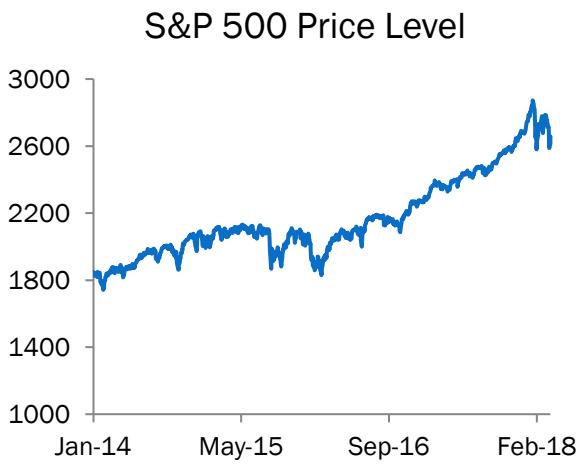
The Economy and Markets:

The placid increases of the US Stock market came to an abrupt halt this past quarter. While stock price indices are little changed from the beginning of the year, it has been a bumpy ride throughout the quarter. The S&P 500 closed March 29 (the last trading day in March) at a value of 2,640.87, which is 1.23% lower than its value of 2,673.61 on Dec 29, 2017. The S&P 500 was buffeted about several times throughout the quarter. In January, the stock market increased significantly, up almost 5.5% for the month. This increase was largely a continuation of the rally that had been going for years on the back of an improving economy, and further spurred on by significant corporate tax cuts signed into law in late December. By February, however, it appears that market participants began to internalize the ramifications of a potentially overheating economy – namely, inflation. The S&P 500 actually suffered its worst daily point loss ever on Feb 5, losing over 113 points (4.1%) in a day. That same day the Dow Jones index also recorded its largest ever daily loss, an eye-popping 1,175 points. In neither case, however, were those drops among the daily largest percentage losses. The equity markets to some extent recovered after that in February, but then stumbled again in March, leading ultimately to the quarterly loss.

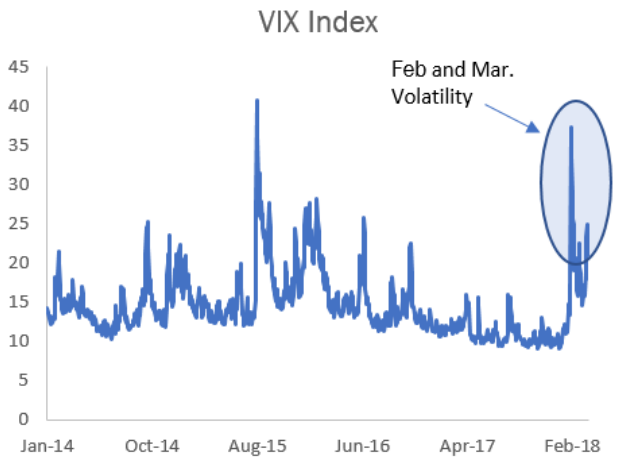
Markets at a Glance (Mar 29, 2018)	
S&P 500	2,640.87
Dow Jones	24,103.11
10 yr. U.S. Treasury	2.74%
3mo U.S. Treasury	1.73%
GDP Growth (last quarter)	2.9%
Unemployment Rate	4.1%



There are two broad risk metrics that we tend to keep an eye on (bearing in mind that no one metric, or even two metrics, can alone tell the entire story), both of which we have discussed in detail in past newsletters.[1] The first is the VIX risk measure. The VIX measure comes from the price of options traded on the S&P 500, and is a market-derived measure of the expected variability of price movements in that index. Reflecting the increase in volatility this quarter, the VIX ended the last day of trading this past quarter at a level of 19.97, almost double the low level of 11.04 at the end of December. The sharp rise in the VIX can be seen in the figure on the next page. The spike in the VIX in early February exceeded 37, a level unseen since the Brexit vote. The VIX measure effectively

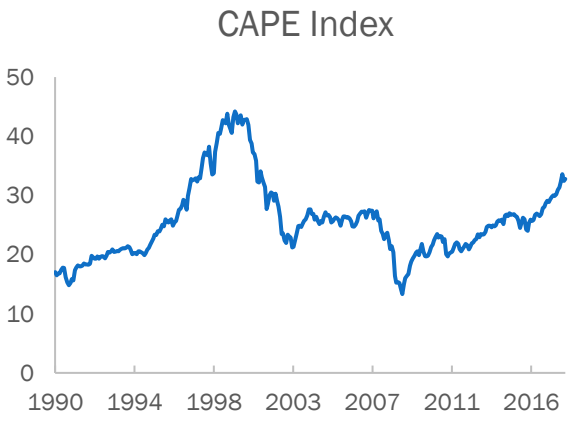
[1] All past newsletters, and some other useful resources, may be downloaded at http://www.madisonfinancialresearch.com/Resources.html.

reports how much the value of the overall market tends to "move around." One thing to always keep in mind with the VIX is that it is subject to change quickly, as the figure makes clear. One implication of the now-higher VIX is that the price of market "insurance" is now considerably higher than it was three months ago. This is a clear indication that market participants are collectively more worried about downside risk in stock prices than they were back in December.

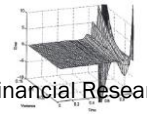


In contrast to the VIX, the CAPE measure (CAPE is an acronym for "cyclically adjusted price to earnings") is a measure of the "value" of the stock. The idea behind this measure is to estimate how much an investor approximately pays for $1 in real earnings from the stock market at any given time. When the CAPE measure is high, long-term (7 – 10 years) future stock returns tend to be low. When the measure is low, long term future stock returns tend to be high. The average for the CAPE measure is around 18 or so. The CAPE measure has been increasing consistently along with the stock market for almost a decade. The recent turmoil in the market has naturally reduced CAPE slightly. However, as you can see in the figure, this reduction in CAPE is almost imperceptible compared with the recent upward movements. The current value is around 31.5 – ever so slightly down from 32 in December. This value is therefore still quite close to its highest point since the time of the internet boom. According to this measure, the market remains quite expensive.

Taken together, the VIX and CAPE seem to imply a potentially dangerous combination – high volatility implying significant daily price movements, coupled with what appears to be an expensive market. This elevated level for CAPE tends to forecast lower than average future stock returns. It is important to note, however, that any predictions that utilize CAPE are much longer-term predictions than simply a few quarters, and are notoriously difficult to provide with any accuracy. But it is among the best predictors known in academia. Time will tell whether that is worth anything right now, but it has been a worthwhile indicator in the past.



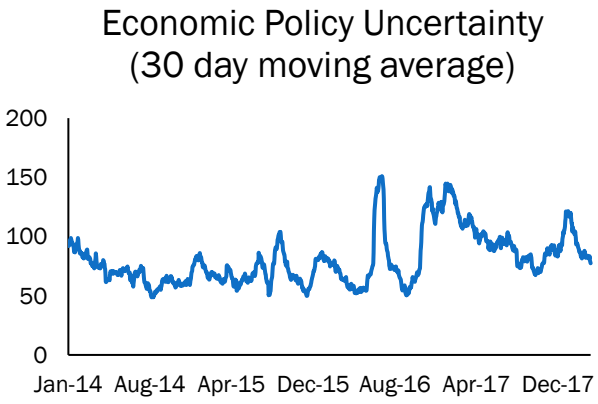
Integral to fluctuations in the market this quarter has been national politics. Usually, it is fair to say that politics are overstated as an overall driver of stock market performance. It is always worth remembering that, ultimately, the value of a business is the value of its profit stream. News items that don't change the future profitability of businesses aren't likely to substantively change the value of businesses. Stock market indices are really just the (weighted) sum of the value of many individual firms. So, if citizens and politicians argue about gun control, drug policy, border control, and so forth,



it isn't likely to have much of an effect of the value of stock or bond prices broadly (this is all the more true if politics devolves into less policy-oriented debates). But, if policy has the effect of changing the expected future profitability of a wide swath of businesses, then market reactions tend to be pronounced.

These kinds of policy changes appear to have been behind the gyrations in the stock market recently. The biggest such recent policy driver has been the tax cuts passed by Congress near the end of last year and signed into law Dec 22. These tax cuts had the effect of increasing the profitability of most firms, by decreasing their marginal tax rates. The cuts were signaled by politicians and forecasted by the markets well in advance, and so as their probability of enactment increased through time, the markets increased in value accordingly. As analysts digested the implications for individual companies throughout January, market values increased.

Early in February, the dramatic market drop appears to have been precipitated by concerns that adding tax cuts on top of an already well-functioning economy carried with it the risk of inflation – something that has been largely absent as a concern in the U.S. economy for over a decade. The presence of inflation would imply that the Federal Reserve would be more aggressive in raising interest rates. Higher interest rates mean that future profitability of firms is less valuable – and therefore would result in a decline in stock prices. However, the market somewhat recovered from this concern, and by the end of February had recovered about half of its losses.



March brought with it several profitability-affecting policies from the White House in the form of tariffs. The first of these was the announcement that the United States would impose tariffs of 25% on imported steel and 10% on imported aluminum. The initial reaction to these tariffs was an abrupt decline in the market, as the expected outcome was that retaliatory tariffs would follow. Of course, if the imposed tariffs had increased the profitability of U.S. business more than it has hurt them, we'd expect a stock market increase. However, it has been many decades since our economy was structured in such a way. Businesses in the United States use steel and aluminum in far greater quantities than the amount of steel and aluminum produced by U.S. businesses. So the tariffs will increase production costs for more businesses than those that are protected…which in sum decreases profitability…which decreases stock prices. The politics of these tariffs were puzzling to many as well, as the primary importers of steel into the U.S. are allies: Canada, Brazil, and South Korea are the three largest importers. China is a very small player. Subsequent pressure resulted in the administration subsequently suspending the tariffs temporarily on several key allies (that amount to most steel and aluminum imports).

On March 22, the White House announced it would apply tariffs of $50 billion on Chinese goods. This appears to have directly precipitated the recent stock market decline, as the market again assumed that such actions will precipitate retaliatory tariffs (which is of course the definition of a trade

war). Tariffs of course are just taxes, and as such they directly reduce the profitability of firms. Troubling to many market participants was president Trump's "Tweet" that "… trade wars are good, and easy to win," earlier in the month. We here at Madison Financial Research know many economists, and have been studying the economy ourselves for decades. Like most economists and other analysts, we do not think trade wars are good, and finding winners among the economic shrapnel is a challenge. The market appears to agree with us, and is down over 2.6% since the announcement, despite a rally on the last trading day of the quarter.

The U.S. economy continues to appear fundamentally sound – the recent market turmoil appears to be grounded in concern about future rather than current profitability. Estimates of 4th quarter 2017 GDP growth (the most recent quarter for which estimates are available) registered 2.9%, slightly off from the 3.2% from the previous quarter. GDP has been growing at a very solid clip, more solid than we would have guessed sustainable. The tax reform bill should continue to modestly help GDP growth in the near term, but most economists indicate that the effect is unlikely to increase growth significantly beyond current levels. The unemployment rate is also strong, at 4.1% for the 5th consecutive month.

For a long time, economists have expected inflation to increase from current levels. This is especially a concern when unemployment is so low. At Madison Financial Research, we prefer to look to the market for such expectations, and for years these market-derived expectations have been muted. However, there are signs of increasing inflation in these measures. At the end of this quarter, market activity indicated an inflation expectation of about 1.94% per year over the next 5 years. This is up only about 0.05% over the end of last quarter. This implies that expected levels of inflation are quite low. They do appear to be slowly creeping upward, as six months ago this level was around 1.6%. The Federal Reserve, certainly keeping an eye on inflation, recently raised the Federal Funds rate once again, to a target range of 1.5% - 1.75%.

We have mentioned in recent newsletters that one benchmark we are keeping an eye on is the spread between 10-year and 3-month Treasury rates. This difference is a simple estimate of the slope of the "yield curve." Economic studies show that when this difference gets very low, or becomes negative, it is often associated with economic weakness. Currently, there is a 1.01% spread between these yields, just slightly lower than last quarter. This is a low level, but not quite at the level typically associated with concern. We will continue to monitor this important economic indicator, given its negative trend, and past predictive power.

Quarterly Special Topic: Our Fallible Minds – Maybe We're Not Such Great Decision Makers After All

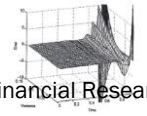
From time to time, our special topic is as much a book review as it is a discussion. This quarter's topic falls squarely into that category. After reading through *The Undoing Project* by Michael Lewis, we here at Madison Financial Research just felt it was a perfect match for our newsletter. From the beginning, the purpose of this newsletter has been educational – to teach people about financial markets and the economy in ways that they may not have thought about before, and hopefully be a bit entertaining along the way. *The Undoing Project* is about two Israeli psychologists who had a profound effect on economics – Daniel Kahneman and Amos Tversky. Economists historically have used as a starting point to their theories the assumption that people behave rationally. Kahneman and Tversky introduced to economists important ways in which people deviate from rational behavior systematically. They taught the economics profession to look at decision making differently than they had previously.

Most non-economists will read the above statement and think "Well, economists are pretty stupid then, of course people do not behave rationally – I mean, just look around." True, the irrationality of humans hasn't exactly been in stealth mode. But economists have never actually argued that people are perfectly rational. Rather, we have argued that while people's behavior deviates from irrationality, it does so in ways such that the deviations roughly offset when you look at a large population. If you tend to perceive a situation as a little riskier than it really is, well, then probably your neighbor perceives the same situation a little less risky than it is, and so forth. In the end, it all "balances out."

Kahneman and Tversky helped define situations in which things don't balance out. It turns out that the errors made by human judgement are systematic – we all make them to some degree. If we all make similar errors, then that can have a big effect on financial markets. Consider their notion of *anchoring*. People tend to make estimates starting from some initial value, and their adjustments to that initial value are subsequently insufficient. Empirically testing this idea, Ariely et al (2003) perform an experiment in which they ask subjects to think of the last 2 digits of their social security number (feel free to play along). Then, they ask the subjects to write down the value, in their estimation, of a good bottle of wine. They find that there is a strong relationship between an individual's 2-digit social security numbers and the estimated value of the wine!

You can imagine the ramifications of these kinds of systematic errors in the marketplace. Recently, the popular culture has been introduced to a cryptocurrency called "Bitcoin." Madison Financial Research has fielded many questions on the subject. Now, imagine you've never heard of Bitcoin, and I approach you and say the following:

> *I have a currency that exists only on the hard drives of computers. You can't buy anything with it locally, though Microsoft, Playboy, and a few other places will take it as payment online (Microsoft recently stopped taking it, but then began accepting it again after a couple month hiatus). No one knows who invented the currency, but they are brought into existence by computers working on solving complex algorithms, and*



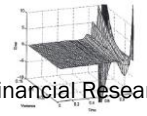
> *the maximum supply of these virtual "coins" is 21 million. After that the algorithm won't create anymore. The exchanges where people buy and sell these coins are frequently hacked, and when that happens the currencies are irrevocably stolen. Most of the exchanges are located in China, where there are capital controls limiting the amount of currency permitted to be moved legally into and out of the country. There are hundreds of competing cybercurrencies out there, but this one has been around the longest and is the most popular.*

How much would you be willing to pay for this currency? Had you never heard of Bitcoin, the answer would likely be quite low, possibly nothing. However, what if you were introduced to Bitcoin in December of 2017 in an article pointing out that the current going price for Bitcoins is $17,000 and has increased 13,000% in the last 5 years? Then, you probably think you are being conservative when you say to yourself, maybe I'll buy a couple of bitcoins and see if I can get an increase of ½ that.[2] The value initially presented to you when you learned of Bitcoin is skewing your perception – you are anchoring.

Anchoring is but one of a host of psychological missteps we humans make throughout our day, and many of these have important economic and financial ramifications. We are particularly poor at making predictions. Among other problems we have, we are just awful at assessing how to deal with rare events. When asked to analyze the probability of a rare event, people almost always overstate the probability of that event. This effect has long been known.[3] People then overweight these rare events in their decision making. As a result, people often insure for risks that they almost assuredly will never experience (and are willing to dramatically overpay for them), and simultaneously are willing to buy lottery tickets even though they carry with them an expected loss. This effect can also be used to help explain why stocks return, on average, so much more than bonds – people overestimate the probability of a stock market crash, and demand compensation for bearing that "risk." (It also explains why firms invest money in "active shooter" training, despite the infinitesimal probability that a given office building will ever face such a situation, and why Americans fear Islamic terrorism, despite the almost-zero risk of ever encountering it).

The inability of humans to make predictions can manifest itself in troubling ways. Consider the research of Lew Goldberg. Prof Goldberg worked at the Oregon Research Institute in the 1960s. The purpose of the institute was to study decision making, and Professor Goldberg was interested in the decision making of doctors making diagnoses. Many subtle and difficult to define processes go in to making a medical diagnosis, and he was interested to see how well he could model the doctor's decision making. To model this, he started by asking a group of doctors about the factors in determining the malignancy of an ulcer. Goldberg's research team ultimately identified seven factors, and used the simplest model of all: an equal weighting of the factors to determine the malignancy. Next, the team assembled a different group of doctors and asked them to evaluate the probability of cancer in 96 different tumors. The team wanted to see how well they could replicate the doctor's

[2] At the time of this writing, Bitcoin is trading for a little above $7,400 per coin. Given the prevalence of anchoring, we suspect many will now consider that inexpensive.
[3] See Lichtenstein et al. (1978) for a discussion of this effect related to mortality risk.



diagnosis. It turned out that the simple model was very good at explaining the doctor's diagnosis. There was nothing subtle about it.

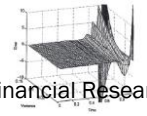
Then, things got interesting (or, terrifying, depending on how you look at it). At the suggestion of a colleague, Goldberg tested whether the constructed model might actually *outperform* the diagnostic ability of the doctors. It did. The algorithm - the simple algorithm that just added up seven binary numbers – was a more reliable diagnostician than the doctors. A group of mathematicians, simply by asking a few questions of a group of doctors and building a simple model, could better diagnose an ulcer than the average doctor studied. Indeed, the model outperformed even the *best* diagnostician amongst the doctors. By eliminating the biases in the prediction, they had bested the experts.

That people violate rationality so consistently is fundamental not only to our economy, but to our society. One of the great confluences of history is that Adam Smith's *The Wealth of Nations* was published in 1776, the same year as the authoring of the Declaration of Independence of the United States. The United States was and is a grand experiment in freedom. *The Wealth of Nations* first posited that free markets, left to their own devices, yield optimal outcomes – the "invisible hand" idea created by Adam Smith makes its way into virtually every popular economics discussion. For a couple centuries thereafter economists honed their mathematical models and showed exactly how this invisible hand operates. But all of those models, from Adam Smith through Milton Friedman and beyond, relied on rationality to reach this sublime conclusion. When people are systematically irrational, this conclusion can no longer be reached.

Richard Thaler won the 2017 Nobel Prize in economics by specifically demonstrating how government laws and regulations can be used to improve upon free market outcomes. To a large extent, he built upon the work of Kahneman and Tversky.[4] Virtually by definition, the more regulations and governmental interference in markets, the less "free" they are. The social science now demonstrates that there is an optimal degree of such interference, and it is nonzero. It may be that collectively we still decide that completely free markets are the way to go. For example, we may simply value complete freedom over more efficient outcomes. But if we proceed this way, we will do so knowing that other societies may be securing more efficient outcomes for their citizens.

Collectively, Kahneman and Tversky effectively launched the field of behavioral economics. Michael Lewis does an excellent job in laying out these foundations in *The Undoing Project*. It is a highly entertaining and educational book. It is hard to pull those two things off simultaneously. We highly recommend the read.

[4] Daniel Kahneman won the Nobel Prize in economics in 2002 for "for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty". Although Kahneman's award was for work created jointly with Tversky, Tversky had died six years earlier, and Nobel Prizes are not awarded posthumously.



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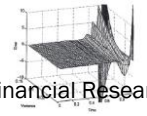

About Us

Madison Financial Research, LLC (MFR) is a registered Investment Adviser.[5] Jason Fink provides all of the investment advising offered by MFR. Dr. Fink has a PhD in Economics from the University of Virginia, and is a Professor and Wachovia Securities Faculty Fellow at James Madison University. He has over two decades of industry and academic experience, including previous positions at First Union Capital Markets, Fannie Mae, the University of Virginia and Florida State University.

What is Madison Financial Research?

MFR exists to provide *unbiased* answers to any financial questions its clients might have, and any help that its clients might need. We are comfortable working with a wide range of clients. For example, we are happy to explain the process of constructing an inexpensive and effective portfolio to novice investors, but also have particular knowledge on endowment spending policies to aid charitable institutions. We want to help investors understand their investments.

In the finance industry, almost all the people an individual can go to for advice have something they are trying to sell. A bank tells you why you need a mortgage. A financial adviser tells you why you should buy an annuity. An insurance agent tells you why their insurance product is ideal.

We are designed differently. We have nothing to sell but our time, which we use to convey knowledge to you. Whatever financial questions you might have, we will work to provide a solution.

These questions can be simple –

"Can you help me get started in understanding online brokerages?"
"Is purchasing this particular annuity a good idea?"
"Is my financial adviser charging me a lot for what he or she is providing?"

They can be complicated –

"When can I retire, and how can I optimally construct my portfolio?"
"Can you provide an overall assessment of my portfolio, including insurance, 401(k), and other major holdings? How can I improve my approach? Should I diversify internationally?
"What is a sustainable spending rate from a given portfolio?"

We have the expertise to handle virtually any financial question, and the patience and teaching experience to provide understandable and actionable answers. And outside of our time, *we have no products to sell* - our advice is unburdened by an alternate agenda.

As an investment adviser, we have a fiduciary responsibility to put our clients first. Investment brokers, insurance agents, mortgage lenders – *none of these have such an obligation to you*. We do, and we embrace it.

The financial world is complex. We can simplify it.

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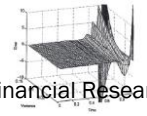

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