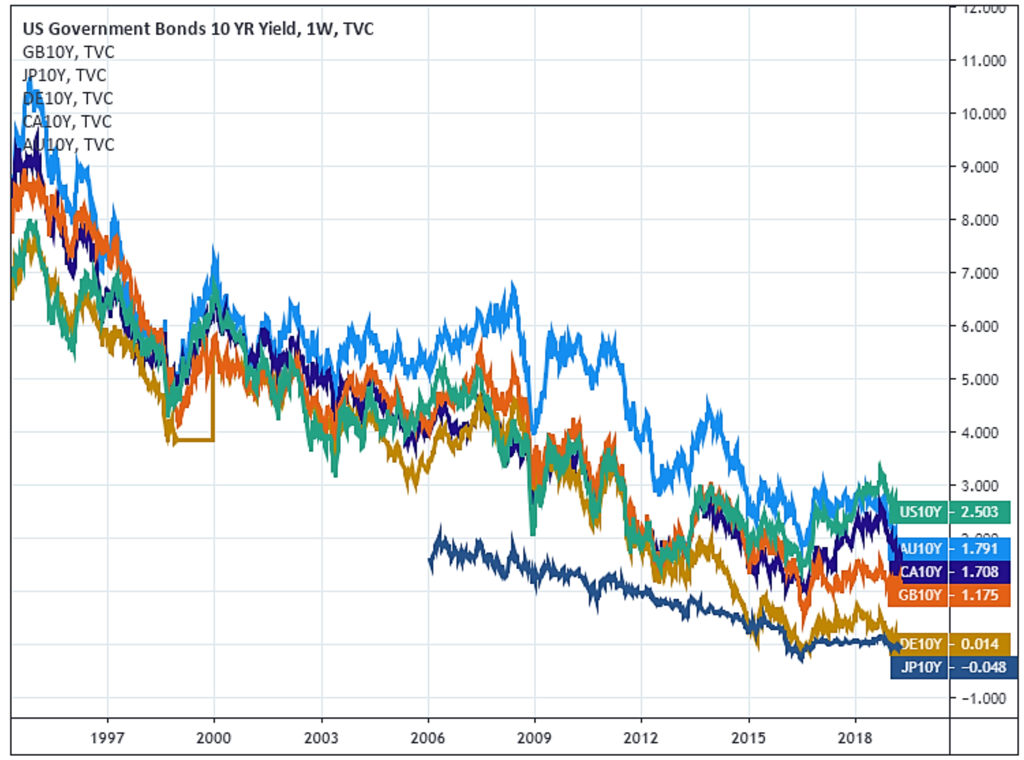
Sources: Treasury.gov

Risk-Return on Debt

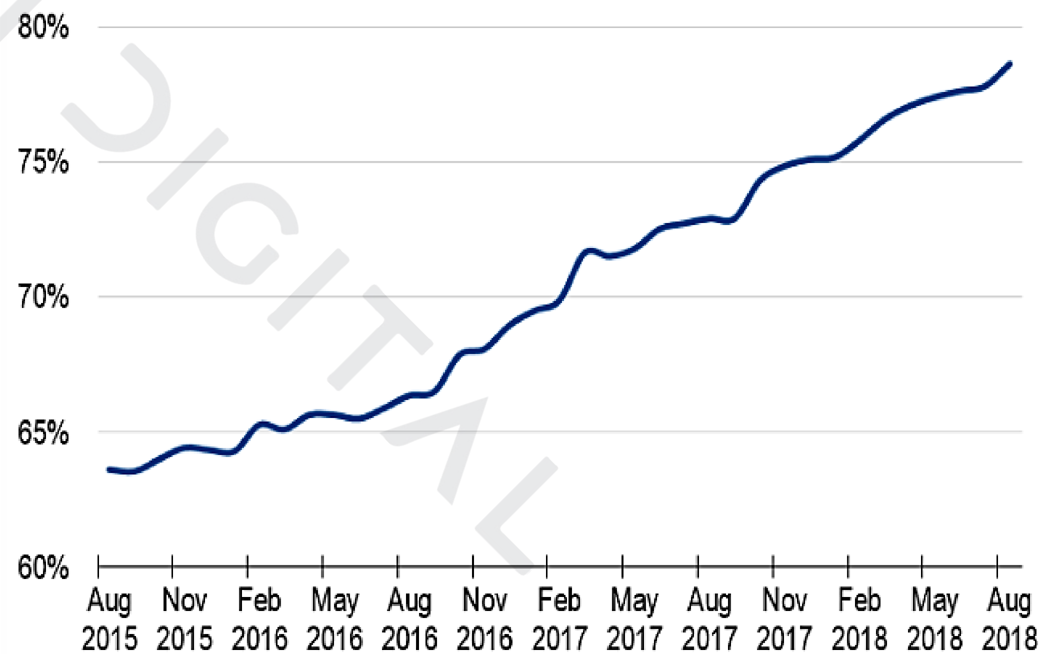
Global sovereign bond yields are trading near historical lows, offering little to get excited about. Further price appreciation is certainly possible, but the risk-reward for many areas of the fixed income market remain unattractive at current levels. There's nearly **$10 trillion of negative yielding debt** outstanding worldwide, a reflection of both immense monetary stimulus and the bleak outlook for growth in much of the developed world. This low-rate environment also poses a serious challenge for central bankers when the economy does take a turn for the worse: there simply isn't a whole lot of room to cut interest rates further. The Fed, for example, has various levers it can pull to try and stimulate the economy, but low rates means a much heavier reliance on alternative options like quantitative easing (QE). **Interestingly, this comes at a time when the U.S. is issuing massive amounts of debt to finance its growing budget deficit.** A return to QE is not out of the question, however, especially if investor demand for Treasuries weakens.

Sovereign bonds are not the only debt instruments with significantly lower yields. The average yield for the Blomberg Barclays U.S. Aggregate Bond Index, which tracks investment grade bonds in the U.S., has trended lower the last several years. The average duration risk of its constituent bonds, however, has jumped, meaning investors are taking on more risk for less yield. The hunger for yield has also **forced investors further out the risk curve** to achieve similar returns in the corporate debt market, evident in the popularity of leveraged loans in recent years. As if the surge in risky credit issuance wasn't enough, roughly **80% of all outstanding leveraged loans are now "covenant-lite"**, meaning they don't offer the same protections for lenders by enforcing certain restrictions on borrowers (maintaining certain cash flow levels, caps on max debt, etc.). Couple this with the credit deterioration of the average investment-grade bond and we have a recipe for a world of investor pain when the market finally does decide to turn.

Developed Market 10-Year Sovereign Bond Yields



"Covenant-Lite" % of Outstanding U.S. Leveraged Loans



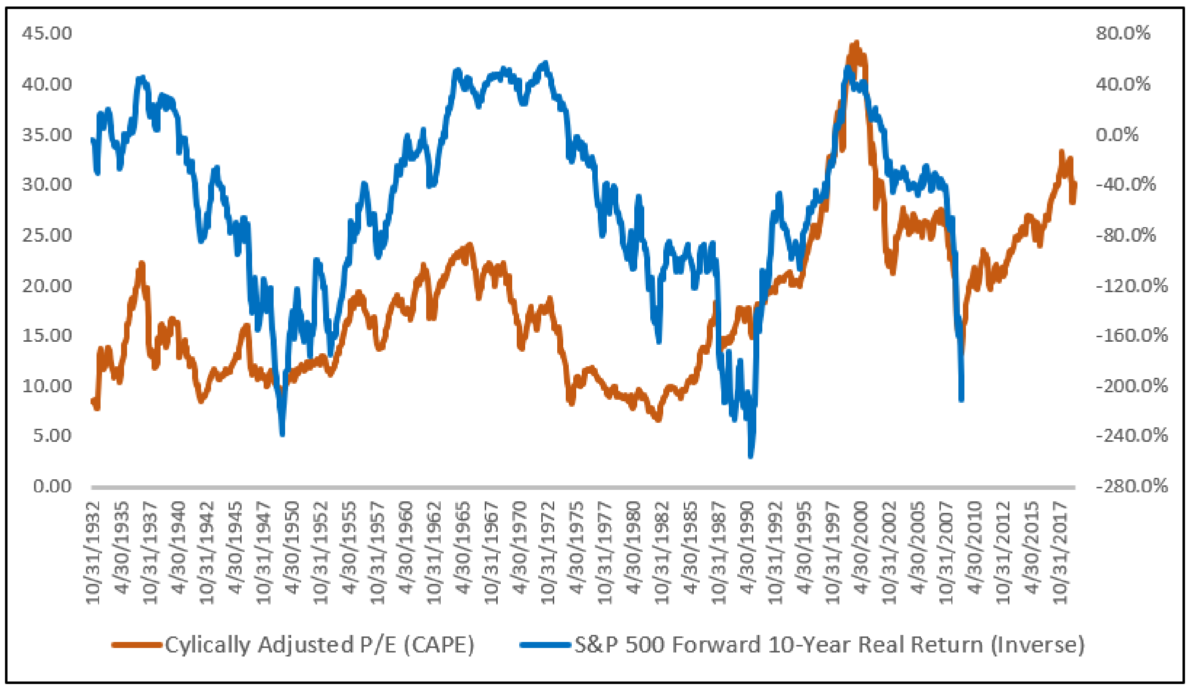
Data as of February 2019 ; Sources: Tradingview, LCD - S&P Global Market Intelligence

Equities: Moderation of Gains

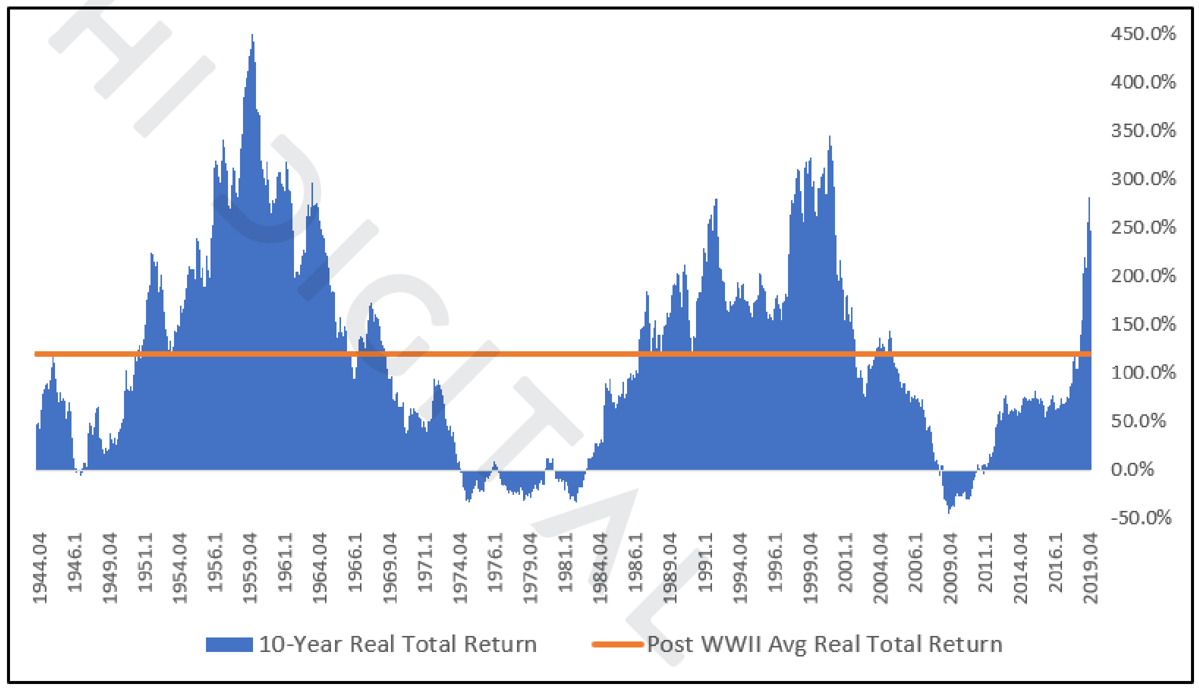
The stock market has had quite the run over the last decade, especially U.S. equities, which greatly benefited from the Federal Reserve's extremely accommodative monetary policy and subsequent low interest rate environment. The S&P 500 has gained more than 250% in nominal terms since April 2009, boasting one of its best performances in history on the back of the worst economic collapse since the Great Depression. Unfortunately, the next ten years are unlikely to mimic the last as the risk of a recession begins to rear its ugly head. In the near-term, stocks typically tend to perform well during late cycle economies, but eventually the harbinger of poor returns comes knocking at the door. While the U.S. economy currently remains on solid footing, the risk of a recession over the next 18-24 months is on the rise. Obviously, this serves as a drag on the outlook for stocks over the longer-term. The S&P 500, for example, gained over 20% and 15% in the 12 months leading up to its pre-recession peaks in 2000 and 2007, but proceeded to fall over 50% on both occasions from peak-to-trough following these highs.

As we discussed in our recent Quarterly Macro Outlook, valuations for equities are above their long-term historic average across a number of key multiples. This does not mean stock prices will collapse tomorrow as **valuation multiples are historically poor timing tools** (stocks can get more expensive in the short run). They are, however, **strong indicators of long-term expected returns for the equity market**, evident in the left chart below.

S&P 500 Forward 10-Year Nominal Return vs. CAPE Ratio



S&P 500 Rolling 10-Year Real Total Return



Data as of April 2019

Sources: Robert Shiller, Yale University

Set Up for Gold Comeback

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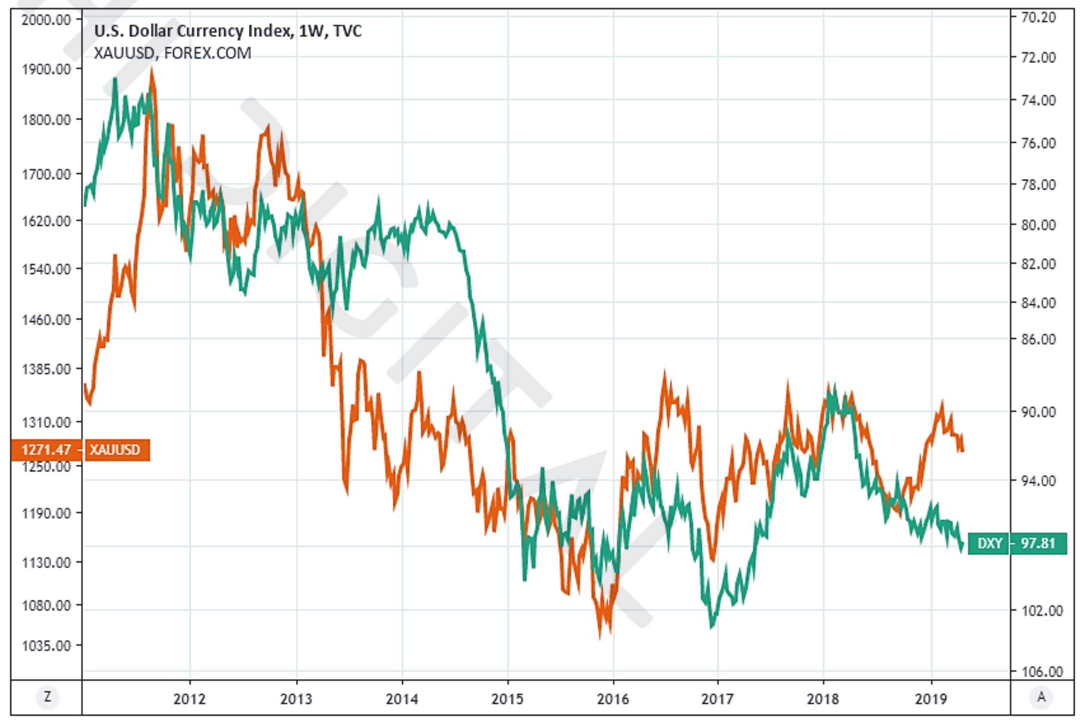
After underperforming risk assets for much of this cycle, the outlook for gold appears to be brightening a bit amid rising uncertainty around unsustainable global debt levels and late-cycle growth concerns. All of the proposed scenarios thus far make a compelling case for the precious metal if the economy turns, as investors tend to flock to safe-haven assets during economic downturns and periods of elevated market volatility and uncertainty. Unsurprisingly, gold began to catch a bid in Q4 2018 as risk assets across the board sold-off in dramatic fashion. If the global economy falls into a recession, gold is likely to outperform most asset classes as investors flock to safety.

As we've noted, a devaluation of multiple major currencies is not out of the question if governments fail to stimulate more robust economic activity to begin chipping away at their growing debt obligations. Raising taxes is another viable option, though it is often met with great resistance. Interestingly, the U.S. has gone the other way recently, evident in the most recent fiscal stimulus package headlined by lower corporate tax rates, in an attempt to stimulate the economy further. This has pushed estimates for the budget deficit even higher in the coming years, however, exacerbating the debt problem. This could lead to an extended decline in the U.S. dollar and other major currencies against gold, which has historically performed well when the greenback is weak. A fall in the dollar could also spark inflationary pressures, helping boost gold further as investors flock to assets viewed as inflation hedges.

Gold/S&P 500 Ratio vs. S&P 500 Peaks

Gold Price vs. DXY Dollar Index (Inverted)



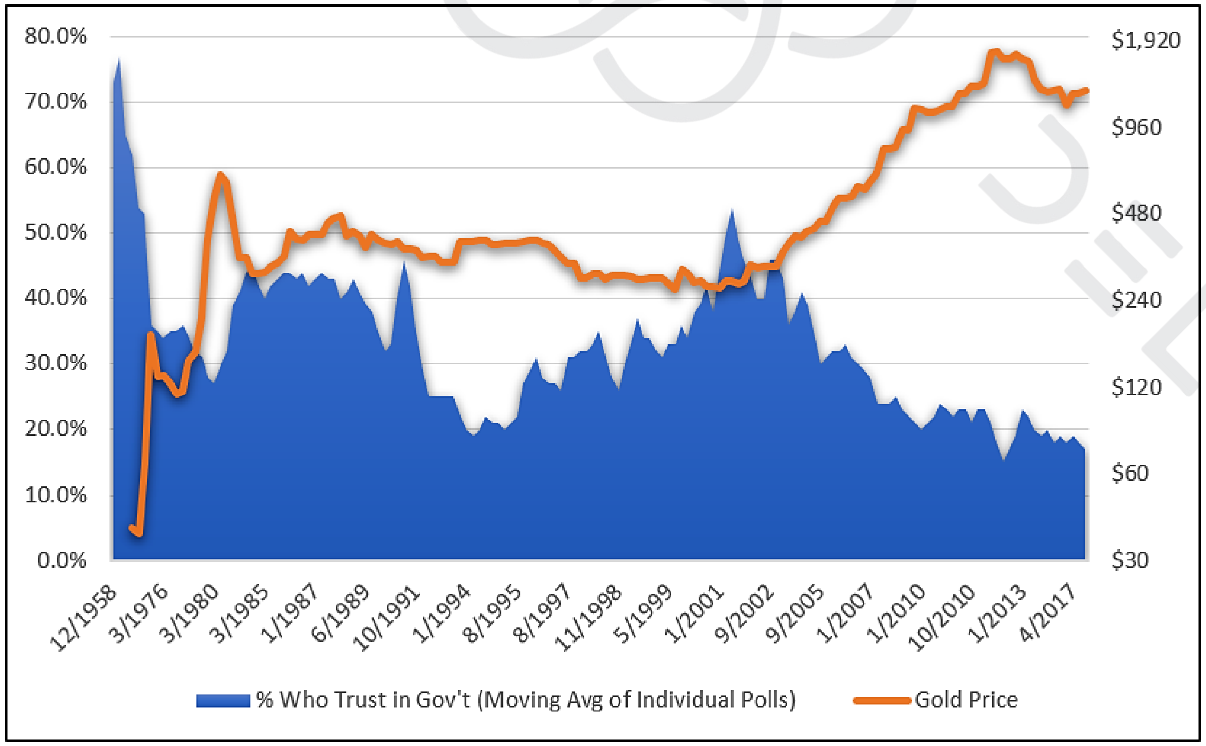
Data as of April 30th, 2019

Sources: TradingView

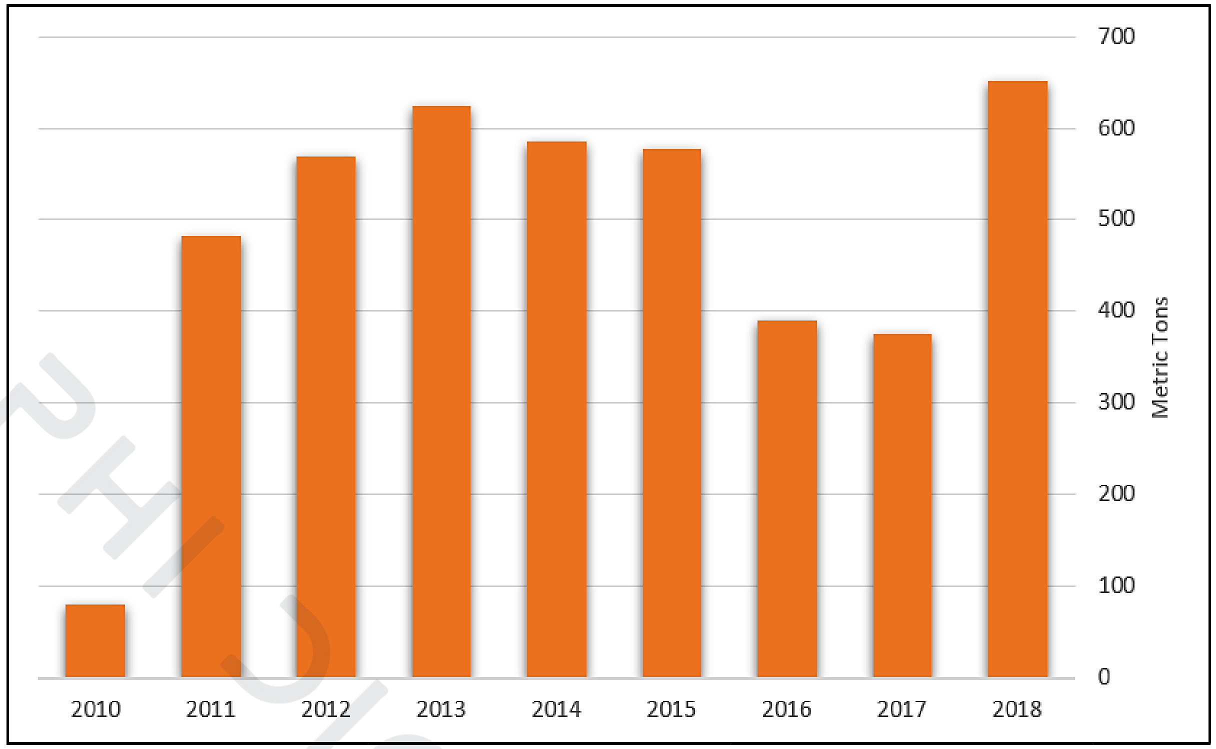
Set Up for Gold Comeback

Gold's performance is also a reflection of the amount of trust people have in governments, rising when the risk of currency devaluation heightens. The growing debt burden across much of the developed world could prove to be quite supportive of gold prices if the weak prospects for economic growth continue to trend lower. Central banks have been adding to their gold reserves more aggressively over the last 12 months, led by strong demand from Russia amid sanctions and its goal to reduce dollar dependence.

% Americans Who Trust the Government vs. Gold Price



Central Bank Net Gold Purchases (2010-2018)



It's notable Inflation has failed to take off this cycle in the U.S., despite the monstrous amount of liquidity pumped into the financial system by global central banks. There are some structural reasons for this (the rise of e-commerce, more efficient price discovery for goods and services, lackluster wage growth, etc.). The U.S. labor market continues to tighten, however, placing upward pressure on wages. This very well could spark higher consumer prices in the near-term (assuming the economy doesn't fall into a recession), which may drive up the demand for gold as well.

Data as of December 2018

Sources: World Gold Council, Pew Research Center

The Option on "Digital Gold"

Gold has served as the quintessential store-of-value asset for thousands of years. In the context of today's investing landscape, it is often regarded as a hedge against adverse central bank policy or currency devaluation. There are several unique qualities of gold that support this widely accepted view. For starters, its durability over thousands of years makes its time-tested track record one of its strongest attributes. Gold is also a relatively scarce asset, making its supply much more predictable than fiat currencies, which, as we've seen, are highly susceptible to drastic fluctuations at the discretion of central banks.

Bitcoin exhibits many of these same traits. While its track record is fairly limited, it addresses a few of gold's critical limitations, making it an attractive complement to the precious metal in an increasingly digital world. Instead of a central authority commanding its monetary policy, the supply of bitcoin is controlled by an algorithm, making it even more predictable than gold's. It is much more portable than gold, especially in large quantities, requiring little more than a small hardware device or the memorization of a "seed phrase." Bitcoin is also more easily verifiable given the transparent nature of its blockchain, whereas physical gold requires a bit of effort to confirm its validity (fake gold, mixed with other metals, etc.).

However, the most significant difference is that **Bitcoin is censorship-resistant.** This means it cannot be seized, is accessible to anyone, and no central authority can block a valid transaction. This is why Bitcoin is often referred to as "digital cash" (except Bitcoin's transaction history is recorded on its blockchain making it more transparent than physical cash). On the other hand, it is much more difficult for the average person to get their hands on physical gold, especially in larger quantities. Most people who "own" gold don't actually have it in their possession; they buy gold-backed investment products (mutual funds, ETFs, etc.) or derivatives to gain exposure to the underlying. These are merely digital claims on gold, often times purchased through brokerage accounts, which requires one to trust a third-party to store the respective amount of gold.

So why not just buy a gold-backed crypto asset like a dollar-denominated stablecoin? Because it still suffers from the same problem: it is not censorship-resistant. For example, the government could seize the issuer's gold reserves, rendering its gold-backed crypto asset worthless. However, the rise of tokenized gold will allow investors to gain exposure to both the precious metal and its digital complement (Bitcoin) in a more seamless way.

Value Potential of Bitcoin

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In our State of Bitcoin report, we dug into a few scenarios to provide tangible examples of Bitcoin's long-term potential value. The most obvious comparison is to the investible gold market, which currently sits around $2 trillion. It is highly unlikely Bitcoin displaces the entire investible gold market over the next decade, but there is a reasonable chance it commands a small allocation in traditional portfolios as a complement to gold in our view.

If the value of gold used for private investment grows at a modest 2% rate per year, the expected value of BTC would be roughly $14,300 assuming a 25% probability it captures half the value of the investible gold market ten years from now. This would imply an 11% compound annual growth rate over the next decade.

Over the next ten years, it is likely a gold-backed digital asset gains popularity. This would eliminate many of the barriers to entry for gaining exposure to the precious metal, but does not offer the same ownership benefits that Bitcoin does. Buying a gold-backed digital asset requires a centralized entity to store that amount of gold, so a digitized version likely replicates many of today's existing options (i.e. gold-backed ETFs, etc).

Gold Model Assumptions	
Time Horizon (Years)	10
Current BTC Price	$5,225
Bitcoin Supply in 10 Years	~20.5 Million
Current Gold Price ($/oz)	$1,280
Current Gold Price/Metric Ton	$41,152,896
Global Gold Supply (Tonnes)	187,200
Total Global Gold Supply	~$7.7 Trillion
% Gold Held as Private Investment	25%
Total Gold Held as Priv. Investment	~$2 Trillion
10-Year Growth Rate	2%

Price of BTC in 10 Years (USD)

		Market Share			
		10%	25%	50%	75%
Probability	10%	$1,145	$2,863	$5,727	$8,590
	25%	$2,863	$7,158	$14,317	$21,475
	50%	$5,727	$14,317	$28,633	$42,950
	75%	$8,590	$21,475	$42,950	$64,425

10-Year Compound Annual Growth Rate (CAGR)

		Market Share			
		10%	25%	50%	75%
Probability	10%	3.4%	13.3%	21.5%	26.5%
	25%	13.3%	24.2%	33.1%	38.6%
	50%	21.5%	33.1%	42.7%	48.6%
	75%	26.5%	38.6%	48.6%	54.7%

Data as of April 2019

Sources: Boston Consulting Group ; Jannick Damgaard, Thomas Elkjaer, & Niels Johannesen

Value Potential of Bitcoin

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As we previously discussed, Bitcoin allows people to transfer and store wealth in a censorship-resistant way. We believe this capability makes it a suitable alternative to offshore bank accounts, which have been relied on for generations to store wealth in a relatively private manner.

The key difference, however, is people have true ownership of their wealth by directly holding their Bitcoin private key and, therefore, cannot have their funds wrongfully seized or frozen. It won't happen overnight, but as the digital economy matures, we see a lot of merit in the argument that Bitcoin will be used to protect some of the private wealth stored in these accounts.

Assuming the total value of private wealth in offshore accounts (roughly $8 trillion) grows 3% per year over the next ten years, even under the conservative assumption that there's a 10% chance Bitcoin captures a quarter of this asset pool, the expected value of its total market size would be approximately $275 billion. Accounting for future coin issuance, BTC's price would be ~$13,500, implying a ~10% compound annual growth rate over the next decade.

Private Offshore Wealth Model Assumptions	
Time Horizon (Years)	10
Current BTC Price	$5,225
Bitcoin Supply in 10 Years	~20.5 Million
Global GDP	~$80 Trillion
Offshore Accounts % of Global GDP	10%
Total Wealth in Offshore Accounts	~$8.2 Trillion
Offshore Account CAGR Forecast (10yr)	3%
Total Offshore Accounts in 10 Years	~$11 Trillion

Price of BTC in 10 Years (USD)

		Market Share			
		10%	25%	50%	75%
Probability	10%	$5,376	$13,440	$26,881	$40,321
	25%	$13,440	$33,601	$67,201	$100,802
	50%	$26,881	$67,201	$134,403	$201,604
	75%	$40,321	$100,802	$201,604	$302,406

10-Year Compound Annual Growth Rate (CAGR)

		Market Share			
		10%	25%	50%	75%
Probability	10%	0.3%	9.9%	17.8%	22.7%
	25%	9.9%	20.5%	29.1%	34.4%
	50%	17.8%	29.1%	38.4%	44.1%
	75%	22.7%	34.4%	44.1%	50.1%

The upside potential for Bitcoin is immense assuming it captures even a modest portion of the investible gold market or private wealth held in offshore accounts. Barring any drastic regulatory burdens, which certainly remains a key risk to our thesis, it is not hard to imagine central banks eventually scooping up a small amount of BTC as a hedge against other reserve assets. The transition will be gradual, but if more private wealth is successfully stored in Bitcoin, more conservative institutions are likely to follow suit as they become more comfortable with digital assets.

Data as of April 2019

Sources: Boston Consulting Group ; Jannick Damgaard, Thomas Elkjaer, & Niels Johannesen

Portfolio Diversification

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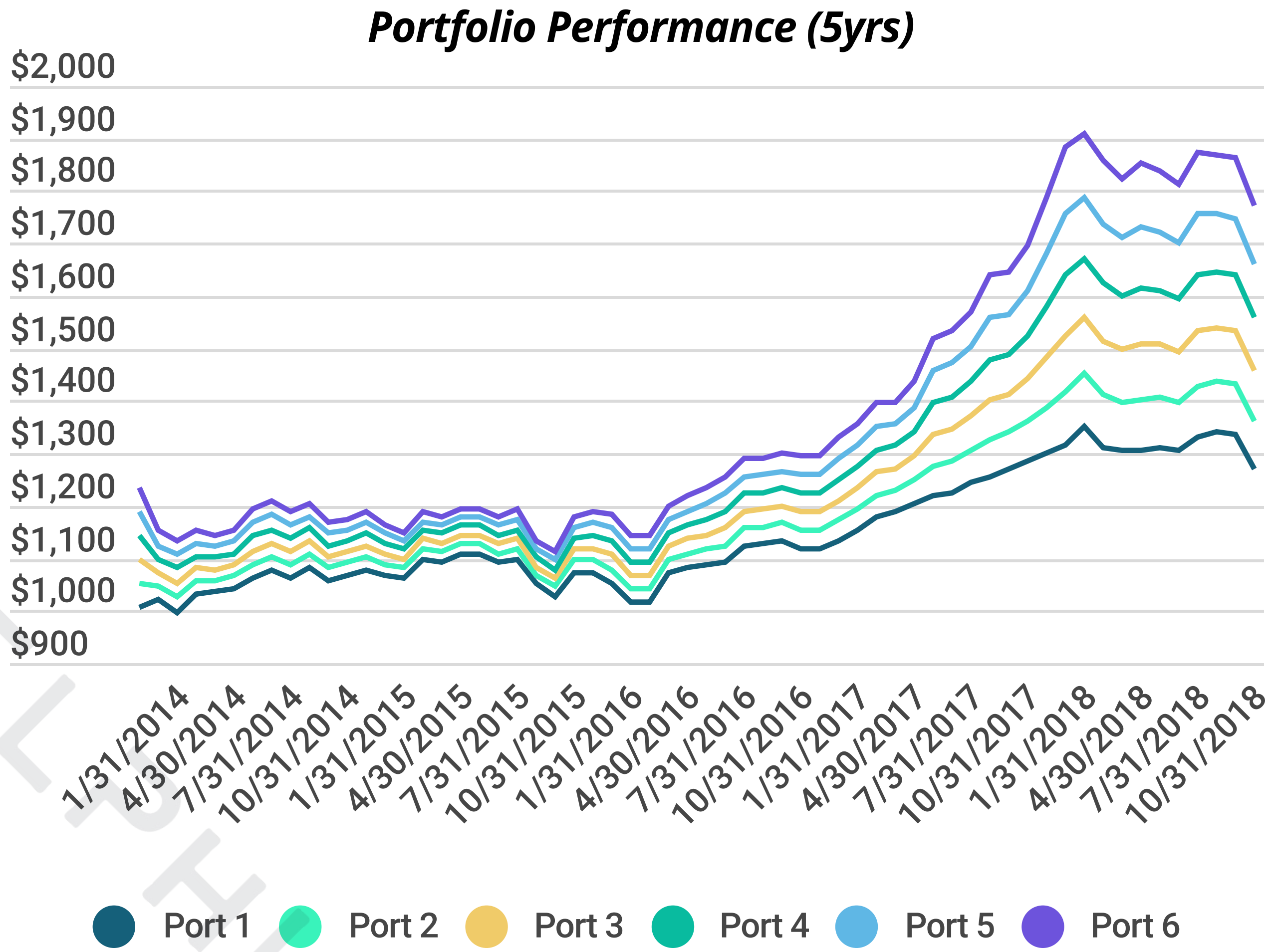
Bitcoin is uncorrelated with traditional asset classes, making it an ideal candidate for portfolio diversification. Appropriately sizing a position in Bitcoin, however, is vital. As expected, portfolios with a higher allocation to BTC saw greater overall returns over the last 5 years. Using a simple tiered-allocation analysis, we found a portfolio with a 3% allocation to Bitcoin rendered the best Sharpe Ratio when compared to a traditional 60-40 portfolio. This allocation mix also had the smallest max drawdown, ~150-bps less than a traditional 60-40 allocation.

Granted, this analysis benefits from hindsight bias, as we know BTC's performance the last several years trumped all other major asset classes. However, if our store-of-value thesis proves correct, traditional portfolios still stand to benefit significantly from a small allocation to BTC over the coming decade, especially amid lackluster expected returns for conventional assets.



Portfolio #	Portfolio Allocation	CAGR	Std. Dev.	Best Year	Worst Year	Max Drawdown	Sharpe Ratio
1	60% Stocks, 40% Bonds, 0% BTC	4.89%	6.67%	16.05%	-3.34%	-8.64%	0.68
2	59% Stocks, 40% Bonds, 1% BTC	6.36%	7.15%	20.90%	-3.87%	-7.75%	0.83
3	58% Stocks, 40% Bonds, 2% BTC	7.82%	8.31%	25.87%	-4.40%	-7.26%	0.89
4	**57% Stocks, 40% Bonds, 3% BTC**	**9.27%**	**9.88%**	**30.96%**	**-4.93%**	**-7.12%**	**0.9**
5	56% Stocks, 40% Bonds, 4% BTC	10.70%	11.71%	36.18%	-5.46%	-7.86%	0.89
6	55% Stocks, 40% Bonds, 5% BTC	12.13%	13.66%	41.52%	-5.99%	-9.92%	0.87
7	50% Stocks, 40% Bonds, 10% BTC	19.10%	24.20%	70.17%	-8.64%	-18.68%	0.81

Data as of December 1st, 2018

Sources: Fidelity, Portfolio Visualizer, Vanguard

**Portfolios are rebalanced quarterly back to original allocation % from November 2013 - October 2018. This analysis does not account for management fees.*

Generational Wealth Shift Favors Crypto

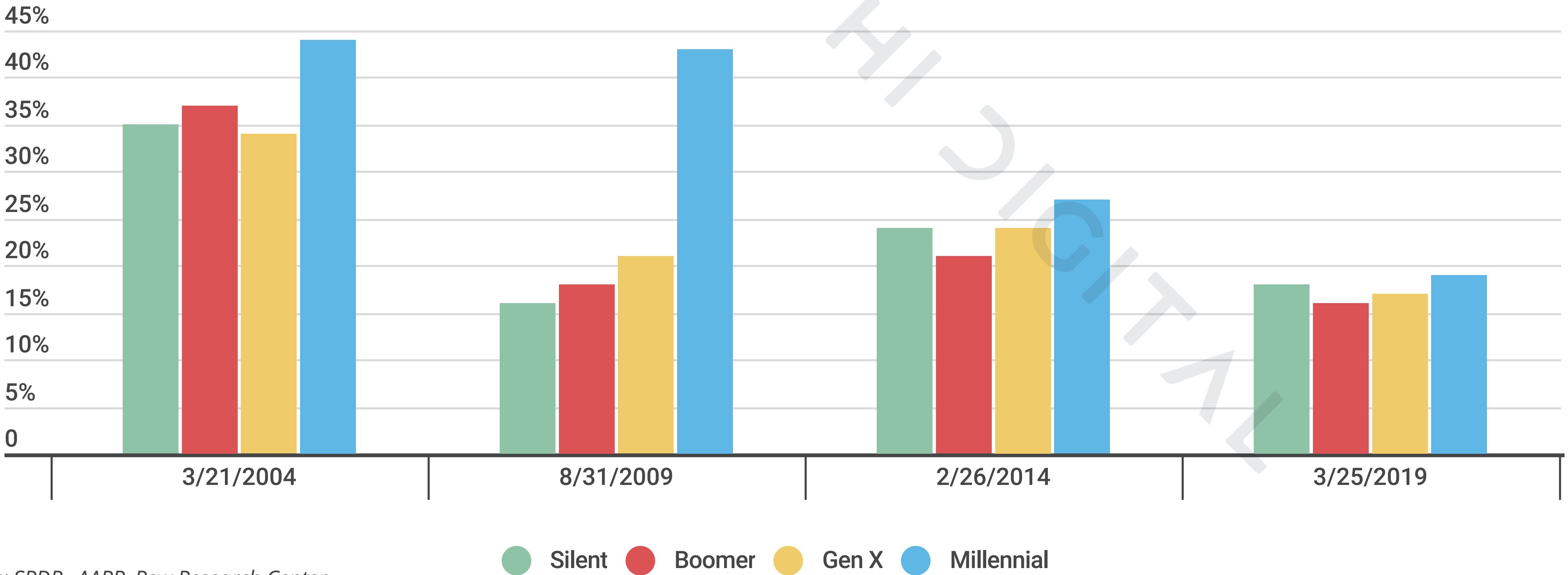
We believe younger generations are driving interest in cryptocurrencies since they are more accustomed to the digital world and may be less trustful of governments and central banks. As baby boomers retire, we may be upon the largest generational shift of wealth in history, and younger generations may look to allocate some of this wealth to crypto.

Public trust in governments remains near record lows. Only 17% and 19% of Generation X and Millennials trust the government in Washington always or most of the time.

44% of millennials believe cryptocurrencies will become widely accepted as a means of transaction for legal purchases within the next ten years.

$30 to $48 Trillion in financial and non-financial assets are expected to pass from baby boomers to their heirs over the next 30 years.

Trust in Government By Generation (Percent who trust Washington always or most of the time)



Sources: SPDR,, AARP, Pew Research Center

Institutional Commentary

We also wanted to share some commentary from industry leaders focused on institutional involvement in crypto…

"The vast majority of institutional investors have little to no cryptoasset exposure… **We expect traditional venture capital funds to increase their investments in cryptoassets going forward,** meaning institutional investor exposure is also likely to rise."

Cambridge Associates

"We've seen a maturation of interest in digital assets from early adopters, like crypto hedge funds, to traditional institutional investors like **family offices and endowments**…More institutional investors are **engaging with digital assets**, either directly or through service providers, as the potential impact of blockchain technology on financial markets – new and old – becomes more readily apparent."

FDA President Tom Jessop

"At Bakkt, we're focused on the work required, both near- and long-term, to evolve the applications for digital assets. Market quality, regulation, scale, security and utility are critical for establishing a strong foundation where innovation can flourish…**This is work that needs to be done, and we are excited to be part of this effort on a global scale as 2019 begins."**

Bakkt CEO Kelly Loeffler

Bitcoin and Crypto Key Risks

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Given Bitcoin is only a decade old, it is still has many risks associated with it at this stage. The broader crypto ecosystem is also subject to numerous risks. While we remain very constructive on the long-term outlook for bitcoin, there are many hurdles it must overcome before it can become an alternative to today's store of value assets. **Price volatility, secure custody solutions, and global regulatory uncertainty are just a few of the challenges currently suppressing demand for bitcoin.** Barring any major disruptions to its network, however, over the long run we foresee bitcoin becoming a staple allocation in investment portfolios and a suitable alternative for storing portions of private wealth held in offshore accounts. You can find more detail on some of the key risks we've listed below in our State of Bitcoin report.

- Negative Regulation
- Dependent on Scaling Solutions
- Competition
- Volatility
- Hackers & Nation State Attacks
- Long Term Sustainability W/out Block Reward
- Global Legality

- PoW Energy Consumption
- Miner Centralization
- Regulatory Risk and Bans
- Infrastructure Fails To Develop
- Hardforks
- Protocol Failure and Bugs
- Potential Environmental Concern

Key Attributes

Bad → Great

	Bitcoin	Gold	Fiat
Censorship Resistant	Perhaps it's most important feature. Centered around the idea that no entity should have the ability to seize your wealth or block a transaction.	While an improvement over fiat, gold's physical nature can make it difficult to shield from seizure.	Governments and banks can intervene to seize or freeze bank accounts and block transactions.
Divisible	Bitcoin is divisible out to 8 decimal places, which opens up the possibility for micropayments where txs can be completed for fractions of a cent.	While gold can be divided into smaller amounts, it becomes impractical to use small specks of gold in commerce.	Fiat currencies are easily divisible given they can go out to 2 decimal places.
Durable	Bitcoin will remain durable as long as the network remains secure. However, it has a short history and risks associated with it.	Gold is nearly indestructible, highly resistant to corrosion, and does not rust.	Fiat is only as durable as the institution issuing it. History is littered with situations where fiat currencies failed to maintain their value over the long term.
Established History	Bitcoin has a far shorter history than both gold and fiat, dating back roughly a decade.	Gold has a track record that dates back millennia and has arguably proven to be the best store of value in human history.	Fiat currencies in their current form are a product of the 20th century and largely the result of Nixon taking the US off the gold standard in 1971.
Fungible	Due to the transparency of the blockchain, bitcoins used for illicit purposes could be traced and refused as payment.	An ounce of melted down gold is always equivalent to another ounce of gold.	There have been instances where fiat denominations have been treated differently due to government policies.
Portable	Bitcoin can transfer value around the world in minutes, and there is no limit to the amount of wealth an individual can directly carry on them.	It can be moved and transacted in small amounts but becomes impractical when dealing with larger values because of its weight.	The digital transfer of fiat is easy, but can take a few days to settle and be subject to capital controls. Physically moving large quantities is difficult.
Scarce	Bitcoin's maximum supply is 21 million BTC with its inflation schedule predefined and governed by a mathematical formula.	While there clearly exists the possibility for the discovery of new reserves both on and off earth, it remains highly scarce.	Fiat lacks true scarcity as governments can create more as needed and have the potential to issue an unlimited amount.
Verifiable	The underlying blockchain ensures authenticity and cryptographic signatures prove ownership.	Can easily be identified, however, gold can be faked or secretly filled with cheaper metals.	While fiat currencies are relatively easy to identify, fiat can be counterfeited.

Sources: Vijay Boyapati (although some ratings and analysis vary)

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