Bellwether CONSULTING

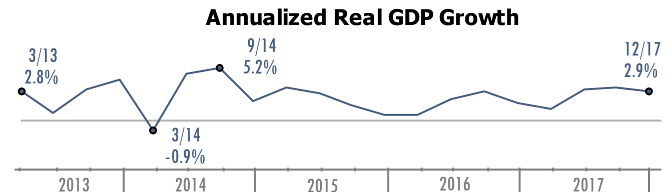
Your Quarterly Update on the Financial Markets
March 31, 2018

MARKET Recap

The US Economy: "Trade War Games"

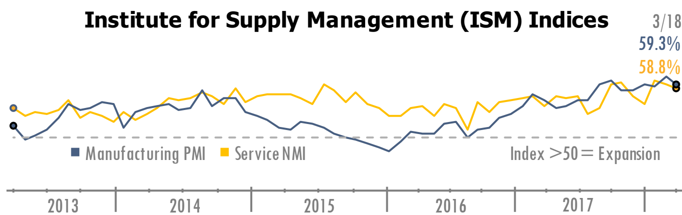
The pace of economic growth slowed slightly in the 4th quarter of 2017, with little change to the overall picture. Fundamental components of GDP were up including personal consumption expenditures, government spending, and exports. Imports increased more than exports though, offsetting most of the positive contributions noted, and private inventory spending accounted for nearly all of the remaining deceleration.

Annualized Real GDP Growth



Leading indicators for manufacturing and service production remained buoyant through Q1; a March decline surprised only in its small magnitude given negative developments on trade policy. We would not be surprised to see inventory contraction should the situation worsen. But for now, labor markets are very strong, and price inflation is in check. Overall the economy has continued to improve in recent months – the Fed agreed in March, as they voted to increase short-term interest rates again. Their March 21st press release noted, "The Committee expects that, with further gradual adjustments in the stance of monetary policy, economic activity will expand at a moderate pace in the medium term and labor market conditions will remain strong."

Institute for Supply Management (ISM) Indices



High prices and gradual monetary tightening create a tense environment for investors. Against that backdrop, the threat of a trade war is particularly unwelcome. Earlier this week the Trump Administration proposed 25% tariffs on approximately $50 billion of Chinese exports, encompassing 1,300 goods in a broad range of categories. China responded with a retaliatory list that sums to about the same value but is more focused and targeted. The Census Bureau publishes a table of US exports to China by 132 different categories spanning 10 years. Space does not permit us to present the entire table, but it's worth a visit to their website to review; trade relations have broadened considerably as China's economy has matured, with complex trends such as an emerging petroleum export industry. Rust belt industries and agriculture would be hit hard, areas from which Mr. Trump drew support in his electoral campaign.

Rhetoric surrounding the recent announcements is vaguely reminiscent of the Cold War, with dramatic threats and counter-threats used as negotiating tactics. Like nuclear war, experts are nearly unanimous that there are no aggregate winners in a trade war. As Joshua surmised in WarGames, "The only winning move is not to play." However, with trade barriers there are winners within specific industries on both sides, those winners have political influence, and world leaders are clearly much more willing to implement scorched-earth tactics with soybeans than H-bombs.

Although these actions are entirely consistent with the President's campaign platform, not to mention his style, the sudden escalation of tension between major world trading partners roiled the equity markets at quarter-end. It also contributed to a resumption of the flattening trend in the yield curve, which had been rising in a more parallel fashion earlier in the quarter. Both are consistent with market expectations that these tariffs, if actually implemented, will curtail global economic growth. Markets are taking the threats seriously, as they should in our view.

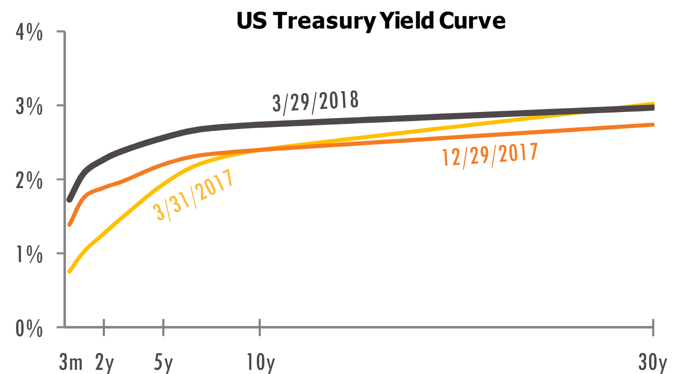
U.S. Goods Exports to China, Census Bureau (US$ mm)

Targeted Areas Highlighted Yellow

#	Export Good	2017	10-Year Growth Rate
1	Civilian aircraft, engines, equipment, and parts	16,266	15.3%
2	Soybeans	12,362	5.5%
3	Passenger cars, new and used	10,526	25.3%
5	Industrial machines, other	5,442	6.9%
6	Crude oil	4,434	n/a
8	Medicinal equipment	3,454	12.7%
14	Pharmaceutical preparations	2,680	18.4%
19	Natural gas liquids	2,013	90.9%
28	Cotton, raw	976	-4.9%
30	Computers	950	5.8%
35	Meat, poultry, etc.	751	-3.6%
36	Nonmonetary gold	750	59.2%
49	Gas-natural	449	74.3%
55	Fruits, frozen juices	378	13.5%
57	Wheat	350	80.7%
78	Tobacco, unmanufactured	162	4.0%
79	Apparel, household goods-nontextile	160	9.1%
80	Corn	152	38.8%
109	Nuclear fuel materials	41	22.2%
110	Sports apparel and gear	36	18.5%
129	Tobacco, manufactured	0	-15.0%
	Total	130,369	6.5%

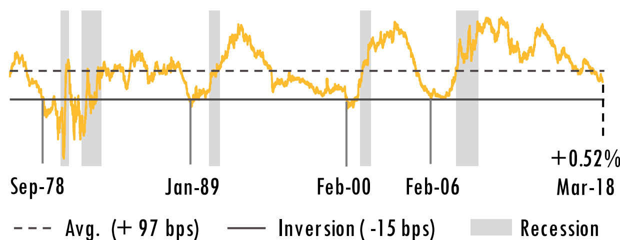
The US Bond Market

Quarter-over-quarter, the yield curve appears to have shifted in an orderly, parallel manner in line with the Fed's latest hike to an overnight target lending rate in the range of 1.50% to 1.75%. Marking the first substantial QoQ increase in 30-year rates since 4Q16, this is healthier action than the flattening seen last quarter.



More than an indicator of potential economic downturn, a flat or inverted yield curve reverses the polarity of an important component to bond returns. "Roll-down" refers to the change in yield that naturally occurs as bonds approach maturity over time. The current 3-year US Treasury now yields 2.39%. Should the yield curve retain its shape, that yield will decline 18 bps over the next year, at which point the 3-year will be a 2-year. This roll-down provides a tailwind of price appreciation for the bond investor, but only under a *normal* (upward sloping) curve.

Treasury yields were volatile through the quarter. Long-term rates rose steadily from early January to mid-February. Meanwhile, the short end saw little action until equity market volatility picked up at the end of January. The yield curve's sizable steepening in January moderated in February and pared back in March. Initially, increasing rates were blamed for the sharp correction in equity prices that started January 26th. However, when rates retracted, stocks continued to falter. After witnessing the 2013 "Taper Tantrum" this effect is not unexpected, but it may be unwarranted. A rise in yields should be expected as the Fed continues to cautiously step up overnight rates and is not necessarily cause for concern.



Paired with more flattening, it could be a different story. Inverted yield curves have reliably preceded every major recession in the US over the past 40 years. The yield difference between the 10-year and 2-year key rates has tightened considerably since the US exited its last official recession. Yet, regardless of which Treasury spread you choose to examine, an inverted curve is not in sight. As of quarter-end, the 2s/10s spread was below the long-term historical average but still far from inverted.

TIPS yields rose in the first quarter as inflation concerns continued to abate. The real yield on the 7-year increased by 30 basis points to 0.70%. 30-year TIPS moved up by only 19 bps to 0.92%. This puts the long end of the curve back to 3Q17 levels, but with the shorter 5-year TIPS substantially higher at 0.64% versus the September low of 0.01%.

Investment-grade US corporate spreads set an 11-year low on February 2nd, even as stocks and high yield issues had run afoul of investor sentiment. Although a few days late to the party, IG spreads jumped from 90 bps to 117 bps by the end of March. The net effect for Q1 was a 19 bps widening (BAML US Corp. Master OAS). High yield spreads, as usual, were more correlated with equity price movements. They hit a low of 3.23% on January 26th, shot up to 3.82% by February 9th, and then attempted to rally but were ultimately widened back out to finish the quarter at 3.72% (BAML US HY OAS). Compared to 1Q17, bond issuance was down in all categories except Federal Agency debt. High yield issuance was moderately strong in January and March but held back by a tepid February.

US Bond Index Returns	
Blmbrg Barclays	**1Q18**
Aggregate	-1.46%
Interm. Gov't	-0.73%
Long Gov't	-3.22%
TIPS	-0.79%
Municipal	-1.11%
Interm. Credit	-1.36%
Long Credit	-3.83%
High Yield	-0.86%
MBS	-1.19%

US regulators have been working to find a suitable replacement for the London Interbank Offered Rate (LIBOR) before the UK's Financial Conduct Authority (FCA) phases out the key interest rate indicator by 2021. The Federal Reserve Bank of New York, in cooperation with the US Treasury Department, is set to introduce the Secured Overnight Financing Rate (SOFR) as the new reference rate. The SOFR will be crucial in transitioning more than $350 trillion of securities currently linked to LIBOR. SOFR is based on real transactions in overnight loans, as opposed to LIBOR which relies on bankers' expectations. The SOFR will be published on a daily basis by the New York Fed starting April 3rd. Steps are being taken to develop a derivatives market based on the SOFR in order to expand the rate's use throughout the market.

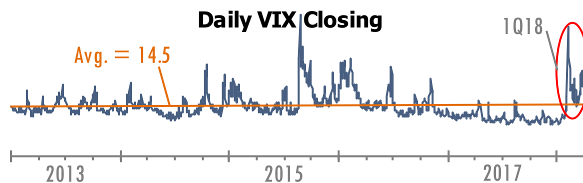
The US Stock Market

After a 2017 marked by record highs and subdued volatility, US stocks kicked off 2018 with the first quarter of broad negative returns in over 2 years. The Dow Jones Industrial Average fell 2.5%, breaking its longest quarterly winning streak since 1997. Things began well, with strong returns in January leading many to predict another record-setting period.

US Stock Indices - Total Returns			
Large-cap Stocks	**1Q18**	**Mid-cap Stocks**	**1Q18**
S&P 500	-0.76%	S&P Midcap 400	-0.77%
Russell 1000	-0.69%	Russell Midcap	-0.46%
Growth	1.42%	Growth	2.17%
Value	-2.83%	Value	-2.50%
Broad Markets		**Small-cap Stocks**	
S&P 1500	-0.72%	S&P Smallcap 600	0.57%
Russell 3000	-0.64%	Russell 2000	-0.08%
Growth	1.48%	Growth	2.30%
Value	-2.82%	Value	-2.64%

Ultimately, however, the quarter experienced 11 days with S&P 500 declines of 1% or more. While many of the positive fundamental drivers from 2017 remained, the quarter saw the "FAAMG" cohort (i.e., Facebook, Amazon, Apple, Microsoft and Google-parent Alphabet), which drove a significant portion of the S&P 500's 2017 performance, plagued by a variety of woes. These ranged from fears of tighter regulation to the Cambridge Analytica data security scandal (Facebook) and targeted negative comments from the White House (Amazon).

The CBOE Volatility Index (the "VIX") experienced one of its largest quarterly increases. After a declining trend that lasted over two years, the VIX rose 80% on market turbulence severe enough to trigger the shuttering of at least one VIX-linked product, the VelocityShares Daily Inverse VIX Short-Term ETN, as it struggled to re-balance after the February 5th spike. Growing fears of a trade war coupled with concerns about inflation and rising interest rates fed the turmoil. However, the return of volatility along with the worry over a potentially slowing economy may benefit some. The growing uncertainty could lead investors to embrace active management over index investing as a way to escape possible broad market declines.



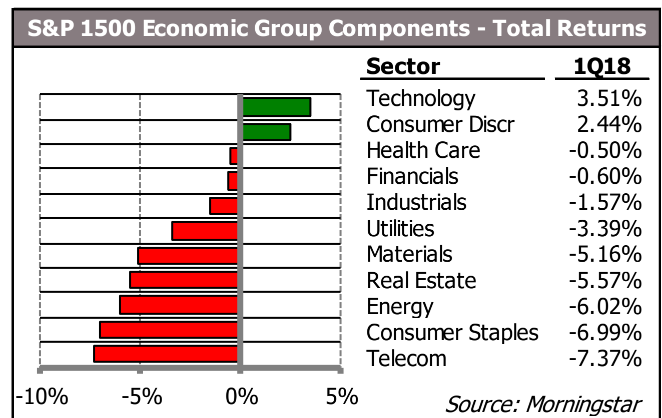
The first quarter also saw a return to small-cap stocks outperforming their large- and mid-cap peers. While an increase in market volatility usually bodes well for large cap stocks due to the perception of their stability, "techlash" in the first quarter led to some of that sector's largest names, like Facebook, Apple, and Alphabet, posting solidly negative returns. While these stocks had been viewed as a stabilizing component in the large-cap space throughout 2017, their increasingly dominant weight in large-cap indices became a liability in 1Q. In addition, financials, the largest sector in the Russell 2000, generally benefits from a steepening yield curve, which some expected to unfold in coming quarters.

Despite the sell-off, the technology sector still led the markets for the quarter as one of two sectors that posted positive returns. Later-quarter losses were insufficient to overcome early quarter gains in Microsoft, Nvidia, and Twitter. Netflix and Amazon bolstered the consumer discretionary sector in a similar fashion. As bond yields rose, dividend stocks became less attractive, leading to underperformance in the consumer staples, telecom, and energy sectors despite offsetting positive factors like a weaker dollar and stronger oil prices.

Meanwhile, IPO activity saw a 44% increase in volume and a 17% increase in proceeds raised over 1Q 2017 (Ernst & Young). The 43 IPOs launched in the first quarter raised a total of $15.6 billion, included four $1 billion-dollar offerings, and were spread across a number of sectors, most notably technology and health care (Renaissance Capital). In recent years, many companies had put off an IPO, relying on private investors instead. But on the heels of the record-breaking 2017 US equity market, 2018's first quarter was one of the strongest for IPO activity in a decade.

Global M&A had an equally strong quarter as US tax reform and strong markets incented action. According to Dealogic, over $1 trillion of global deals were announced in 1Q 2018. Deal volume in the US was up 67% over 1Q 2017. US health insurer Cigna Corp. scored one of the largest transactions with its $67 billion deal to acquire Express Scripts. The quarter also saw regulatory issues play out as the White House blocked US chip-maker Qualcomm's takeover by Singapore-based Broadcom on the grounds of national security and the US Department of Justice sued to block AT&T from buying Time Warner.

S&P 1500 Economic Group Components - Total Returns



Sector	1Q18
Technology	3.51%
Consumer Discr	2.44%
Health Care	-0.50%
Financials	-0.60%
Industrials	-1.57%
Utilities	-3.39%
Materials	-5.16%
Real Estate	-5.57%
Energy	-6.02%
Consumer Staples	-6.99%
Telecom	-7.37%

Source: Morningstar

International Markets

Rising tensions over global trade, confusion over future US policies, geopolitical stress between the US and a number of regions, and tech sector issues combined to end a streak of positive performance for developed markets. Meanwhile, emerging markets turned in another quarterly gain.

Foreign Stock & Bond Indices - Total Returns			
MSCI Broad Indices	**1Q18**	**Barcap Global Indices***	**1Q18**
World Index	-1.28%	Global Aggregate	1.36%
EAFE (Developed)	-1.53%	Pan-Euro	3.07%
Emerging Markets	1.42%	Asian-Pacific	5.30%
		Eurodollar	-0.87%
MSCI Regions		Euro-Yen	7.30%
Europe	-1.98%	Other Currencies	7.10%
Japan	0.83%	** Unhedged*	
Pacific ex-Japan	-3.73%		
Latin America	8.02%		

Europe

At its March monetary policy meeting, the Governing Council of the European Central Bank concluded that a large degree of monetary stimulus remains necessary for underlying inflation pressures to continue to build up and support headline inflation developments over the medium term. The information that has become available since the previous monetary policy meeting in January confirmed a strong and broad-based growth momentum in the euro-area economy, which is projected to expand in the near term at a somewhat faster pace than previously expected. This outlook for growth confirmed that inflation will converge towards the inflation aim of below, but close to, 2% over the medium term. At the same time, measures of underlying inflation remained under control and have yet to show convincing signs of a sustained upward trend.

According to reports from the March 8th Governing Council meeting, euro-area economic expansion continues to be strong and broad-based across countries and sectors, with real GDP increasing by 0.6% in 4Q 2017. Private consumption is supported by rising employment, which is also benefiting from past labor market reforms, and by growing household wealth. Business investment has continued to strengthen as a result of rising corporate profitability and solid demand, while housing investment has improved further over recent quarters. In addition, the broad-based global expansion is providing momentum to euro-area exports.

The ECB's macroeconomic projections for the euro area foresee real GDP increasing by 2.4% in 2018, 1.9% in 2019, and 1.7% in 2020. Compared with the December 2017 projections, the outlook for GDP growth has been revised up in 2018 and remains unchanged thereafter. Projections for annual inflation are 1.4% in both 2018 and 2019 and 1.7% in 2020, with the outlook for headline inflation largely unchanged. The Governing Council decided to keep the key interest rates unchanged and expects them to remain at their present levels for an extended period of time.

Americas

After the S&P/TSX Index reached an all time high in January of 2018, Canada ended the quarter as one of worst-performing global markets, with the energy, telecom, and utilities sectors all weighing on results. The Canadian dollar fell sharply against virtually all major world currencies, and the Bank of Canada refrained from increasing its key short-term rate. The S&P/TSX Index posted a 1Q return of -7.21% (-4.52% in Canadian dollars), led by the energy sector down -10.06% (-7.46% local) on concerns over the NAFTA negotiations.

In Mexico, consumer prices rose by 0.38% in February, taking the annual rate to 5.3%. Inflation is on a declining trend. It was 6.8% in December 2017, a 17-year high, but it remains uncomfortably above the official target of 2% to 4%. Core inflation, which excludes energy and some basic foodstuffs, rose by 0.5% in February, and by 4.3% over the trailing full year. Concerns about price pressures and a recent rise in inflation expectations led the Banco de México to increase its policy interest rate by 0.25% in February to 7.5% (the highest since February 2009) after an increase in November 2017.

In the last two years, consumer prices have been hit by several shocks. The peso has depreciated 22% since early 2015 due to falling oil prices. (Around 17% of Mexico's government revenue comes from oil.) A weak peso makes imports more expensive, affecting end prices. The Mexican peso has recovered some ground recently as fears about a possible collapse of NAFTA talks dissipated. But recent positive economic data in the US have prompted investors to flee from riskier assets such as the peso, betting the Fed will raise interest rates faster than initially expected. The Bank of Mexico said that the peso could face new episodes of volatility in the coming months as uncertainty remains high. It cited presidential elections in July, the Fed's policy stance, and the risks that parties ultimately fail to reach a deal on NAFTA.

In February, the central bank of Brazil reduced the SELIC policy interest rate by 0.25%, bringing it to 6.75%, a record low. The cut was in line with The Economist Intelligence Unit's forecast and investors' expectations. The focus of attention was on the BCB's signaling that the monetary easing cycle that began in October 2016, when the SELIC was at 14.25%, has come to an end.

Brazil's President Michel Temer failed to muster enough support for his pension reform proposal in February 2018, so the reform has been put off until after the October elections. Confidence improved among manufacturing business leaders in February, but dropped among consumers amid concerns about the job market. Temer's government issued a blueprint for growth that made the case for lowering tariffs and retraining workers to steer them away from obsolete or less competitive occupations. This shift comes as Brazil emerges from recession. In recent months, the government has sought to build goodwill with the Trump administration by opening its oil industry to foreign investment. Brazilian officials have scrambled to seek exemptions from steel tariffs and have been preaching the gospel of free trade.

China

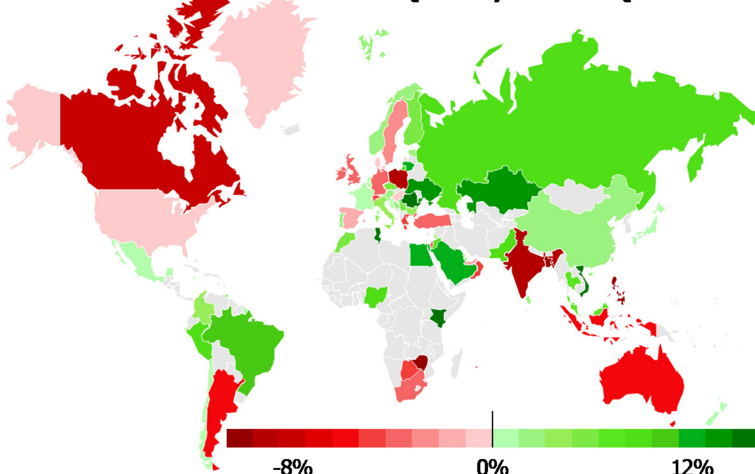
China's economy expanded faster than expected in the first two months of 2018, helped by strong overseas demand for Chinese goods. Industrial production expanded by 7.2% in January and February from a year earlier, according to the National Bureau of Statistics, well above the 6.2% pace in December. Fixed-asset investment, an indicator of construction activity, climbed 7.9% in the two-month period from a year earlier, increasing from a 7.2% increase in 2017 and beating forecasts for a 7% gain. Retail sales grew 9.7% from a year earlier, compared with a 9.4% rise in December and forecasts for 9.6% growth. Export-demand strength was signaled last week in data showing an unexpected 44.5% surge in exports in February and a widening of China's global trade surplus. The benefit from overseas demand is expected to fade as US President Donald Trump announced that his administration would impose approximately $50 billion in annual tariffs on Chinese imports. In response, China's Ministry of Commerce said it would impose a similar amount of tariffs on American-produced fruit, pork, wine, seamless steel pipes, and more than 100 other products.

Party leadership issued a blueprint reorganizing the government to enhance centralized control under President Xi Jinping. Next, the National People's Congress passed a constitutional amendment abolishing term limits on the presidency, opening the way for Mr. Xi to stay in power for many years. Shortly after, Mr. Xi moved to extend his control by unveiling new superagencies to tackle major potential threats to popular support for Communist Party rule: environmental pollution and financial recklessness. In an effort to overhaul supervision of the country's debt-ridden financial sector, a plan was unveiled to combine China's banking and insurance regulators, bolstering their ability to monitor financial institutions. At the same time, both agencies will relinquish some of their broad policy responsibilities to China's central bank, which would acquire an even greater role in preserving financial stability.

Japan

Following a meeting on March 8-9, 2018, the Monetary Policy Board of the BOJ retained its current policy. The board voted 8-1 in favor of maintaining its target for 10-year Japanese government bond yields at around zero and its short-term interest rate at -0.1%; settings that have been in place since September 2016. The Yen has appreciated against the US dollar since December 2017. An appreciating yen helps to keep a lid on import price inflation, making it harder for the BOJ to meet its price stability target. A stronger yen also erodes the value of repatriated profits of Japanese firms with overseas operations and hurts the profits of Japanese exporters.

According to data published by the Ministry of Internal Affairs and Communications, the all-items consumer price index (CPI) rose by 1.4% y-o-y in January. This was the strongest gain since March 2015, when prices increased by 2.3% after a rise in the consumption tax in April 2014. The increase in the all-items CPI is attributable to inclement weather and rising medical costs. Despite this, key measures that track underlying trends revealed muted price pressures. The core-core CPI, which excludes fresh food and energy prices, increased by just 0.1%, marking three straight months of sluggish gains. These trends might argue for a continuation of an ultra-loose monetary policy. However, the BOJ remains committed to meeting a price stability target of 2% in the next two years or so, believing that stimulus will help generate rising company profits, wages and consumption. This argument may lack credibility as the deadline for achieving the stated price stability goal has been repeatedly pushed back. Moreover, despite strong rhetoric from officials, wage increases have been slow to take off, keeping pace with historical trends. One of the reasons behind the country's weak wage growth is the prevalence of part-time and temporary workers, who make up some 30% of the labor force.



Focus On: Financial Stats – Updating Your Metrics Rolodex

More than 90% of data in existence was created in the past 2 years. To some investors, this massive trove of data is an opportunity to discover new market-beating metrics. The intelligent investor, however, recognizes that this promising potential also presents challenges and pitfalls. A "magic bullet" metric, while appealing, cannot form the basis for proper due diligence. To fully understand both the value and risks each investment opportunity presents, the intelligent investor must assemble a mosaic of metrics and qualitative information and, most importantly, must assemble it cautiously.

Chapter 20 of Benjamin Graham's landmark work, *The Intelligent Investor*, is titled "Margin of Safety as the Central Concept of Investment." Appropriated from the margin of safety (aka fudge factor) engineering students apply to the results of their calculations, Graham emphasizes a critical requirement of any intelligent investor - knowing what you don't know. In designing a bridge, for example, the rule of thumb is to multiply predicted tensile forces three-fold in order to incorporate real-world phenomena that physics models fail to accurately account for or simulate. Investors must face reality with less caution and safety as few financial securities trade at a 70% discount to their intrinsic value.

Avoiding Pitfalls	
Overfitting	Have a fundamental economic basis for every metric
Noise	Sufficient data to isolate signal from noise
Irrelevance	Differentiating the easily-measured from the important
Shelf-Life	Regularly reviewing effectiveness
Conflation	Knowing what you are, and what you are not, measuring
Overlap	Two statistics that always agree are really one statistic
Over-Confidence	Recognizing nothing is 100% certain

Sage advice abounds in *The Intelligent Investor*, advice which has had nearly 70 years to become conventional wisdom. Even today, the book should be atop anyone's reading list before getting their hands dirty in financial markets. Despite Graham's well-deserved recognition, not all of his advice holds up after the 45 years since his last revised edition. In his sections on fixed income, Graham makes a fundamental error in focusing on price rather than yield or yield spread. At one point, he remarks "...a second-grade 5.5 or 6% bond selling at par is almost always a bad purchase." Graham likely did not envisage the protracted global environment of zero-interest-rate-policy (ZIRP), under which BB-rated bonds averaged less than a 6% yield for most of the past six years and proved to be perfectly profitable purchases.

The point is not that Graham was an "equity guy" who just didn't get bonds. To the contrary, he demonstrates keen understanding on both academic and practical bases. Rather, the point is that when he focuses on the right metrics, those that signal a fundamental economic truth, his advice has proven timeless. When he highlights individual metrics bound to the economics of his time, he provides a cautionary example.

Classic or Outdated? Improving on Established Metrics

Many of the financial metrics promoted in *The Intelligent Investor* are considered to be classic and timeless. However, some are simply long-lived and popular. Does purchasing stocks based on low price-to-earnings (P/E) and price-to-book (P/B) ratios work when everyone else is already looking at those same numbers? Or when companies are trying to make those numbers look good, but find other metrics to be better standards for their own success?

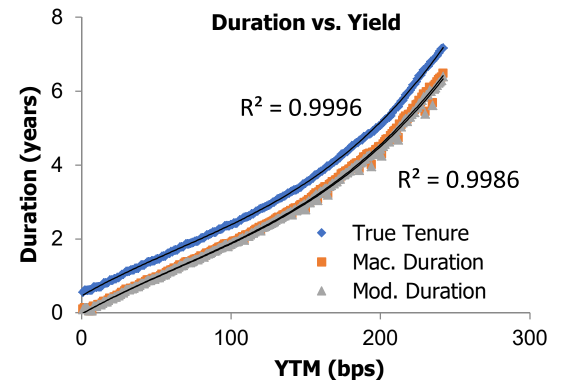
P/E ratio is one of the most popular and misused valuation metrics today. People often assume that since the S&P 500's historic average P/E is 16, anything higher is overvalued. Yet, the index has had an average value of 19 over the last fifty years and 26 over the last twenty years. Further, P/E can be manipulated by management teams through buybacks or changing their leverage. Furthermore, trailing P/E is backwards-looking and can be misleading if a company is cyclical and coming off a peak earnings period. Replacing trailing earnings with forward earnings improves the measure, but it can be unreliable as companies often adjust their forward earnings guidance and encounter unanticipated boons and setbacks.

Since P/E does not allow for growth, the price/earnings to growth (PEG) ratio is often used as an alternative. The PEG ratio gained popularity after Peter Lynch's bestseller *One Up on Wall Street* was released in 1989. Though widely accepted, many criticize PEG as still too simplistic. A 2012 paper asserted that PEG can be improved by incorporating additional factors such as debt service levels, risk, and cost of capital in the calculations, essentially creating a mosaicked metric. The analysis demonstrated an improved PEG-based trading model that outperformed both the standard PEG and multiple benchmark portfolios with an abnormal return of 3.1%. In this case, mixing in complementary metrics enhanced results.

Many new metrics have evolved to address valuations in the internet age. In response to firms' increasing online presence, the number and trend of monthly active users (MAU) and average revenue per user (ARPU) are becoming standard reports. As with any metric, the numbers must be taken in context. A high MAU signals an online platform's success and market dominance, but was it earned through organic growth, overly aggressive marketing, or acquisition? And, while helpful, ARPU does not entirely capture the difference in value generated by a user on one platform versus another. As with PEG, investors must seek out ways to broaden, and so improve, the picture created by these newer metrics.

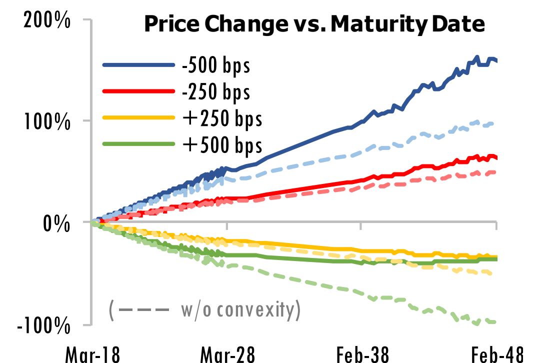
Value or Risk? Measuring What Matters

It is widely agreed upon that duration and credit quality are the most important measures when examining fixed income securities. So for bonds with minimal risk of default, like US Treasuries, yield is simply a function of duration, right? Not quite. While modified duration and yield-to-maturity are both widely-used and practical measures for evaluating fixed income security risks, both are inherently flawed as valuation metrics. A different measure (that few fixed income traders have even heard of) provides a significantly better fit. Dividing convexity by duration gives "true tenure," a measure that fits yield with an R-squared of 99.96% versus 99.86% for more common measures of duration. Macaulay's duration and modified duration provide reasonable fits against yield-to-maturity (using a cubic spline), but distinct curves are needed for issues of differing original maturities for a close fit. With true tenure, all bonds in a given duration span can be fit together regardless of whether they were originally 30-year bonds or 5-year notes.



Quantitatively we see that true tenure has more explanatory power on yields than duration, but fundamentally we can see why duration will never accurately price bonds. Each day, a bond's duration decreases slightly – except when a coupon payment is made. On those dates, duration jumps. At the extreme, imagine a bond with two $50 payments due: one tomorrow and one 10 years from today. The bond's duration, being the dollar-weighted average life of the security, will shoot up from around 5 years to around 10 years between one day and the next. How much should the yield change? The answer: not much. Whatever yield a zero-coupon 10-year commands in the market is not going to be much-altered by slapping on a payment that arrives just one day away. If said bond trades at $80 today, it will trade at $50 tomorrow and, in both cases, yields just under 5.25%.

A US Treasury bond maturing February 2038 has a lower duration than one due February 2048, but which is riskier depends on more than duration. If convexity is factored in, the bond with 30 years left to maturity will gain more if yields decline, but also lose less if rise sharply enough; past a point, convexity takes over and a bond with longer duration but higher convexity can actually outperform as rates rise. In valuing a bond, convexity may have a minor effect, but in evaluating risk, convexity counts the most where it matters.



Many other factors may prevail over duration and convexity as well. Rates do not rise and fall in parallel. Longer maturity issues may be buffeted from rising rates, as their yields are more closely tied to long-term inflation expectations than the foreseeable future of interest rate targets set by the Fed. The yield on the bond itself as well as roll-down also provide a margin of safety against greater interest rate exposure. It is when we combine the established measures of risk – in an appropriate way, of course – that we arrive at better metrics to assess value.

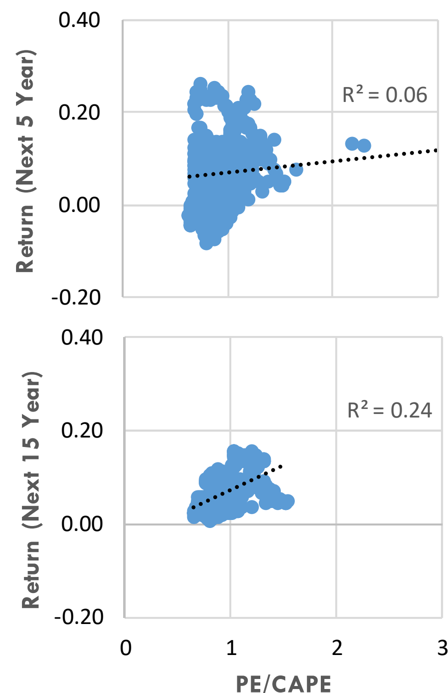
Signal or Noise? Understanding What You're Measuring

Graham does not have a lot to say about mutual funds in *The Intelligent Investor*, though a chapter is devoted to open-end (most mutual funds) and closed-end (most ETFs) funds. Graham believed the distinction is critical, imploring the reader to only invest in "...closed-end shares at a discount of, say, 10-15% from asset value." Approximately 94% of ETFs trade within 2% of their net asset value. Discounts (and premiums) in excess of 10% do occur, but only due to suspension of creation (and redemption) of shares or severe illiquidity. In other words, it is not feasible to invest in funds with a discount anywhere near 10-15%. Fortunately, a wealth of more actionable fund-level stats has since accumulated.

One portfolio statistic that has gained prominence over the past 9 years is Cremers' and Petajisto's *active share*. A simple calculation of non-overlapping holdings between a fund and its benchmark, the absolute values of every underweight and overweight are summed and then halved, for a possible maximum of 100% if no overlap exists. Imagine two funds, both with 80% active share and benchmarked to the Russell 1000. One manager allocates 60%/40% to Russell 1000 & 2000 index funds. The other manager also allocates 60% to a Russell 1000 index fund but invests the remainder in 10 hand-picked small cap equities. Blindly counting off-benchmark exposures as active is just one of many flaws in active share. If we try to compare two managers with different benchmarks, all else equal, the manager with the broader benchmark will have a higher active share. The lowest possible active share of an n-holding portfolio will be the total weight of the benchmark's top n-holdings. Currently, a fund holding 50 stocks benchmarked to the Russell 2000 will have, at minimum, an active share of 88%. Yet, small cap managers often tout even a 90% active share.

Some improvements can be made to active share. Instead of treating out-of-benchmark exposures as purely active, you can assign them the same active share as the in-benchmark holdings would have were they the only holdings. Or, you can measure active share against a composite benchmark if a manager consistently allocates to multiple investment universes. Whether you choose to use active share or not, it should be clear that active share alone cannot completely and reliably describe how active a manager truly is. More context must be gained by examining allocation differences by sector, region, and other factors.

There are many more popular measures of active-ness that can serve to complement active share. Tracking error, a performance-based calculation, gauges a portfolio's volatility of excess returns. It incorporates any specified window of time, rather than a single point. It incorporates all information embedded in performance. Tracking error will likely not change much by holding an out-of-benchmark global oil producer versus one that is included in the benchmark.



Applying the right metric to the right style of investment is also key. When compared to a historical cyclically adjusted P/E (CAPE), the current P/E ratio provides significant predictive power of future returns over the next 15 years, on average. So, this may be a useful metric to analyze a portfolio, but only if the manager uses a long-term investment horizon and invests in a diversified portfolio. If the investment horizon is 5 years, instead of 15, the correlation between PE/CAPE and future returns drops precipitously. If the portfolio is concentrated, idiosyncratic risks and other factors tend to dominate.

Knowing What You Don't Know

A YouGov survey of nearly 1,000 people found only 4% of respondents believed they were less intelligent than average versus 55% who claimed the opposite. A meager 7% answered (quite correctly) with "Don't Know." Mortgage-backed securities were able to collapse global financial markets because of misplaced confidence investors had in the quality of repackaged debt. New and sophisticated financial products can unlock opportunities for alpha generation, or they can result in overly-aggressive bets on faulty or poorly understood assumptions. *Market Wizards*, another good book, mentions a simple rubric employed by some top traders of old: to only commit a maximum of say 20% of total capital to any one idea. This is basic risk management. To expose your entire portfolio to any one risk vector - whether it is the price of a single stock, the regulatory power of a single authority, the import cost of a single commodity, or the valuation methodology of a single model – is to invite total and complete ruin.

However you choose to employ your fudge factor, realize that it is not a sign of poor judgment or carelessness. Often engineering students are confused, at first, when told to apply a crude margin of safety to their intricate calculations. The calculations are complex and precise out to 12 decimal places, but that does not make them accurate. Assumptions are made, concessions are given, human error pervades, and the unknown remains.

Financial markets are notoriously unpredictable. Our best models are based on Brownian motion, a stochastic process with random noise as a core feature. It is easier to predict the path of a rocket to the moon than the path of a stock's price. Or rather, the former can be predicted with much greater confidence. We see this in other disciplines too. Some political pollsters were victims to overconfidence in predicting Hilary Clinton held a 99% chance of victory in the 2016 presidential election. Those more cognizant of their models' shortcomings constrained odds-making to a 70% probability.

The intelligent investor examines all available information and attempts to pick out the signal from the noise. They audit every component in their process routinely. They look at what is fundamentally valid and what is simply popular, recognizing each for what it is and ascertaining its effect on the market. They take everything in context and do not put their faith entirely into any one thing. They admit anything, even they, can be wrong; and they safeguard against that risk.

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