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Winter 2018

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Cryptoassets Q&A

featuring

Don Wilson, DRW

Advantage Futures: Why did DRW first get involved in cryptocurrencies?

Mr. Don Wilson: DRW is always looking for new opportunities, and we encourage employees to come forward with interesting ideas. In 2012, several employees were excited about bitcoin and how it might impact the world. Because we couldn't decide what was more important, the distributed ledger technology that underlies bitcoin, or bitcoin itself, we got involved in three different ways: We bought bitcoin; we established a trading desk, which officially became Cumberland in 2014; and we co-founded distributed ledger technology firm Digital Asset.

ADV: What is DRW's role in cryptocurrency markets? What does Cumberland do?

DW: In 2014, we formally established Cumberland as a bitcoin trading desk, one that is uniquely positioned between the traditional financial industry and the nascent cryptocurrencies space. Since its founding, Cumberland has become one of the world's largest providers of liquidity in cryptocurrencies, with employees in Chicago, London and Singapore. We leverage our 25 years of experience in traditional financial markets and risk management to provide two-sided, institutional-sized liquidity 24 hours a day, 5 days a week.

ADV: How has trading in these markets changed over time and, in particular, over the last year?

DW: These markets have continuously evolved over the years, but 2017 in particular was an important inflection point.



There was a shift in the market as people continued to familiarize themselves with cryptocurrencies, but also started putting real capital into the markets. This was evident in the dramatic growth in cryptocurrency valuation we saw over the course of 2017 and marked a new era of exchange adoption as well; CME, CBOE and Nasdaq all announced plans to list bitcoin futures contracts, with the former two launching before the close of the year.

ADV: What is the significance of the blockchain technology underlying bitcoin?

DW: We recognized the potential of Distributed Ledger Technology early on. This technology provides an efficient way of tracking ownership and enables you to do so across multiple organizations securely. We wanted to explore the possibilities of applying this technology to financial processes like clearing and settlement, which led me to co-found Digital Asset. Digital Asset licenses DLT software to large

financial institutions, with an initial focus on complex, multi-party post-trade processing. The Australian Securities Exchange recently announced that it intends to replace its equities system with DA's technology. It is managed separately from DRW under CEO Blythe Masters, and I remain a member of the Board.

ADV: Many people said the rise of cryptocurrency trading is unlike anything they've ever seen. Is this a financial revolution or a bubble?

DW: Looking at the price action over the last year, the market certainly has many characteristics of a bubble—much like we saw with the dot-com era in the 90's. We believe something similar will play out. Many ideas and projects in the marketplace will fail, but that process will give rise to better ideas and projects. Our perspective is that many will go on to make a significant impact on the world.



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BITCOIN FUTURES AT ADVANTAGE



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ADV: What does the launch of the bitcoin futures contracts mean for the cryptocurrency trading industry?

DW: The product launches are a natural progression in the maturity of this asset class and are overall very positive for the development of these markets. The futures also reopened the door to an ETF, with both the NYSE and Cboe announcing plans to list, although the SEC recently slowed down that process. These are products institutional banks are familiar with, which could bring more institutional capital into the markets, furthering the development and maturation of the industry.

ADV: Bitcoin is making a lot of headlines, but there are many active cryptocurrencies. What kinds of demand are you seeing for other digital currencies?

DW: The broader interest in decentralized technologies, coupled with the dramatic increase in bitcoin and other token valuations over the last year, definitely led to interest beyond bitcoin. Rather than referring to these instruments as cryptocurrencies, perhaps a better term is cryptoassets, which encompasses both cryptocurrencies as well as tokens issued as a result of an ICO. Cumberland is active wherever there is meaningful volume and, today, we trade over 20 cryptoassets. We are continuously adding new tokens to our trades based on demand from our counterparties.

ADV: Are the cryptocurrency markets safe and secure? What are some things you do to manage the risks associated with cryptocurrency markets?

DW: While we've certainly seen some vulnerabilities in this new space, bitcoin itself has never been hacked. Where you see the most risk is in the platforms built to facilitate crypto trading and storage, which is why it is important to carefully select the products and exchanges to which you connect. We have a rigorous onboarding process, and we apply our 25 years of experience in risk management, operations and security to our cryptocurrency trading practices. The importance of sound operational practices should not be overlooked.

ADV: Wall Street banks have shown some skepticism of cryptocurrency trading, but recently seemed to have softened their stance and a few are opening cryptocurrency trading desks. When will cryptocurrency become more mainstream, and what does that mean for the professional individual trader?

DW: Wall Street has been slowly adopting cryptocurrency over the last year. They have been publishing research on these markets, and they're definitely having conversations about what is or will be their position and strategy on cryptocurrency. We see a dramatic shift in the profile of our counterparties as more institutional capital enters the space, and the institutional banks are developing and introducing their own corporate offerings and establishing trading desks. For the individual trader, that is likely a good thing because there will be a quickening of the pace at which standardized technology is introduced. And if more brokers compete for execution and routing business, that usually leads to price competition and more readily-available research, which benefits the solo trader as well. ▲



Don Wilson got his start in the derivatives industry in 1989, focusing on capturing opportunities in the markets through technology, research and risk management. He founded principal trading firm DRW in 1992 while trading in the Eurodollar options pit at the Chicago Mercantile Exchange. Today, DRW has more than 800 employees at seven global offices and trades in dozens of markets around the world.

drw.com



Q&A with Blair Hull



Advantage Futures: Please tell us about your early days in Los Gatos, California. What experiences were formative in you becoming a successful trader?

Mr. Blair Hull: My grandfather traded stocks, and I remember watching him chart these stocks every day using high, low and close. I had no idea what he was doing, but I was hooked. As an undergraduate at University of California Santa Barbara and later in business school, I was still trying to figure out what he was doing. I concluded, for the most part, charting wasn't of much value; however, it piqued my interest in the investment process. Blackjack was really what got me into the investment world. Ed Thorp wrote a book in which he said if you had a lot of low cards out of the deck, then you had more big cards (10s, face cards and aces). If you got a Blackjack, you were paid one and a half to one, so you had an advantage. I played Blackjack for five years, 50 days a year.

William Sharpe, a Nobel Prize winner in economics, defined an investment as a sacrifice of current consumption for expected future gain. Gambling is just a sacrifice of current consumption for expected future loss. If you can actually turn the odds in your favor, you're an investor. I was really an investor when I played Blackjack. The difficulty with Blackjack and investing is that you need to be in it for the long run. You must have enough individual investments that can prove out over an extended period of time. Investing and Blackjack are very uncertain games. One must play the game to gain the advantage, but one must also be able to stay in the game.

ADV: Tell us about your trading background and experience.

BH: I used the capital I earned as a Blackjack player to lease a seat on the Pacific Stock Exchange. I started trading options with the same theory of gaining the advantage and staying in the game but, in this case, coming up with a value of each option. Around the same time, I was intrigued by market timing. In 1981, I presented a paper at a gambling conference in Lake Tahoe concluding it was possible to time the market. Shortly after, I decided not to focus on market timing—one of my greatest decisions—because the returns from options trading, like Blackjack, vastly exceeded those of market timing. Instead, I concentrated on buying inexpensive options and selling expensive options. I built Hull Trading on this principle, and it eventually led to the sale of the firm to Goldman Sachs.

In 2008, I had a family office managing the proceeds of this sale. Like many other investors, we suffered substantial losses. Coming out of 2008, academic literature on market timing was turning. Articles previously claimed it was not possible to time the market, but a growing number of indicators were deemed to be predictive. I thought if I could put those into a strategy, I could potentially get enhanced returns; thus the formation of Hull Tactical and the strategy we have in place today.

ADV: What about Hull Tactical Asset Allocation appeals to your investors? What do you believe gives your firm a competitive edge?

BH: I believe it is the combination of a quantitative investment approach and intellectual transparency. The approach is rooted in capturing and combining into an “ensemble” an array of signals spanning statistical, behavioral/sentimental, technical, fundamental and economic data sources. The key is to combine a number of variables with a little bit of information in a sensible way and use this information to trade in a disciplined

manner. Our strategy attempts to forecast the returns on the S&P 500 index by utilizing a wide variety of machine learning and statistical modeling tools. I also feel Hull Tactical’s transparency is unique. We published research papers about two of our models, one in Journal of Portfolio Management and one on SSRN (Social Science Research Network). We have a third paper in the works. These three papers combined will span about 75% of our current strategy. Hull Tactical also publishes a daily report showing how we arrive at every day’s allocation.

ADV: What do you believe is HTAA’s most important performance measurement?

BH: You could say we look at three main metrics. The first is returns, for obvious reasons; however, returns are to some degree a matter of scaling. Secondly, we want to prove over the long run that a strategy such as ours has the potential to produce superior returns with reduced risk relative to buy and hold. In this respect, the Sharpe ratio of our strategy is what we are evaluating. Last but not least, in 1966 Jack Treynor and Kay Mazuy proposed a metric to determine whether mutual fund managers have market timing ability. They called it gamma. In simple terms, gamma measures how a fund manager loads up on stocks in good times and cuts back in anticipation of a poor market.

ADV: Describe, in general, the HTAA approach to trading. Describe, specifically, how diverse variables affect market timing models.

BH: The HTAA ensemble of models has more than 40 individual inputs. Individual models have screening criteria that can change the mix of inputs used to forecast stock market returns. We have found that certain inputs are more relevant than others in different periods, so the list of inputs can change from time to time. For example, if you look at the signal decomposition portion of our Daily Report, you will see one of the most important variables is

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the Federal Reserve Bank Loan Officer Survey. We look at this survey every quarter to see if banks are tightening credit. If they're tightening credit, that's a bad sign. If they're loosening credit, it's a good sign. Valuations are also important and very negative right now. We combine cyclically adjusted price to earnings ratio, cyclically adjusted total yield (which is the sum of dividends and buybacks) and price to book into a single valuation metric. Right now, it is telling us markets are overpriced. Other variables I like are the Baltic Dry Index, which is a proxy for shipping costs around the world, and the variance risk premium, which measures the difference between implied and realized volatility in the market. We have found the latter variable particularly useful when this spread gets unusually high or low.

ADV: What is the time horizon of your typical trade?

BH: As I mentioned, the actual model is made up of about eight models. One looks at the market with a horizon of about six months, but we also have a model fundamentally driven where the horizon is a month and four models with horizons of one or two days to a week. One of these models actually looks at market volatility to decide what the market might be doing in the short term.

ADV: How has your trading evolved over time?

BH: Initially our strategy was based on the output of a fundamental model with a six-month forecast horizon, and we described this model in our paper "A Practitioner's Defense of Return Predictability." But if you are only looking six months ahead, your strategy's breadth is limited by having very few uncorrelated predictions. We found we could enhance our strategy by introducing several new models with varied inputs and a range of forecast horizons. The second paper we published focused on our monthly model. We have four models with shorter horizons; however, the one-month and six-month models have the highest weights in our ensemble.

It's mostly our research that has evolved over time and continues to evolve. The trading approach remains about the same. Depending on the daily signals generated by the models, our net exposure can range from between 100% short to 200% long the S&P 500. Thanks to our ability to go short when necessary and take advantage of leverage when appropriate, we aim to be well positioned for both bear markets and bull runs.

ADV: Where do you see your assets under management headed over the next 12 to 24 months?

BH: It really depends on the markets. As long as the market continues to be a 3 Sharpe strategy, there is a limited advantage active managers can offer to their clients. However, we are headed into the ninth year of this bull market—making it the second longest on record. At some point, investors are likely to seek strategies that might offer them reduced risk or downside protection.

ADV: Do you believe there is a capacity limit to your trading strategy?

BH: The limit is very high. We are trading some of the most liquid instruments in the world. The daily dollar volume in S&P 500 exchange traded products exceeds \$100 billion. We also adjust our position at the end of the day, when the trading volume is typically the highest.

ADV: Does the firm provide any newsletter or other client communication?

BH: We publish a blog and a daily report on www.hulltactical.com that shows and explains our current position. You can also sign up to receive our blogposts and reports through the website. Additionally, we update our Twitter and LinkedIn pages with all relevant news. ▲

Hull
TACTICAL

Blair Hull founded Hull Investments, LLC in 1999 and currently serves as the firm's manager. Hull Investments was created to serve as a family office for three generations of the Hull family and acts as parent company to a number of financial entities.

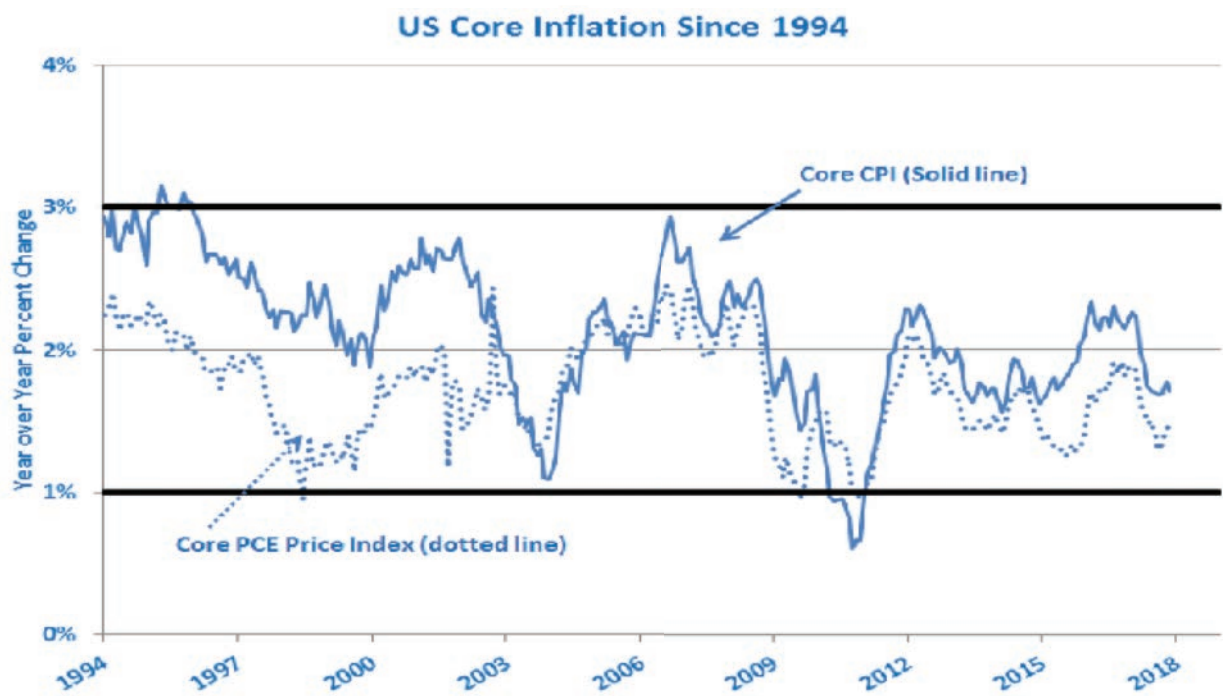
Mr. Hull created registered investment advisor HTAA, LLC ("Hull Tactical") in 2013. Hull Tactical operates an actively managed ETF and utilizes advanced algorithms as well as macro and technical indicators to anticipate future market returns. Visit www.HullTactical.com.

2018 Economic Outlook: Why has inflation been so subdued?

By Blu Putnam,
Chief Economist,
CME Group

All examples in this report are hypothetical interpretations of situations and are used for explanation purposes only. The views in this report reflect solely those of the author(s) and not necessarily those of CME Group or its affiliated institutions. This report and the information herein should not be considered investment advice or the results of actual market experience.

With unemployment low and inflation expectations creeping higher, the US Federal Reserve (Fed) may hike rates two or three times in 2018, and Treasury bond yields might drift a little higher. The big caveat is that this consensus scenario will only happen if inflation actually follows the script and starts to rise. Dr. Janet Yellen may no longer be Chair of the Board of Governors of the Federal Reserve System (Fed); however, the Powell-led Fed and bond market participants are likely to remain just as data dependent as in the Yellen-led Fed.



Inflation has been subdued for over two decades. This is not a recent phenomenon and is not due to the lagged impact of the 2008 financial panic. Indeed, whether measured by the consumer price index (CPI) or the Fed's favorite personal consumption price deflator (PCE), core inflation which excludes the more volatile food and energy categories has been stuck in a 1% to 3% range in the US since 1994. During this 24-year period, we saw two big cycles in unemployment; a stock market tech rally and tech wreck; a housing boom and massive housing recession; short-term rates above 5% as well as near zero; plus some massive Fed experiments with unconventional monetary policy (i.e., asset purchases or quantitative easing, QE). Thus, to evaluate different scenarios for inflation going forward, we need to step back and examine the underlying causes of this more than two decades of subdued inflation. In so doing, we will look at a number of simplified theories of inflation forecasting. By examining their often heroic (and incorrect) assumptions, we will get a much improved sense of why most inflation theories totally failed to have any predictive value, why the Fed is data dependent and why the rate outlook remains cloudy.

Our central thesis comes straight from basic economics: Price rises (i.e., inflation) occur when spending demand exceeds the supply of goods and services. As we take a tour of various approaches to inflation forecasting, we will highlight the changing patterns in the demand for spending or the supply of goods and services. A common theme will be that structural changes in our information-age economy vastly changed how spending demand is created and how goods and services are supplied. **The results of these information-age pattern shifts have effectively rendered virtually all of the simplified inflation forecasting approaches useless.**

Monetary policy is now less relevant to the real economy

In the 1950s and 1960s, Professor Milton Friedman of the University of Chicago became famous for his research on the money supply as the primary cause of inflation—even if the lags in monetary policy were long and variable. The monetarist theory of inflation fit the inflation data exceptionally well during the 1960s and 1970s, but it fell apart in the late 1980s and never regained any empirical support in later decades.

What went awry with the monetarist theory? The assumed relationship between the money supply and spending demand totally broke down. Back in the 1950s, if one wanted to buy goods or services, one paid with cash or with a check drawn on a basic bank account that paid no interest. There were savings accounts in the 1950s, yet they did not have check-writing privileges. Credit card use was minimal and the ability to borrow through a credit card was constrained. The ability to move funds instantly

and efficiently from investment accounts to payment accounts was a dream. Neither cash management nor brokerage accounts allowed check writing. The ability to transfer money over the internet or with a smart phone was not possible. In this bygone era, the money supply was very tightly correlated to spending, and thus rapid increases in the money supply served as a good predictor of future spending and future inflation—assuming the supply of goods and services was constrained to grow at a slower rate than the money supply growth.

The 1980s and subsequent decades ushered in massive change in the way spending demand was created and severed the link with any and all measures of the money supply. Checking accounts were allowed to pay interest. Checks could be written on brokerage accounts. Credit cards came with lines of credit to be used (up to a limit) at the discretion of the spender. These changes in how spending was facilitated were enough to destroy the correlation of money supply measure with inflation, and the Fed stopped setting money supply target ranges in the late 1980s. Then came the 1990s and subsequent decades. The information age brought myriad ways to transfer money and manage credit, including smart phones and internet.

The story does not stop here, though. Even if the measured money supply was no longer a good predictor of future inflation, one might still expect interest rate policy or quantitative easing to have an influence on future inflation. **Yet, neither interest rate policy nor central bank asset purchases have produced any evidence of correlation with inflation for almost two and a half decades.**

There seem to be two critical forces at work that have contributed to the lack of influence of monetary policy over inflation and the real economy since the early 1990s. The first is increased prudential bank regulation focused on capital requirements. The second is the rise of sophisticated interest rate risk management in the financial sector.

When banks and other lending institutions are capital constrained by prudential regulations, they are unable to expand credit which could drive spending demand. Even if short-term interest rates are relatively low and below the prevailing inflation rate, credit growth will be constrained by capital requirements. Even if the Fed buys massive quantities of US Treasury and mortgage-backed securities, bank lending will be constrained by capital requirements. The rise of prudential regulation to safeguard the financial system, which gained substantial momentum after the collapse of the savings and loan institutions in the recession of 1989-1991, had the unintended consequence of making monetary policy less effective in terms of inflation management. **As the policy pendulum swung toward bank regulation, the influence of central bank macro-economic tools waned.** The embedded assumption by most academic economists in their macro-economic models

that the policy environment is stable and has no influence on the efficacy of monetary policy could not be more wrong.

The Savings & Loan (S&L) crisis of 1990-1991 also had another impact. S&L's were basically institutions that borrowed short-term (savings accounts) and lent longer-term (home mortgages and later high yield debt). They took on substantial interest rate risk and many S&L's did not hedge or otherwise manage that risk; earning the premium for taking the risk of maturity intermediation was an integral part of their business model. After the S&L crisis there were effectively no financial institutions of any importance left in the US economy that did not adopt sophisticated interest rate risk management processes.

One of the interesting consequences of improved interest rate risk management in the financial sector is that the profitability of financial institutions would be less impacted by changes in interest rate policy. That is, small changes in Fed interest rate policy would no longer impact financial sector profitability.

With interest-rate risk more effectively managed, the big risk left on the books of financial institutions is credit risk—the risk of a recession that substantially diminishes the credit quality of their loan portfolio. Even in the credit risk sector, financial institutions vastly improved their ability to assess and manage credit risk over the decades—not enough to handle a deep recession such as 2008-2009, but effective credit risk management does limit the ability of the Fed to tap the brakes or hit the accelerator to influence the real economic growth.

Make no mistake, if the Fed were to raise short-term interests sharply above the prevailing rate of inflation, they could no doubt trigger a recession, but macro-economic management and fine-tuning has become less and less possible. This latter point illustrates some of the asymmetry in Fed policy outcomes. The Fed can still cause a recession by tightening too much—often measured by the shape of the yield curve. When short-term rates are equal to long-term bond yields (flat yield curve) or when short-term rates are set above long-term bond yields (inverted yield curve), recessions often follow in one or two years. The other side does not work so well anymore. Near-zero rates and asset purchases can raise equity and bond prices above what they otherwise would have been, but the impact on the real economy and inflation is virtually non-existent. **Put another way, the Fed can still create asset price inflation as it did in the 2010-2016 period of emergency low rates and QE, but the Fed has very limited ability to encourage more growth in an economy already creating jobs at a good pace.**

One last caveat is in order: When an economic recession is caused by a financial market failure such as 2008-2009, central bank buying of assets (i.e., the Fed's

approach) or provision of emergency liquidity loans (i.e., the European Central Bank's approach) can limit the damage of the recession and prevent a downward spiral into a depression. This ability to contain a recession, however, does not translate into an ability to promote additional economic growth when an economy is already growing again.

If not monetary policy, what about fiscal policy?

With monetary policy having failed to produce the additional economic growth and inflation pressure desired by policy makers, the US is embarking on a rather grand experiment in 2018 to see if large permanent corporate tax cuts can encourage economic growth and possibly push inflation a little higher. The outcome will be interesting to observe and is not so clear because the link between tax cuts and spending is quite loose. Corporations may choose to buy back shares, pay larger dividends, refinance debt or make acquisitions—all of which have excellent potential to increase shareholder value and yet may have no impact on the real economy. Only if corporations use the tax cut to pay higher wages or to invest in expansion plans in the US will the domestic real economy see higher spending. Some of this may, indeed, happen. The big question is how much and will it be enough to make a material difference in the growth of the economy. If one assumes tax cuts unambiguously increase spending on goods and services, then higher real growth and inflation pressure follow from the assumption of higher spending demand. If one assumes the permanent tax cuts to corporations and the temporary rate cuts for relatively well-off individuals will not raise spending demand by very much, then of course the impact on growth and inflation will also be small.

While not on the current policy agenda, this analysis also suggests increases in government spending is a more direct way to stimulate spending demand. After all, gross domestic product is the arithmetic sum of consumption, investment and government expenditures, plus net exports. Raising government spending goes directly toward increasing spending demand in the domestic economy without any confusion or debate as there is with corporate tax cuts. Indeed, the restraint in the growth of US federal government spending during the 2010-2017 period—after the one-time emergency fiscal spending of 2009—is arguably one of the reasons inflation remained subdued even with near-zero short-term interest rates.

Another fiscal policy issue for analysis is the rise of the national debt. At least in the short-term, both tax cuts and increased government spending would work to increase the deficit. Only if materially higher economic growth appeared down the road would tax revenues rise to partly offset the tax rate cuts or the increases in government expenditures. We carefully note, though,

that rising debt loads do not signal future recessions. Over the long term, growing economies typically take on more debt relative to GDP. As the debt to GDP ratio grows, though, the economy becomes more fragile and more interest rate sensitive. **That is, higher interest rates mean higher interest expense, so rising national debt raises the risk of a monetary policy mistake—moving too fast to a flat or inverted yield curve—and causing a recession.** Our conclusion is higher debt loads may well translate into a more cautious Fed in terms of raising short-term interest rates.

And, why haven't tight labor markets resulted in rising inflation?

Moving on to the labor market theories of inflation, the assumption labor economists such as Janet Yellen typically make is that low unemployment rates are indicative of tight labor markets. This means stiff competition for scarce labor and thus leads to higher hourly wages, which signals increased spending demand. There is, indeed, a loose contemporaneous correlation between wage inflation and consumer price inflation, but that relationship is not necessary causal—just an empirical association. And, as labor markets have shifted over the decades to more and more service sector jobs and less and less manufacturing jobs, the case for a causal relationship running from hourly wages to inflation has been weakened, if not destroyed.

To focus on spending demand, our preference is to look at the growth in total labor income. Total labor income growth is the sum of employment growth (more people working), growth in hourly hours worked (people working longer) and growth in hourly wages (people getting paid more). If you look at any one of these items in isolation, you risk getting the wrong answer. In Janet Yellen's defense, she definitely preferred a holistic approach to labor market data—looking at every measure possible to assess in a qualitative way what is really happening.

The focus many analysts put on hourly wage growth, though, is misguided. The problem is—yes, you guessed it—in the assumptions. The link between hourly wage growth and total labor income has a lot to do with what kinds of jobs are being created. Most models created by economists make the assumption that the job distribution within the economy is stable. Nothing, of course, could be more wrong in this era of corporate disruption. The economy is creating many more lowly paid service jobs and losing relatively better paid manufacturing jobs. This is a multi-decade trend, so why so many academic and policy-oriented economists do not give it more emphasis in their inflation forecasting models is a mystery to practitioner economists. The only relatively highly paid sector seeing job growth is business professionals, including those in finance, accounting,

insurance and legal professions. This sector is too small to move the inflation needle. The basic point is if the job mix is shifting to relatively lower paid professions, the overall average hourly wage growth will be biased downward regardless of the path of consumer price inflation.

There is more to this story, too. Spending demand is a function of both ability and willingness to spend. The growth in total labor income measures the changes in the ability to spend, but it does not necessarily reflect the willingness to spend. Our view is that fear of losing one's jobs is the primary factor affecting willingness to spend.

After the 2008-2009 Great Recession, many companies shed jobs. If you kept your job, you may have witnessed family, friends or co-workers lose their jobs. This is the province of behavioral finance and psychology, but we would argue the recovery from a recession involves much more than job creation—the fear that swept through the labor force from job losses in the recession may take much longer to diminish. Hence, **spending demand undershoots a linear extrapolation of total labor income growth until the job-loss fears abate. And, in this era of corporate disruptions, fears of losing one's job have not abated very quickly.** For example, brick and mortar retailing is being disrupted and goods delivery jobs are being created. Overall, job growth is doing fine—unless you are in one of the disrupted sectors, and then fear of job loss remains. This means in the long-lasting yet modest economic expansion after the Great Recession of 2008-2009, spending demand was held back by the very slow recovery in confidence in maintaining one's job and income. The fear declines each year of the expansion, but it is a slow process in this era of disruption.

Outlook and Risks for 2018

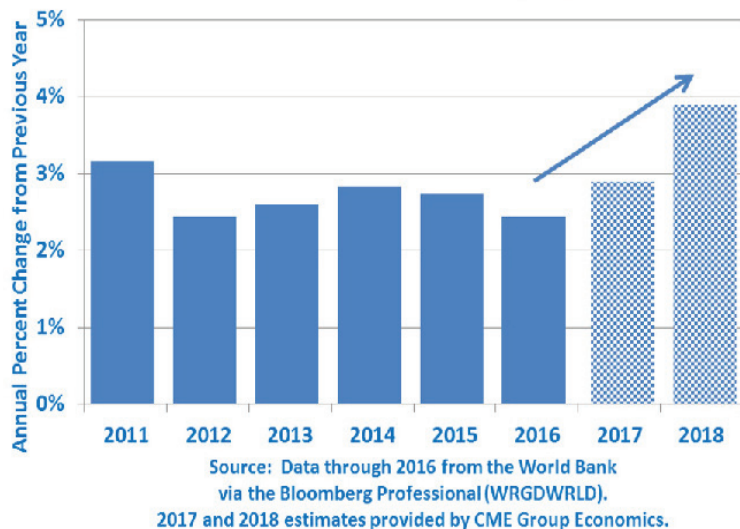
Our initial conclusion regarding the 2018 US inflation and growth outlook is to give little credence to traditional, simplified forecasting approaches. The heroic assumptions that once made these simple models useful have long since been relegated to the dustbin. Like it or not, the analysis is nuanced and complex.

When considering all the various factors, our view is the glass is more than half full and spending demand appears to be incrementally on the rise in 2018. There are two critical factors:

First, global growth is rising. Improved global growth tends to lift all boats, although not always by the same amount. The increases worldwide in growth are coming in no small part from improved conditions in commodity producing countries such as Russia and recoveries in some countries such as Brazil that suffered a deep

politically-induced recession. Real GDP growth is also inching higher in Europe and Japan. As global real GDP growth heads toward a 4% annual rate, this provides an excellent backdrop for incremental improvements in the US economy as well.

World Real GDP Growth Inching Higher



Second, fear of losing one's job is diminishing each year. Job growth has been very steady since the economic expansion began in late 2009. While, as already noted, job growth is being led in lower paid service professions, there is still plenty of job growth to go around in other sectors, too, to make workers feel much more confident in their future.

There is also the new tax law—mainly a permanent corporate tax cut—with some temporary reductions in personal tax rates along with removal of some deductions. All in all, the effect of the new tax law will take several years to have its full impact. The consequences for spending demand in 2018 are not likely to be large, since most of the corporate tax cuts will initially feed into higher share prices driven by stock buybacks, higher dividends, debt restructuring and mergers and acquisitions. Still, the short-term impact of the new tax law is likely to be positive for the economy, although very hard to untangle from the following wind from improved global growth and the diminished fears of job losses leading to strong consumer confidence.

Our baseline scenario is that US core inflation, excluding food and energy, will gradually see more upward pressure in 2018 and rise toward 2.25% to 2.5% year-on-year by December 2018. This pushes core inflation into the upper half of its multi-decade range of 1% to 3%, but it decidedly does not constitute a breakout toward 4% or 5% inflation down the road.

Our baseline economic growth projection is also around 2.5% for US real GDP. This is a decided improvement over the 2% average from 2010 through 2017, but it is incremental—not a major shift to +3% real GDP growth. While not discussed in this report, the biggest constraining factors for the US economy come from

demographics and economic policy. First, there is the slow growth of the labor force. The arithmetic is that real GDP growth is the sum of labor force growth and labor productivity growth. Demographics have slowed labor force growth and labor productivity has not picked up the slack. Second, there is the exceedingly large baby boomers generation moving into retirement (less spending demand) while the not quite-so-large millennial generation enters the workforce, especially encumbered by heavy student loan debt which constrains spending demand.

Another risk to the forecast is future developments in trade policy. The US is involved in negotiations with Canada and Mexico regarding the North American Free Trade Agreement (NAFTA), and the negotiators are at an impasse. The US (or Canada or Mexico) can unilaterally withdraw with six months' notice. A considerable number of sectors of the US economy would be disrupted by such a decision, including corn, natural gas and beef cattle (all exports from the US to Mexico), as well as the multi-country integration of the automobile industry, which may have a tough year anyway as US car sales are expected to slow. If the US chose the unilateral withdrawal approach, equity markets would probably decline and be a signal of how significant the demise of NAFTA would be for the economies of the US, Canada and Mexico. The US is also in trade talks to revise the treaty with Korea, and the US withdrew from the Trans-Pacific Trade Agreement. Trade is a key driver of global growth. The Great Depression was made worse by the imposition of heavy tariffs with the Smoot-Hawley legislation. So far, though, the trade talks have been a benign factor in the outlook.

In summary, with low unemployment and rising inflation expectations, the Fed is on track for two or three rate increases in 2018, but the pace of the rate increases will depend on the actual path of inflation—not the expectations. Also, with the new tax legislation expected to increase budget deficits and the national debt in the short-run, the Fed is likely to tread very carefully and move slowly regarding any rate increases. Finally, **the Fed does not want to be blamed for causing a recession, and the best historical indicator of a future recession has been when the yield curve moves to a flat shape with short-term rates roughly equal to long-term bond yields.** As the yield curve flattens, the Fed will debate the value of this indicator, but the Fed will stay cautious just in case the yield curve recession indicator still works. ▲



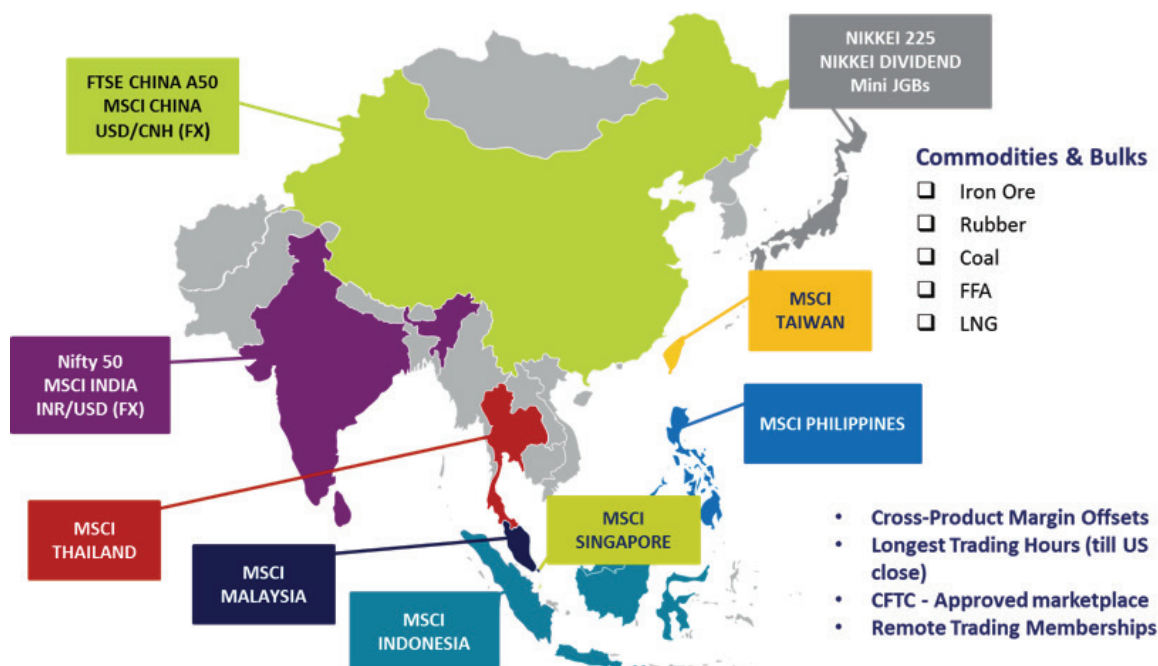
Bluford "Blu" Putnam has served as Managing Director and Chief Economist of CME Group since May 2011. With more than 35 years of experience in the financial services industry and concentrations in central banking, investment research and portfolio management, Blu serves as CME Group's spokesperson on global economic conditions.





Singapore Exchange (SGX) – Providing the world with access to Asia

Headquartered in AAA-rated Singapore, SGX is globally recognized as a leading liquid pan-Asian multi-asset exchange in Asia. Since pioneering the Nikkei 225 futures contract in 1986, SGX is amongst the leading offshore markets for global participants to access and trade key Asian economies (China, Japan, India and Southeast Asia) on a single platform. Leveraging on a strong equity derivatives franchise, SGX also lists FX and commodity products linked to the Asian region.



Overview of SGX performance in 2017 2017 Trading Statistics for key equity index & FX derivatives	Number of contracts	SGX FTSE China A50 futures	SGX Yen Nikkei 225 futures	SGX Nifty 50 futures	SGX MSCI Taiwan futures	SGX MSCI Singapore futures	SGX Nikkei Options	SGX INR/USD futures	SGX USD/CNH futures
	Average Daily Volume (ADV)	276,258	87,954	86,124	79,485	40,051	33,273	33,009	7,732
	Open Interest as of end Dec 2017	699,621	178,390	397,534	212,235	223,033	1,502,311	57,857	25,697

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SGX achieved a solid performance in 2017 across its equity index franchise. The only offshore China A-share futures contract (SGX FTSE China A50 Index futures) continued to attract investors with an open interest increase of 18% YoY, ending the year above US \$9 billion. Other contracts including SGX MSCI Taiwan Index futures and SGX MSCI Singapore Index futures also ended the year up 6% and 30%, respectively. In total, SGX's ADV across equity derivatives and FX derivatives was 655,619 contracts, while open interest grew to 3,445,527 contracts by end of December 2017.

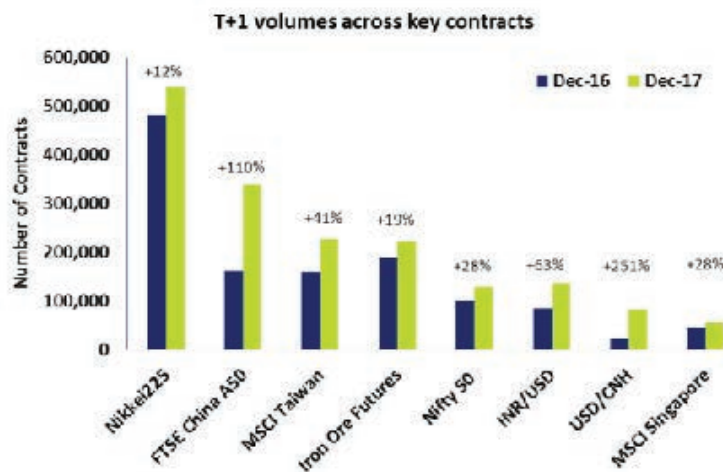
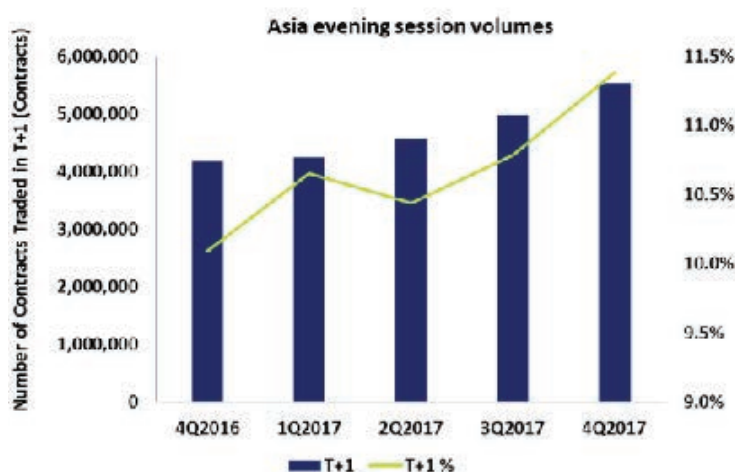
During the year SGX saw a focus on emerging markets, with MSCI Emerging Market Index (MSCI EM) and MSCI Emerging Markets Asia Index (MSCI EMA) continuing to outperform the MSCI World Index. With China, India and Taiwan comprising a significant weightage of over 50% to MSCI EM, there is an increasing need by capital allocators to manage risk exposure to these regions—adding to the liquidity on SGX. In response to this market

need, SGX introduced futures on MSCI EM and MSCI EMA in November 2017 so participants can trade the regional indices alongside the Asian single-countries in the same time zone for capital and trading efficiency.

Growing liquidity in the global trading hours

With Asia's growing influence on MSCI EM, in particular the anticipated inclusion of China A-shares into the MSCI basket in 2018, US investors and traders may put Asia firmly on their radar. SGX's round-the-clock platform facilitates this access up to 4:45am ET (DST) which allows participants to trade throughout the day, including US hours.

As a sign of Western appetite for Asian markets, volumes in SGX's Asia evening session (T+1) grew 33% in Q4 2017 versus Q4 2016. In particular, the China-centric contracts SGX FTSE China A50 futures and USD/CNH FX futures doubled and tripled T+1 volumes, respectively.

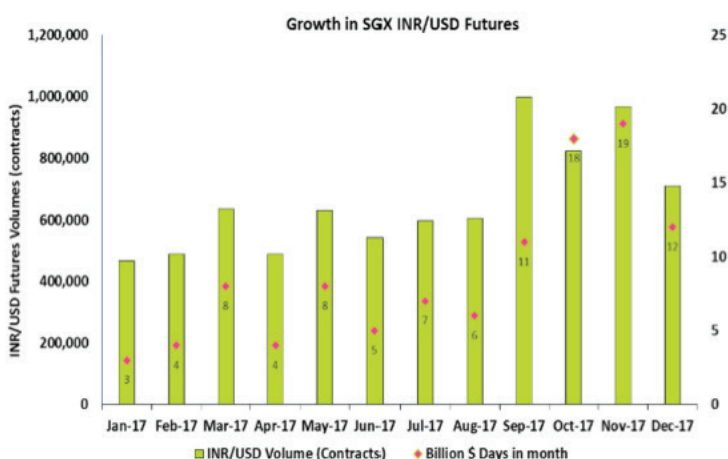
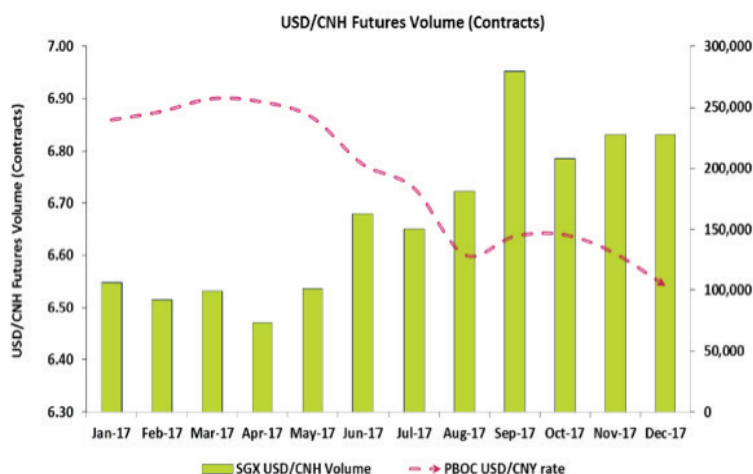


Breakout year for SGX's FX futures

SGX's growing FX futures franchise was up 59% in 2017 from 2016, with close to 10 million contracts traded. Open interest also reached a new record of 118,353 contracts on December 26, 2017.



SGX rupee futures (INR/USD) and offshore RMB futures (USD/CNH) are the main drivers of this growth. These contracts ended 2017 at ADV of 37,357 (US \$1.2 bn) and 11,031 (US \$1.1 bn) alongside open interest of 57,857 and 25,697 contracts, respectively. New single-day trading volume highs were reached in September 2017.

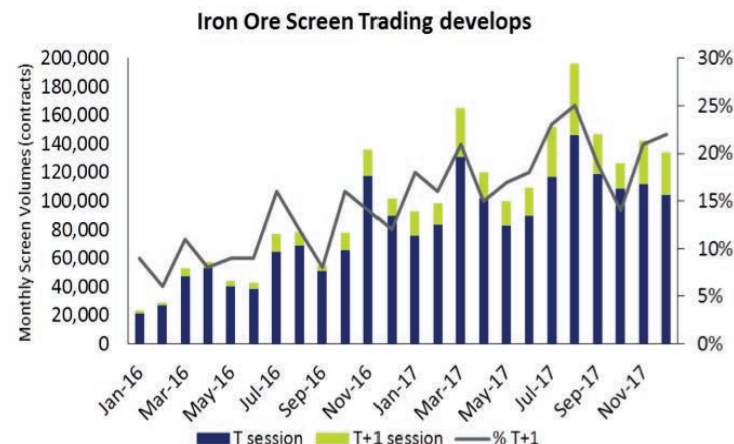


Global participants have been using these futures to hedge their exposure given the periodic jumps in volatility and macro-economic factors influencing these currencies. For example, the increasing foreign direct investment into India drives the need for rupee hedging, while landmark developments relating to offshore RMB (such as the currency's inclusion in the International Monetary Foundation's special drawing rights basket) and partial inclusion of Chinese equities into MSCI and FTSE Russell Indices may have been a contributing factor of the heightened international investor interest in RMB.

SGX USD/CNH volumes have surpassed the 10,000 ADV mark since September 2017 and established an estimated 75% volume market share versus other offshore markets. Given the regulation and microstructure changes in favor of exchange-traded products such as Basel III, SGX is optimistic about the growth in exchange-traded FX futures.

Growing financial participation in iron ore futures
SGX's commodities derivatives shelf has been built around Asia-centric raw material trade flows and industries—iron ore, coking coal, steel, freight and rubber. As the pioneer


of the iron ore derivatives market, SGX became a leading offshore market with a volume and open interest market share of 96% and 90% respectively. Leveraging on this, the SGX coal and freight contracts grew in 2017 as customers traded the “virtual steel mill” on SGX.



The growth of screen trading has been a positive development, which now accounts for 15% of total futures volume at end of 2017. SGX Iron Ore futures ADV in 2017 was 50,018 contracts of which screen traded ADV stood at 6,382 contracts, versus 4,612 contracts last year with an increasing T+1 presence.

This growth is complementary to OTC trading in expanding the size and diversity of the iron ore market. While the majority of users are Asian miners, mills and traders, there was an exciting increase in financial participation largely on SGX's screen platform. There is an opportunity to further grow this participation and encourage the use of iron ore derivatives as an indicator of the Chinese economy's development, given its link to industrial development and urbanisation.

Your access point to Asia

Given the liquidity of SGX's pan-Asian multi-asset franchise, SGX's in-depth understanding of the markets, regulatory framework and commitment to meeting the risk management needs of global investors, SGX is a choice platform for investors looking to explore the opportunities Asia offers. 

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***Funded accounts as of January 2018**