



Is the Economy Veering Towards Greater Instability?

Even as the economy strengthens, are the risks of the next period of financial instability being sown? Hyman Minsky described the process leading towards financial meltdown more clearly than the process that promotes prosperity. Nine years into a recovery, one wonders exactly where we are on the Minsky cycle.

By Chris Mier, CFA | Strategist

Thanks to the Great Recession, we all know what a “Minsky Moment” is. Hyman Philip Minsky died before he began to gain notoriety courtesy of Paul McCulley, and then real fame as mainstream economists, including Fed Chair Janet Yellen, drew on Minsky’s work as they searched for a theory to explain the financial collapse, the subsequent Great Recession and the slow rate of recovery.

Minsky’s great contribution was his **“Financial Instability Hypothesis”**, published in 1992, which had gone largely unnoticed until McCulley quoted it in 1998. Minsky’s views diverged from orthodoxy in that he recognized that financial markets are a critical component of the entire economic machinery and not merely an appendage to the “real economy” of goods production. Financial effects had previously been explained away through the efficient market theory and faith in the restoration of equilibriums. Minsky’s theories, told without benefit of mathematics or complex econometric models, were more applicable to the environment of the financial collapse and Great Recession because they offered a realistic description about what we all witnessed, rather than abstractions.

The Financial Instability Hypothesis ignored conventional economic dictums—the rational representative agent, the tendency for markets and economic forces to find equilibriums, the capacity for prices to restore market equilibriums and operate efficiently, etc. Instead, Minsky made the argument that capitalist economies exhibit tendencies, based on inflation and upon debt deflations to “spin out of control”. Importantly, Minsky observed that, rather than restore the disturbance back to an equilibrium through economic or price adjustments—the classical view—economic system’s reactions were inherently unstable and showed a propensity for amplification. Minsky was not an adherent of “homo economicus”, the rational optimizing representative agent that is foundational in orthodox economic theory. In Minsky’s view, long periods of economic and financial stability would inevitably lead to greater risk-taking, leading to increasing instability and financial collapse. The cycle then moves to a phase of risk-aversion and conservatism, finding its way ultimately back to stability. The theory logically reduces to the notion that stability leads to instability, without equilibriums.

A key feature of the Financial Instability Hypothesis is the belief that governments and

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Is the Economy Veering Towards Greater Instability?

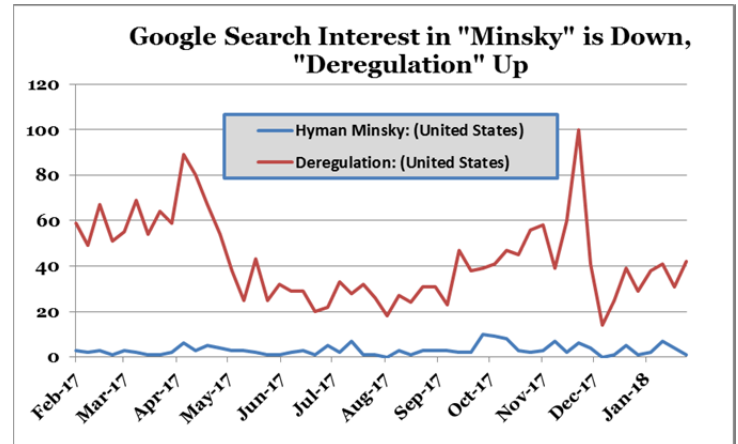
monetary authorities will attempt to restore stability, but will usually fail to do so. In the aftermath of the Great Recession, we saw conservative policies by the central banks, especially the use of forward guidance, to steer financial markets and the economy, and an unprecedented elevation of “financial stability concerns”, which attained almost the same status as the dual mandate by the US central bank. Meanwhile the government bought companies, and passed a multitude of financial market regulatory reforms. In the private sector, once financial markets were pried open again, firms borrowed to shore up balance sheets, delever, and increase cash. Animal spirits, like Elvis, had left the building. Corporations focused on cutting costs, managing their margins, and limiting capital expenditures, as they watched aggregate demand inch along at rates far below those of the typical economic recovery.

A decade later, the environment has gradually improved and increasingly taken on a different hue than the sub-par recovery that is typical of the recovery from a financial market collapse, as described by Minsky. Major factors that suggest that the economy has finally pulled itself out of the Minsky recovery phase include:

- The economy is now growing at an increasing rate, rather than the slowing rate typical of an economic recovery in its advanced state.
- An increase in speculative activities, such as the recent fascination with cryptocurrencies.
- A decline in the enthusiasm for regulation and a movement towards relaxation of restraints on financial market activities.
- Fiscal policy expansion.
- Increases in the default rates of high-leverage areas of financial markets, specifically student loans.

As shown below, Google search activity has declined for the word “Minsky”, but increased for the word “deregulation”. What occurs during the recovery period when the economy begins once again to enjoy a “protracted period of good times”, as described by Minsky? Ultimately, another collapse is brought on by a transition from

economic activities that can support the full cost of debt service, to activities that require “roll-overs”, and finally to “Ponzi” activities where asset sales are required to attempt to cover liabilities.



Increased financial market speculation, the removal of accommodation by the monetary authorities, and increased risk-taking are suggestive of an economy still in its period of “protracted good times”, but perhaps beginning to advance through the initial stage of “debt validation”. The process begins with the Hedge Financing stage (servicing principal and interest), progresses into the stage of greater dominance by “Speculative Units” that must roll-over the debt, and finally the Ponzi Unit phase. Continuation of low-volatility, modest economic expansion can no longer be reasonably assured while the Fed continues to reduce monetary accommodation and the economy increasingly trends towards riskier activities propelled by high asset prices and rarified levels of consumer and business confidence.

The point is that it is not too soon to be thinking of the end game when the fed funds rate finds its peak, economic activity threatens to slow, and the monetary authorities re-engage in activist monetary policies to ignite growth. The gap between the current fed funds target and the target anticipated by the Fed in their SEP forecasts continues to narrow as the FOMC raises rates and the Fed continues to lower its estimate of the natural rate of interest that sustains stable economic activity. Given the apparent timeline, anticipation of a recession that materializes in late 2019 or 2020 is not an unreasonable assumption.

Economic and Interest Rate Forecast — February 2018

Factors Supportive of Lower Rates

Retail sales unexpectedly declined 0.3% in January, while December sales were revised from +0.4% to flat.

Existing home sales fell for second consecutive month in January as the supply of houses on the market dropped to a record low, boosting prices and sidelining prospective first-time buyers in certain markets.

Vehicle sales cooled off to annualized 17.07 million units in January, about 4% less than the rate in December, a development attributed to bad weather. Four million vehicles that come off lease in 2018 will end up on used dealer lots, pressuring new car sales, especially sales of highly profitable SUVs.

Factors Supportive of Higher Rates

The U.S. added 200K jobs in January vs. 180K consensus forecast, while December report was revised upward by 12K. The unemployment rate remained steady at 4.1%. Average hourly earnings increased 0.3% in January, bringing year-over-year rise in wages to 2.9%, the biggest jump since the end of the recession.

Congress passed a far-reaching bipartisan budget deal that adds hundreds of billions of dollars to military and domestic programs over the next two years, while raising the federal debt limit.

The Institute of Supply Management's index of non-manufacturing activity hit 59.9 in January vs. 56.5 consensus estimate, suggesting that the rate of growth in the service sector has accelerated.

ISM Manufacturing and Chicago Purchasing Manager surveys were upbeat, while construction spending report was solid.

Figure 1 Economic and Interest Rate Forecast — February 2018

	1Q'17	2Q'17	3Q'17	4Q'17	1Q'18	2Q'18	3Q'18	4Q'18	1Q'19	2Q'19	3Q'19	4Q'19	Avg'17	Avg'18	Avg'19
Economic Forecasts															
Real GDP	1.2	3.1	3.2	2.6	2.9	2.9	2.7	2.6	2.7	2.5	2.6	2.5	2.3	2.8	2.6
Core PCE Deflator	1.8	1.5	1.4	1.5	1.5	1.7	1.8	1.9	2.0	2.1	2.2	2.0	1.6	1.7	2.1
Unemployment Rate*	4.7	4.4	4.3	4.1	4.1	4.1	4.0	3.9	3.8	3.7	3.6	3.7	4.4	4.0	3.7
Nonfarm Payrolls (chg in 1000s)	532	569	425	647	520	475	460	450	440	435	435	450	2,173	1,905	1,760
S&P 500	2,327	2,398	2,467	2,603	2,735	2,769	2,803	2,837	2,872	2,907	2,943	2,979	2,449	2,786	2,925
Short-Term Interest Rates*															
Fed Funds Target (%)	0.70	0.95	1.16	1.20	1.42	1.79	1.89	2.13	2.33	2.63	2.63	2.63	1.00	1.81	2.56
3-Month LIBOR (%)	1.07	1.21	1.31	1.46	1.78	2.15	2.25	2.49	2.68	2.98	2.98	2.98	1.26	2.17	2.91
7-Day SIFMA (%)	0.69	0.84	0.82	1.05	1.10	1.35	1.55	1.65	1.80	2.00	2.00	2.10	0.85	1.41	1.98
Treasury Interest Rates*															
2-Year Treasury (%)	1.24	1.29	1.36	1.69	2.08	2.40	2.46	2.66	2.81	3.07	3.09	3.11	1.39	2.40	3.02
3-Year Treasury (%)	1.51	1.47	1.51	1.81	2.24	2.50	2.56	2.73	2.86	3.09	3.11	3.15	1.57	2.51	3.05
5-Year Treasury (%)	1.94	1.81	1.81	2.06	2.48	2.68	2.73	2.86	2.96	3.12	3.15	3.22	1.91	2.68	3.11
7-Year Treasury (%)	2.25	2.07	2.06	2.25	2.64	2.79	2.84	2.97	3.06	3.22	3.25	3.30	2.16	2.81	3.21
10-Year Treasury (%)	2.44	2.26	2.24	2.37	2.72	2.91	2.96	3.09	3.19	3.35	3.37	3.40	2.33	2.92	3.33
30-Year Treasury (%)	3.05	2.90	2.82	2.82	3.00	3.22	3.28	3.43	3.55	3.73	3.76	3.80	2.89	3.23	3.71
Municipal Interest Rates*															
30-Year MMD (%)	3.08	2.86	2.75	2.71	2.84	3.03	3.07	3.19	3.29	3.43	3.44	3.46	2.85	3.04	3.40
Muni Yield Curve Slope (%)	2.21	2.02	1.93	1.58	1.47	1.38	1.22	1.24	1.19	1.13	1.14	1.06	1.93	1.33	1.13

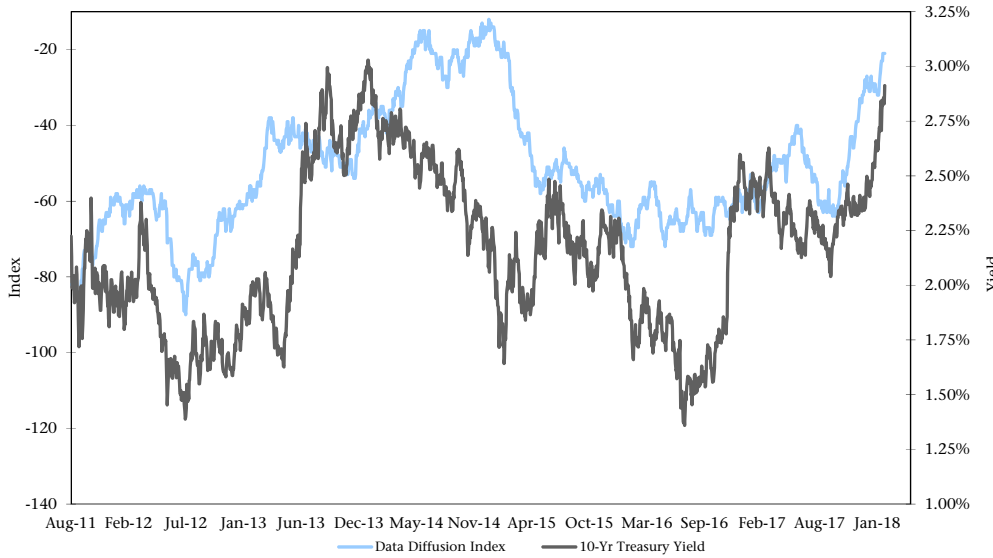
P: Preliminary Data

* 3-month average

Source: Loop Capital Markets' Analytical Services Division and Short-Term Desk. Black Text: Actual Blue Text: Forecast as of February 15, 2018

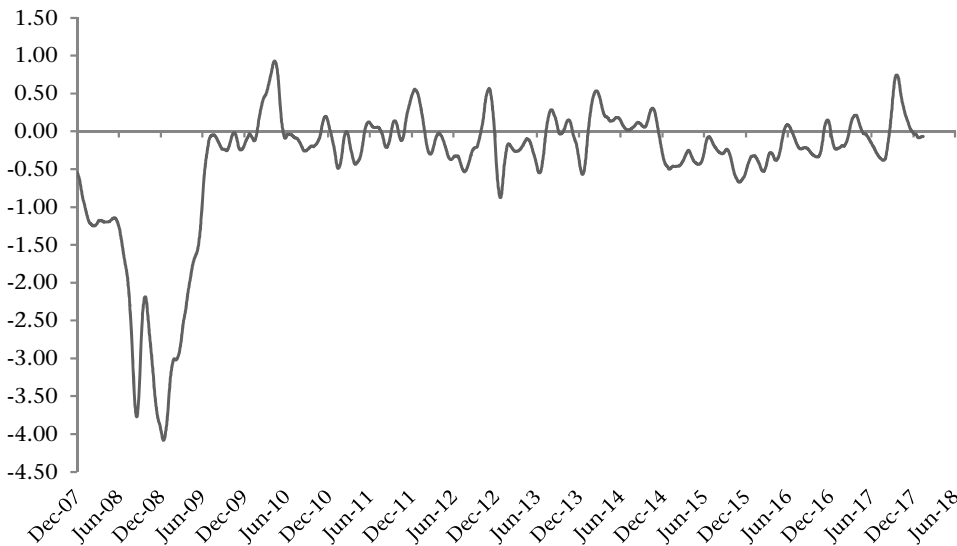
Market Review *Data Diffusion / ADS Index*

Figure 2 Data Diffusion Index vs. 10-Yr Treasury Yield



Source: FRED, Loop Capital Markets

Figure 3 Aruoba-Diebold-Scotti Business Conditions Index (12/31/2007—2/10/2018)



Source: Federal Reserve Bank of Philadelphia

As economic releases came in stronger than expected since the end of Q3'17, Treasury yields rose.

Data Diffusion Index: We calculate the Data Diffusion Index based on 30 different weekly, monthly and quarterly economic releases, such as construction spending, capacity utilization and new home sales. If the number came above the consensus estimate (which is positive for economic growth) the index would increase by one, and vice versa. The Treasury yield is expected to track the data diffusion index (the yields would increase as the economy exceeds expectations and vice versa).

The ADS index has been volatile lately. The decline from April through mid-August was followed by a sharp reversal in October. Since that time, the index has reverted to neutral. The comparison is relative to trend growth of about 2%, represented by the flat line.

Reading the ADS Index: The index is designed to track real business conditions at high frequency. Its underlying (seasonally adjusted) economic indicators (weekly initial jobless claims; monthly payroll employment, industrial production, personal income less transfer payments, manufacturing and trade sales; and quarterly real GDP) blend high and low-frequency information and stock and flow data.

Infrastructure Plan

By Ivan Gulich | Senior Vice President

Infrastructure Needs

The American Society of Civil Engineers estimates cumulative U.S. infrastructure needs from 2016 through 2025 at \$4.6 trillion.¹

Infrastructure Systems	Total Needs (\$ Billion)	Estimated Funding (\$ Billion)	Funding Gap (\$ Billion)
Surface Transportation	2,042.0	941.0	1,101.0
Water/Wastewater Infrastructure	150.0	45.0	105.0
Electricity	934.0	757.0	177.0
Airports	157.0	115.0	42.0
Inland Waterways & Marine Ports	37.0	22.0	15.0
Dams	45.0	5.6	39.4
Hazardous & Solid Waste	7.0	4.0	3.0
Levees	80.0	10.0	70.0
Public Parks & Recreation	114.4	12.1	102.3
Rail	154.1	124.7	29.4
Schools	870.0	490.0	380.0
TOTALS	4,590.0	2,526.0	2,064.0

The funding gap represents 45% of total infrastructure needs. Other metrics confirm that infrastructure has been chronically underfunded. For example, the ratio of infrastructure spending vs. depreciation declined from 2.0 in 2004 to 1.35 in 2016.²

Capital investment by state and local governments, as a percentage of GDP, peaked at 2.6% in Q2'09, due to injection of federal funds and Build America Bonds issuance in the wake of the Great Recession. Since that time the ratio has steadily declined to 1.6% in Q2'17.³ Deferred infrastructure maintenance puts additional pressure on state and local budgets already strained by the need to cover pension and OPEB liabilities.

Failure to adequately fund infrastructure is not limited to deferred maintenance of roadways and bridges, symbolized by the proverbial pot holes that motorists are keenly aware of. Flooding caused by storms and hurricanes is exacerbated by insufficient investment in seemingly invisible infrastructure that would have prevented the damage.⁴

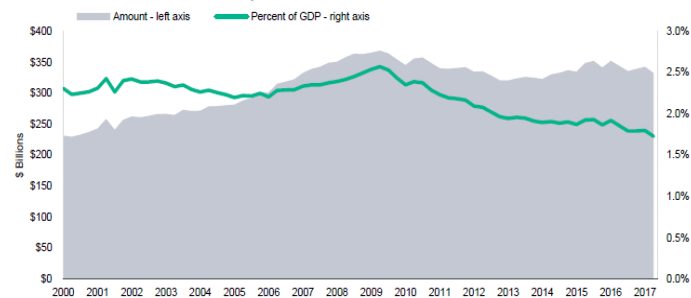
Trump's Infrastructure Plan

For these reasons a massive infrastructure financing plan was featured prominently in the presidential campaign. As a real estate developer, Trump favors investments in construction projects, especially architectural marvels that tend to capture people's imagination. Throughout his campaign, he lamented that the U.S. infrastructure was in poor shape and complained that arriving into LaGuardia felt like visiting a "third-world country" when compared to brand new airports in China.⁵

After signing tax reform into law, his first major legislative victory, the President has released an ambitious 10-year \$1.5 trillion infrastructure plan on February 12. The 55-page legislative framework states that U.S. infrastructure is "in an unacceptable state of disrepair, which damages our country's competitiveness and our citizens' quality of life". The infrastructure bill should stimulate at least \$1.5 trillion in new investment over the next 10 years, shorten permitting process to two years or less, meet rural infrastructure needs and empower state and local authorities. Trump's plan addresses not only traditional infrastructure, such as roads, bridges, and airports, but also drinking and wastewater systems and waterways, public lands, veterans' hospitals, and brownfield and Superfund sites.⁶

To avoid widening the federal deficit, which will inevitably balloon after bipartisan agreement to remove the spending caps and extend the debt ceiling recently cleared Congress, Trump's infrastructure plan relies on only \$200 billion in federal funding, with state and local governments and private investors covering the rest. The federal share has been included in the Administration's \$4.4 trillion FY'19 budget proposal that was released on the same day as the infrastructure plan.⁷

EXHIBIT 1
State and Local Government Capital Investment



Notes: Data are seasonally adjusted at annual rates and not adjusted for inflation.
Source: Bureau of Economic Analysis

¹ The American Society of Civil Engineers: 2017 Infrastructure Report Card

² Seymour: State and Local Government Delays in Capital Expenditures Push Costs into the Future, Moody's, October 5, 2017

³ Seymour: State and Local Government Delays in Capital Expenditures Push Costs into the Future, Moody's, October 5, 2017

⁴ Slavin: Infrastructure spending gaps may pose a greater risk than pension shortfalls, The Bond Buyers, February 14, 2018

⁵ Ferris: Trump compares US airports to 'third-world country', The Hill, September 26, 2016

⁶ The White House: Legislative Outline for Rebuilding Infrastructure in America, February 12, 2018

⁷ Sink: Trump's \$4.4 Trillion Budget Boosts Defense With More Red Ink, Bloomberg, February 12, 2018

The \$200 billion would be funded with cuts to programs seen as inefficient, such as TIGER grant programs and by raising the 18.4-cent-a-gallon federal tax by 25 cents per gallon, a proposal endorsed by Trump and backed by the U.S. Chamber of Commerce as well as some Democrats.⁸ The Administration proposes to cut funding for Amtrak, U.S. Army Corps of Engineers, rural water and wastewater programs and eliminate “Fast Starts” program for funding transit projects altogether, in order to offset the costs of the infrastructure program.⁹

Proposed allocation of federal dollars in Trump’s infrastructure plan:

Program	(\$ Billion)
Incentive for S&L Gov. (rebuilding projects)	100
Block grants for rural projects	50
Transformative projects	20
Expansion of TIFIA, WIFIA, RRIF	14
Support for tax-exempt PABs (public infrast.)	6
Capital Financing Fund (federal office buildings)	10
Total	200

Source: *The Bond Buyer*

The guidelines for selecting projects that are competing for federal funds reflect novel approach to allocating federal dollars. The most important factor in scoring projects, with 70% weighting, is their ability to secure sources of funding outside the federal government. An incentive grant cannot exceed 20% of project cost, while no state can receive more than 10% of program’s total funding amount.

Trump’s budget proposal would also authorize federal agencies to sell assets to state and local or private entities if a sale would optimize taxpayer value. The premise is that companies can complete projects faster and cheaper than governments due to their flexibility and innovation.

Transformative projects are those deemed commercially viable, but which would have difficulty attracting private investors because of unique technical challenges and risk characteristics.

The infrastructure plan would remove state volume caps and transportation volume caps for tax-exempt private activity bonds (PABs). The AMT would be removed for PABs, while the list of PAB eligible projects would be expanded.¹⁰

Legislative Outlook

Federal funding for infrastructure projects is generally popular among state and local government officials and Congressional

Democrats. John Hicks, executive director of NASBO, pointed out that “states won’t look down their nose at adding more money for infrastructure.”¹¹

Unlike tax reform legislation, which passed the U.S. Senate by simple majority along partisan lines, infrastructure legislation would require bipartisan effort to clear filibuster-proof 60-vote threshold.

Democrats have blasted Trump’s proposal for (1) providing insufficient funding, (2) pairing it with cuts to existing infrastructure-related federal programs and (3) benefitting private developers on the backs of taxpayers. They are calling for \$1 trillion in new federal funding for infrastructure, which is unrealistic. On the other hand, the states would have difficulty raising taxes to fund infrastructure projects because of the tax cuts at the federal level and effective elimination of SALT deduction.

Fiscally conservative House Republicans are opposed to deficit spending to fund state and local infrastructure projects. However, their clout has diminished since the election. Trump commands the support of the republican base, which allowed him to cut fiscally profligate deals with Democrats without paying political price. For example, recent bipartisan agreement to raise spending caps and debt ceiling, which includes massive increases to military and domestic programs, has completely eviscerated sequestration, a mechanism designed to constrain growth in budget deficits. When it comes to federal spending, it’s business as usual on Capitol Hill.

A bigger roadblock to reaching bipartisan agreement on infrastructure spending is political. In an election year, Democrats, who are hoping to make inroads in both chambers and perhaps regain Senate majority are reluctant to give the Administration another legislative win. Republicans will run on tax reform in November. Passing legislation to rebuild the nation’s infrastructure would make this session of Congress one of the most productive in recent memory, which would help Republican incumbents.

An infrastructure plan that includes Democrat priorities, such as spending on public transit and clean energy projects, could still conceivably pass Congress before the summer recess. The timing is compressed, since there are five to six committees with jurisdiction over infrastructure legislation in each chamber. We will continue to monitor infrastructure plan developments as the Administration’s outline is transformed into a legislative proposal and update our analysis.

⁸ Shepardson: Trump backs 25-cent-a-gallon gasoline tax hike, Reuters, February 14, 2018

⁹ Bliss: Let’s Stop Calling It a \$1.5 Trillion Infrastructure Plan, CityLab, February 13, 2018

¹⁰ Hume: PABs would get boost, but can Trump sell his infrastructure plan?, *The Bond Buyer*, February 12, 2018

¹¹ Cohen, Rappoport: Trump’s Infrastructure Plan Puts Burden on State and private Money, *The New York Times*, February 12, 2018

Positive Trends for Corporate Pensions Foreshadow a Positive Fiscal 2018 for Public Plans

By Rachel Barkley / Vice President

Milliman has released its February report on the largest 100 corporate pensions. The news was largely positive, with much of the cause for optimism transferrable to public pension plans as well. Corporate pension funded levels rose to 87.2%, up from 84.1% a month prior and 83.8% a year ago.¹² Comparatively, state pensions had a median funded ratio of 74% in fiscal 2016.¹³

The recent increase in funding for corporate plans was due to a combination of positive investment returns boosting assets, along with a reduction in liabilities. Investments returned 1.2% for the month of January, compared to a median monthly expected return of 0.52%. Over the last 12 months, plans returned a cumulative return of 11.88%.

Public pension plans are expected to realize comparable investment returns, which would lead to a boost in funded levels for fiscal 2018, all else equal. Corporate plans have returned 6.7% fiscal YTD through the first seven months of the year. If public plans realized the same returns, many would have matched or exceeded their annual return expectations already, with five months left in the year. However, Milliman does warn that February's market volatility may continue, which would impact public pensions as well as corporate and may temper fiscal year investment returns.

On the liability side, rising interest rates have increased the monthly discount rate for corporate pensions from 3.53% in December to 3.74% in January, reducing liabilities by 2.4% from the month prior. The corporate discount rate is set by a benchmark of corporate bond interest rates. Public plans that use a blended discount rate may see a somewhat smaller monthly liability reduction as the Citi Pension Liability Index discount rate rose from 3.6% in December to 3.78% in January.

Milliman projects corporate discount rates to range from a pessimistic forecast of 3.19% to an optimistic forecast of 4.29% for 2018.

The combined effect of investment returns exceeding assumptions and an increase in the discount rate can be seen for public plans in Minnesota's State Employees Retirement Fund, which increased its funded ratio from 47.5% in 2016 to 62.7% for 2017. The discount rate was increased from 4.17% for the 2016 valuation to 5.42%. Investments returned 15.23% for the year, above the 7.5% assumed rate of return.

Going forward, Milliman's baseline forecast expects corporate plans to reach an aggregate funded ratio of 89.7% by the end of 2018, rising to 92.9% in 2019. In an optimistic scenario, rising interest rates and continued stock market gains could push corporate funded levels to being fully funded during 2019.

Overall, Loop expects pension funded ratios to rise in 2018 for both corporate and public pension plans. Corporate plans will remain more highly funded than public plans, with the variance between the two sectors possibly increasing due to fewer public plans benefitting from rising discount rate assumptions. Additionally, corporate plans may get a boost in funding from companies that benefit from the recent federal tax reform. The impact of the recent tax reform on states is less clear cut, with some projected to realize an increase in revenues, which may help pension contributions, while other may see pensions pressured further due to competing needs. Governance issues for public plans also play out more publically, and may be influenced in coming months by the November election cycle in certain areas.

Milliman Corporate Pension Funding Index-Pension Funded Ratio



¹² Milliman analysis: Corporate pensions' \$61 billion funding gain in January may cushion early February market slide. Milliman. February 2018.

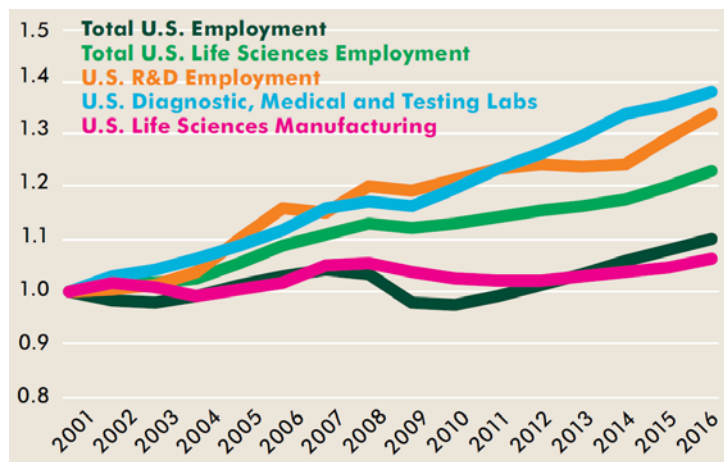
¹³ Loop Capital.

Life Sciences Bring Jobs and Construction Growth, But Only to Certain Areas

By Rachel Barkley / Vice President

Employment in life sciences, generally defined as the pharmaceuticals, biotechnology and medical device sectors, has expanded rapidly in recent years. From 2006 to 2016, industry employment increased 13.5% nationally, almost twice the 6.9% total U.S. employment increase.¹⁴ The growth in biotechnology is particularly notable in recent years, increasing 26% from the end of 2013 to 2016.

Employment Growth by Sector



Sources: U.S. BLS, CBRE Research

A combination of technological advances, demographic trends and widespread health problems continue to propel the industry forward. At the same time, funding has also increased from a combination of federal funding from the National Institutes of Health (NIH) and venture capital providers.

However, growth in the field is highly concentrated in a handful of metro areas, particularly the San Francisco-San Jose Bay Area, Boston, Chicago and San Diego. A combination of talent, laboratory space and capital has led to the formation of industry clusters in these areas.¹⁵ Growth in this sector not only reflects positively on the local job market, but it also aids construction activity and property values, as we see here. We also note that being a historical center of the industry is not necessarily enough to sustain the location's status, as we see in New Jersey.

San Francisco-San Jose Bay Area

The San Francisco-San Jose Bay Area remains the leader in terms of total life science employment as well as life science research and development (R&D) employment. It benefits from currently having the largest number of life science companies in the nation and the presence of major research universities, including the University of California, Berkeley, the University of California, San Francisco and Stanford University.

Industry employment has increased by 54.4% in the last ten years, making it the second fastest growing area in the nation. Over the past fifteen years, roughly three quarters of industry growth has been from R&D employment.

The core submarkets have a total vacancy rate of 3.6%, with area vacancies ranging from 0% in the South Peninsula, near Stanford University, to a high of 11% in Fremont. Notable ongoing construction is concentrated in South San Francisco, which is expected to see three new developments before the end of 2019 for a total of more than a million square feet. The largest area development, with a 2018 expected delivery, will be in Foster City, as a built-to-suit 500,000 square foot property for Illumina.

The area's \$1.4B in funding from the NIH was the third largest in the country for 2016 and represents a 28.6% increase YoY, well over the national 7.9% increase. Its proximity to Silicon Valley aids funding opportunities. California, as a whole, and Massachusetts, have received by far the largest distributions of venture capital funding in recent years, including 82% in Q2 2017.¹⁶ A number of area companies have also gone public to raise funds, with a total of 14 companies in the area issuing IPOs in Q2 2017, more than double the number of IPOs in previous quarters.

Boston

Boston currently serves as the East Coast center for life sciences, having increased its industry employment 49% between 2001 and 2016, more than twice the U.S. average. It places second nationally, behind only the Bay Area, in terms of industry R&D jobs, with an employee base aided by the area universities. JLL ranked it first nationally in terms of competitive landscape, based on its industry concentration, venture capital funding, lab supply and other

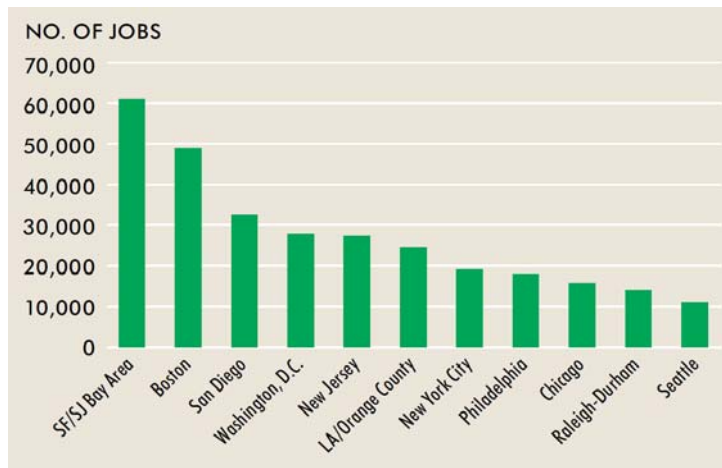
¹⁴ U.S. Life Sciences: The Boom Amid Disruption. CBRE, 2017.

¹⁵ Humphrey, Roger. Trade & Industry Development. March 1, 2017.

¹⁶ CBRE

factors.¹⁷ Currently, 18 of the largest 20 pharmaceutical companies have a facility in Massachusetts.

Lifescience R&D Jobs by Metro Area, Q2 2017



Sources: U.S. BLS, CBRE Research

The sector continues to grow, with the metro receiving the highest level of funding of any area in 2016.¹⁸ It received \$2.2B in funding from the National Institutes of Health (NIH) in 2016, along with \$3B in the last year (Q2 2016-2017) in venture capital funding.

This contributes to a growing commercial real estate field, with low vacancy rates for the sector. The City of Boston’s industry vacancy rate is an incredibly low 1%, while nearby Cambridge, which houses a significant amount of the sector, has a 4.5% vacancy rate despite the completion of recent projects that added rentable space. Asking industry rent space has increased by more than 50% in three years in Cambridge. Several companies signed notable leases in 2017, including Blueprint Medicines and Sage Therapeutics which are expanding their footprint in the area.¹⁹

An additional 431,500 square feet complex in Cambridge, which was 100% pre-leased, was delivered in Q4 of 2017, while a 380,000 square foot complex in Cambridge is currently scheduled for delivery in 2019. High rents and low vacancy rates have expanded construction in recent years to neighborhoods, including the Seaport District in Boston, as well as nearby suburbs.

Chicago

Chicago benefits from being a historical pharmaceutical center, which has aided its transition to being a leader in the overarching life sciences market. As seen in the other industry centers, it is aided

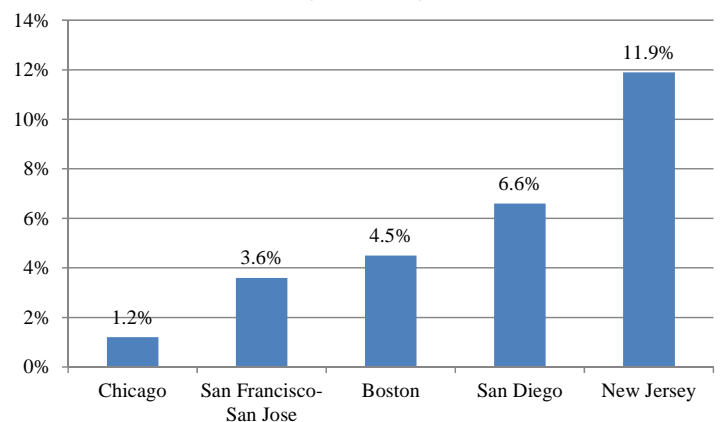
by the presence of substantive research universities, namely Northwestern University and the University of Chicago. Additionally, it is home to the Argonne National Laboratory science and research center, along with the U.S. Department of Energy’s Fermilab. It currently has the fifth largest number of life sciences jobs nationally. Industry employment growth has ramped up since 2013, although it still slightly trails the U.S. average.

Each of Chicago’s medical schools has expanded their research efforts over the past five years, including expanding their physical footprint. Northwestern is in the middle of building a 600,000 square foot building adjacent to its current medical school, with an additional 400,000 square foot second phase to come. Once both projects are complete, it will be the largest university medical research building in the nation.

Venture capital funding has increased, with total Illinois funding over the past two years of available data (2015-2016) equal to that of the prior eight years.

The area’s vacancy level is 1.2%, the lowest among the major metro areas. Ongoing construction includes the 668,000 square foot Illinois Science and Technology Park in the north suburbs. Additionally, the first of three 100,000 square foot buildings at the Rosalind Franklin Science and Innovation Research Center is under development. The current tower will be occupied by a combination of the Rosalind Franklin University and private companies.

Industry Vacancy Rates



Source: CBRE

San Diego

Industry employment increased 52% from 2001 to 2016, the fastest growth rate among major hubs. It is now the sixth largest center for life sciences jobs and third largest for life sciences R&D.

The University of California, San Diego (UCSD) is the area’s major research university, while multiple research centers are also located in the vicinity, including the Sanford Burnham Prebys Medical

¹⁷ An evolving industry: Today’s clusters creating tomorrow’s breakthroughs. JLL Research 2017.

¹⁸ CBRE.

¹⁹ CBRE

Discovery Institute, Scripps Research Institute, Salk Institute, Sanford Consortium and the J. Craig Venter Institute. Among NIH funding for the region in 2016, 45% went to research institutes while 55% went to universities.

Recent venture capital funding, totaling \$493MM in Q2 2017, has been concentrated in oncology, genomics and metabolic disorders.²⁰ NIH funding has been relatively flat, increasing 1.5% over the past ten years.

Construction and remodeling activity has included space conversions by Eli Lilly and Genesis, which indicate they plan to remain in the area for the foreseeable future. Calibr, Synthetic Genomics, COI Pharmaceuticals and Astellas Pharma have all signed leases in the past year²¹, which also indicate the area is positioned to remain a key player in the industry going forward.

Two major construction projects are ongoing, a 170,000 square foot built-to-suit complex in Torrey Pines for Vertex and a 110,000 square foot property that is 66% pre-leased to UCSD. Additionally, HCP has purchased a property that it plans to convert to lab space.²²

Vacancy rates for the area range from 2.7% in Torrey Pines, which is home to the largest concentration of lab space in the area, to 11.1% in University Towne Center. As a whole, the metro region has a 6.6% vacancy rate.²³

New Jersey

New Jersey has been a home to numerous life science companies for the better part of a century and is now home to the fourth largest industry cluster in the nation. It serves as the headquarters for Merck, Pfizer, Bristol-Myers Squibb and Allergan, among others. Its proximity to a considerable portion of the nation's population, including New York City and Philadelphia, continue to serve as logistical advantages. Numerous state-level economic incentives have also bolstered the State's presence in the industry.

However, life sciences employment for 2016 was down from 2001 levels, as some members of the industry have moved to higher growth areas, such as the Bay Area or Boston. Industry employment leveled off after the last recession and has now resumed an upward climb, with 10% employment growth from 2013 to 2016.

Recent funding lags its competitors. For 2016, NIH funding was \$240MM, the 23rd largest among metro area. Venture capital

funding for Q2 2017 totaled \$153MM, the lowest level amongst the five major areas. There is no current notable industry construction ongoing, which also indicates the lack of growth in the area.

The industry's vacancy rate stands at 11.9%, by far the highest among the five metro areas. This has been negatively affected by merger and acquisition (M&A) activity in the sector.

New York State has also made a push to attract the industry, which may further lure New Jersey companies. In 2016, Governor Cuomo announced a \$650MM initiative to spur growth in the industry, including tax incentives, capital grants and operating support.²⁴

Final Thoughts

Going forward, the expansion of life sciences is expected to continue, partially aided in 2018 by tax savings from the Tax Cuts and Jobs Act of 2017. Additionally, the FDA reportedly plans to update regulations to accelerate industry R&D, which may spur further expansion.²⁵

High rents and low vacancy levels may begin to push firms farther away from the metro centers or motivate them to seek out other areas. Additional metro areas are also trying to expand their industry footprint, either through new companies or by luring relocations. In addition to New York, Houston, which is home to the Texas Medical Center, is working to develop a 30-acre \$2B commercial campus in the heart of the city.²⁶ Meanwhile, Austin, Texas and the State of Washington are among other areas courting the industry.^{27,28}

Over the long-term, proximity to universities and research institutions is expected to remain a key component to remaining competitive in the sector, due to the ensuing talent pools and collaborations between the private and public sectors. Those areas that manage to gain and retain traction in the industry will be well-positioned to continue to grow in future years.

²⁰ CBRE

²¹ CBRE.

²² CBRE.

²³ CBRE

²⁴ Governor Cuomo Announces Groundbreaking \$650 Million Initiative to Fuel Growth of a World-Class Life Science Cluster in New York. New York State. December 12, 2016.

²⁵ 2018 Life Sciences Outlook. Deloitte. February 2, 2018.

²⁶ Humphrey, Roger. Trade & Industry Development. March 1, 2017.

²⁷ Austin Chamber of Commerce

²⁸ State of Washington Department of Economic Development

Will Cap-and-Trade Programs Fire Back Up?

By Rachel Barkley | Vice President

Environmental concerns are gaining traction among state governments, with more than 30% of states listing environmental protection as a goal in 2018²⁹. The Trump administration has made clear that climate control is far from a priority. States that want to continue or enhance climate control efforts will need to take the lead, which may take the form of cap-and-trade programs. This is especially notable as states struggle to fund infrastructure needs, which can often be partially funded through cap-and-trade revenues.

Here is a look at two successful cap-and-trade programs as well as a look at new initiatives that may be put into place.

California

California has been a leader for this, with its program launched in 2013. At the time, the cap-and-trade regulations applied only to electric power plants and industrial plants. Beginning in 2015, fuel distributors were added. Sources that emit at least 25,000 metric tons of carbon dioxide annually are subject to regulation. This includes electricity importers. In total, 450 businesses are required to comply, with enforcement by the California Air Resources Board (CARB).³⁰

Emission allocations are based on a combination output and sector-specific benchmarks. Electric utilities, natural gas utilities and industrial facilities are able to receive free allocations which decline over time. Additional allocations must be purchased or traded. The overall emission cap is set to decline 3% through 2020 and then at a faster, but yet to be determined rate, through 2030.

Investor-owned utilities are obligated to consign their free allowance for sale at auction, with all proceeds used for the benefit of ratepayers. Auctions are held quarterly. Price minimums began at \$10 and increase annually at inflation plus 5%. Maximum prices began at \$40 and increase annually at the same rate as the minimum. A hard ceiling is scheduled to be set in 2021.

Beginning in 2021, at least half the offsets for compliance must come from projects that directly benefit the state. The program is currently authorized through 2030.

The state has generated \$6.5B in revenues through this program since inception, in addition to revenues flowing to investor and publicly owned utilities.

The state's portion of proceeds is deposited in the Greenhouse Gas Reduction Fund (GGRF). Disbursement of revenues from the GGRF is determined by two 2012 laws. AB 1532 requires revenues to be spent for environmental purposes, especially improving air quality. SB 535 requires that at least a quarter of revenues are spent on disadvantaged communities. In 2017, Governor Brown clarified priorities for auction revenue through AB 398, with reducing air toxic and criteria air pollutants, promoting low and zero-carbon transportation, sustainable agriculture, healthy forests and urban greening, reducing short-lived climate pollutants, promoting climate adaptation and supporting climate and clean energy research being the top priorities.

Cap-and-Trade Auction Proceeds in \$MMs

Auction Quarter or FY	State of California	Investor Owned Utilities	Publicly Owned Utilities
2013	\$257.3	\$37.1	\$502.1
2014	477.1	64.1	601.5
2015	1,490.8	105.5	867.9
2016	1,829.1	140	761.7
2017	891.9	266.9	1,152
2017Q3	642.1	22	271.1
2017Q4	862.8	20	275.6
Total	\$6,451.2	\$655.7	\$4,431.9

Cumulatively through fiscal 2017, the GGRF has appropriated \$3.4B, including \$1.1B in fiscal 2017.³¹ Nearly \$900MM of funds implemented through fiscal 2016, not including high speed rail, have generated more than \$4.5B in investments from other sources.³² Approximately \$2.7B has been appropriated to transportation and sustainable community projects across five agencies.

Regional Greenhouse Gas Initiative

In 2009, ten states formed the Regional Greenhouse Gas Initiative (RGGI): Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Rhode Island and Vermont. Seven participating states had Republican governors when the RGGI was

²⁹ State of the State addresses

³⁰ California Cap and Trade. Center for Climate and Energy Solutions

³¹ California Climate Investments. Annual Report. 2017.

³² California Climate Investments. Annual Report. 2017.

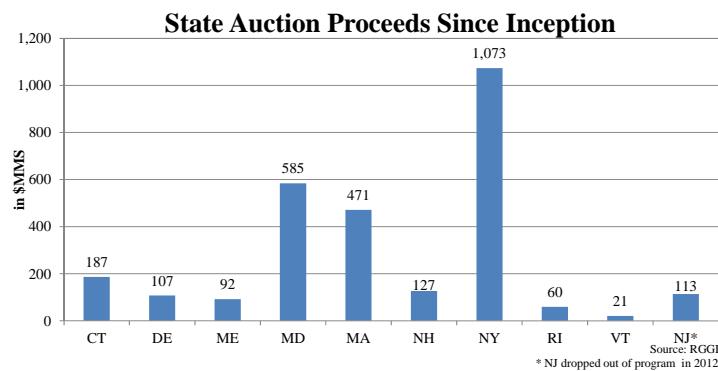
formed, demonstrating that this can be a bipartisan issue. New Jersey opted out of the program in 2012.

The program is designed to reduce greenhouse gas emissions in the power sector. Fossil-fueled electric power facilities in member states with a capacity of 25 megawatts or greater are required to hold allowances equal to their emission levels over a three year period. Each allowance represents the authorization to emit one short ton of CO₂.

However, the original cap was not sufficient to compel entities to reduce emissions or purchase allowances due to the emissions cap being too high.³³ The group amended the cap, adopting a 91 million short ton limit on carbon dioxide emissions for 2014, which has been successful in achieving emission reductions. This cap declines 2.5% annually through 2020. The 2017 rate was set at 84.3 million, following this method.

Each state operates its own trading programs. For the most recent auction, there were 35 bidders with a bid to initial supply ratio of 2.2. A total of \$55.8MM was raised, bringing the calendar 2017 total to \$198.4MM. In addition, the states have a Cost Containment Reserve (CCR), consisting of allowances in excess of the cap. The CCR is set at 10% of the regional cap annually and is refilled as necessary at the beginning of the calendar year. These are made available for sale if allowance prices exceed a predetermined level. This predetermined level increases 2.5% annually through 2020. It will then be set at \$13 in 2021, increasing 7% annually thereafter.

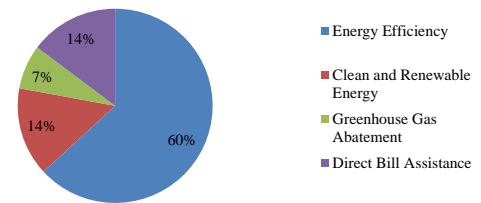
Since inception, the states have generated \$2.8B in revenues, with New York accounting for \$1.1B, as shown in the accompanying graph.



Through 2015, the RGGI estimates it avoided 5.3 million of CO₂ emissions and resulted in \$2.3B in energy bill savings. States have discretion as to how they spend their proceeds, although similar trends appear between the states. As of Dec. 2015, 77% of proceeds had been issued for investment projects, while 14% was committed

for future funding. Energy efficiency projects are the most common recipient of investment proceedings. New Jersey's proceeds remain intact at \$113.3MM, representing 5% of the total. States have also used RGGI proceeds to fund general operations, with \$93.1MM having been transferred to state general funds. The majority of this was by New York, which transferred \$90MM in 2009 to reduce its budget gap. New Hampshire used \$3.1MM in 2010 for similar purposes.

RGGI Investment Project Categories Since Inception



Source: RGGI

New Cap-and-Trade Initiatives

Several governments have indicated they plan to follow California and the RGGI's leadership this year. Virginia wants to join RGGI, while New Jersey, which previously left the RGGI under then-Governor Christie, has announced it will rejoin the group.

Oregon is planning to consider legislation to create its own program. Much like California, the policy would be applied to facilities emitting more than 25,000 metric tons of carbon dioxide annually. Approximately 100 entities are expected to fall under the threshold for regulation.³⁴ However, it should be noted that the State has considered similar proposals periodically over the last decade, which have yet to be passed. Bipartisan support for cap-and-trade programs nationally has ebbed and flowed. Hawaii's Governor Ige has also noted his intent to create a similar program.

Arguments Against Cap-and-Trade Programs

Critics of such programs point out that cap-and-trade increases energy prices. Duke Energy, one of the nation's largest power companies, petitioned to increase rates 13.5% when the U.S. House of Representatives was considering instituting a national cap-and-trade program (H.R. 2454, Waxman-Markey Cap and Trade Bill). Duke indicated the potential cap on emissions was a driver for the proposed increase.³⁵ Additionally, research has indicated that consumers in cap-and-trade programs may be subject to more volatile prices due to dynamic pricing.³⁶

³⁴ Understanding Oregon's 'cap and invest' climate bills. Oregon Live. January 13, 2018.

³⁵ "Cap and Trade" Scheme Increasing Electricity Rates. U.S. House of Representatives Committee on Ways and Means. March 21, 2015.

³⁶ Parmesano, Hethie and Theodore J. Kury. Implications for Carbon Cap-and-Trade for Electricity Rate Design, with Examples from Florida. Public Utility Research Center. University of Florida. 2010.

³³ The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Congress. Congressional Research Service. May, 16, 2017.

There is also a debate on the impact of cap-and-trade and similar initiatives on the economy. The National Bureau of Economic Research found that NOx Budget Trading Program, a regional cap-and-trade program that ran from 2003 to 2008, reduced manufacturing jobs in member states by 1.3%.³⁷ However, a study by Duke University and the University of Ottawa on British Columbia's cap-and-trade program found no negative impact on the area's economy, while the program reduced emissions by between 5% and 15%.³⁸

Lessons Learned

A few lessons have emerged from programs implemented in the U.S. as well as in other countries, that should be noted as cap-and-trade prepares to make a resurgence. The programs need to be well managed to work. Cap-and-trade programs set the desired level of emission reductions and allow the market to determine the price necessary to achieve the effect. However, prices can fluctuate greatly. Prices for allowance trading in California on the secondary market were below the auction rate floor in some years before auctions, indicating pricing needed to be adjusted, while an increase beginning in November has generated increased auction demand.³⁹ In the European Union, an oversupply of emissions allowances, drove the carbon price to zero Euros in 2007.⁴⁰ Cap levels also need to be carefully calibrated to achieve the desired effect. As discussed above, original cap levels for the RGGI were not low enough to spur emissions reductions. While increased costs may be justified for environmental protection, cap-and-trade programs are likely to lose support if emission goals are not met.

In designing a plan that effectively reduces emissions, size matters. Small programs on the state level may not make much of an impact on a national level if large states with high emissions continue to operate as usual.⁴¹ For instance, efforts in Massachusetts won't be sufficient to offset the impact of Texas. Additionally, emitters can often leave the state as opposed to paying to comply, although revenues in California and RGGI states show that many do stay. Due to the need for scale in these programs, a federal program is generally the most effective. Given the fact that the Trump administration is not receptive to such efforts, a large regional program, such as the RGGI, would be the most effective, followed by large state programs as seen in California.

³⁷ Curtis, E. Mark. Who Loses Under Power Plant Cap-and-Trade Programs. National Bureau of Economic Research. December 2014.

³⁸ Murray, Brian C. and Nicholas Rivers. British Columbia's Revenue-Neutral Carbon Tax: A Review of the Latest "Grand Experiment" In Environmental Policy. The Nicholas Institute for Environmental Policy. Duke University. October 2015.

³⁹ Carbon Prices Rise In California's Cap-And-Trade Program As Legal Certainty Grows. Forbes. February 8, 2017.

⁴⁰ Building a low-carbon economy – the UK's contribution to tackling climate change. Committee on Climate Change. December 2007.

⁴¹ Schmalensee, Richard and Robert N. Stavins. Lessons Learned from Three Decades of Experience with Cap-and-Trade. Massachusetts Institute of Technology and Resources for the Future. November 2015.

Other Alternatives

A carbon tax is another way to reduce CO2 emissions. Under a carbon tax, a set price is added onto carbon emissions with no set emission limits imposed by the government, making the outcome of emission reductions less clear than under a cap-and-trade program. Also, while abatement costs may change over time, changes to the tax rate are often difficult. Like cap-and-trade, it results in the government collecting revenue that can be used for other needs. Administration of a carbon tax is much easier than a cap-and-trade program as there is no allowance allocation or auctions to oversee.

Washington's Governor Inslee has proposed a carbon tax in his State of the State address for 2018. Several businesses in the area are supportive of the idea, including Microsoft and Puget Sound Energy.⁴²

Credit Impact

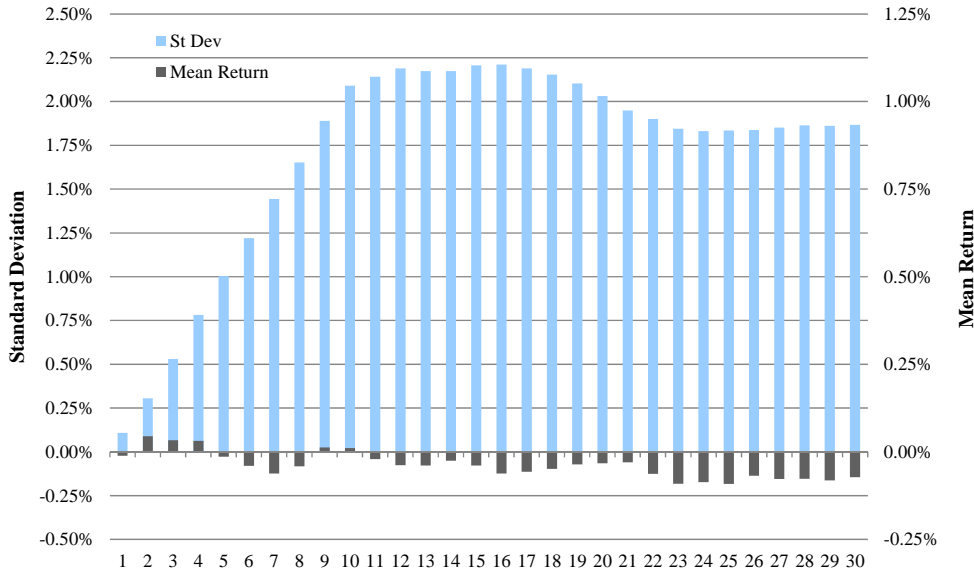
The majority of the states considering such programs would likely not see any negative measurable credit movement from adopting a cap-and-trade program or carbon tax, although this will also likely depend on how successful the programs are and the economic make-up of each state.

The breadth of the economy, as in New York and California, among other states that have implemented cap-and-trade programs, can provide a buffer against potential negative economic impacts. States that promote clean energy jobs may also be able to at least partially offset any jobs lost due to a switch to clean energy sources. States that use resulting revenues for infrastructure projects may see a boost as they are able to address needs without using other revenues or issuing additional debt.

⁴² Washington State of the State Address. January 9, 2018.

Market Review *Historical Monthly Bond Price Changes*

Figure 4 Muni Benchmark Callable Scale — Average Bond Price Changes (February)



Sources: Loop Capital Markets

Figure 5 Muni Benchmark Callable Scale — Average Bond Price Changes (February)

AAA MMD - MONTHLY PRICE CHANGE

Maturity	5	10	15	20	25	30
Feb-01	-0.09%	0.00%	-0.15%	-0.08%	0.08%	0.15%
Feb-02	1.02%	1.57%	1.32%	0.85%	0.69%	0.62%
Feb-03	0.90%	2.34%	1.91%	1.26%	1.18%	1.18%
Feb-04	1.03%	1.86%	1.76%	1.51%	1.27%	1.26%
Feb-05	-0.89%	-1.35%	-1.10%	-1.02%	-0.63%	-0.63%
Feb-06	-0.18%	0.24%	0.56%	0.87%	1.19%	1.19%
Feb-07	0.62%	1.52%	1.68%	1.68%	1.68%	1.60%
Feb-08	-2.59%	-5.87%	-6.77%	-6.23%	-5.78%	-5.92%
Feb-09	-1.64%	-1.28%	0.87%	1.34%	1.10%	1.26%
Feb-10	0.72%	1.22%	0.88%	0.16%	0.32%	0.55%
Feb-11	0.40%	2.77%	2.32%	2.39%	0.71%	0.71%
Feb-12	0.14%	-1.38%	-1.29%	-0.72%	-0.80%	-0.72%
Feb-13	0.09%	0.08%	-0.41%	-0.24%	-0.32%	-0.40%
Feb-14	0.45%	1.06%	1.05%	1.04%	0.96%	1.04%
Feb-15	-1.12%	-2.43%	-2.96%	-2.88%	-2.95%	-2.95%
Feb-16	0.32%	-0.41%	-0.65%	-0.73%	-0.48%	-0.40%
Feb-17	0.59%	0.24%	0.32%	0.24%	0.24%	0.24%
Mean	-0.01%	0.01%	-0.04%	-0.03%	-0.09%	-0.07%
St Dev	1.00%	2.09%	2.21%	2.03%	1.83%	1.87%

Source: Loop Capital Markets

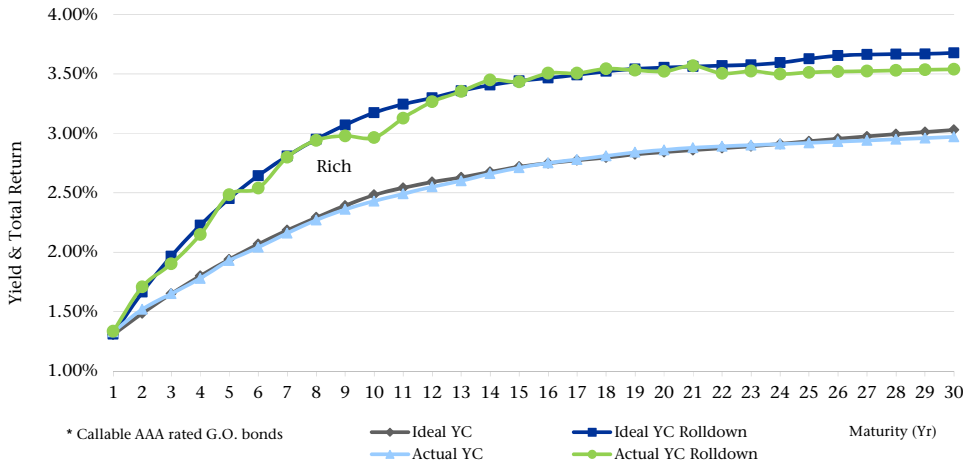
We show historical bond price changes for each point on the muni benchmark callable curve during the month of February for the last 17 years.

The returns were positive two-thirds of the time, but the averages were skewed by large losses in 2008 due to Bear Stearns crisis. The average return over a 17-yr period across all maturities is -0.04%.

The 10 to 20-yr range was most volatile, with average standard deviation of monthly bond price changes of 2.15%.

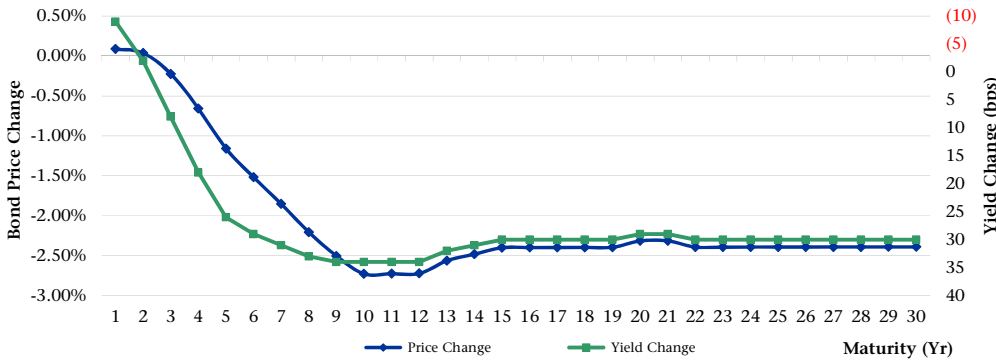
Market Review *The Yield Curve*

Figure 6 1-Year Forward Roll-down—Muni Benchmark Curve* (February 12, 2018)



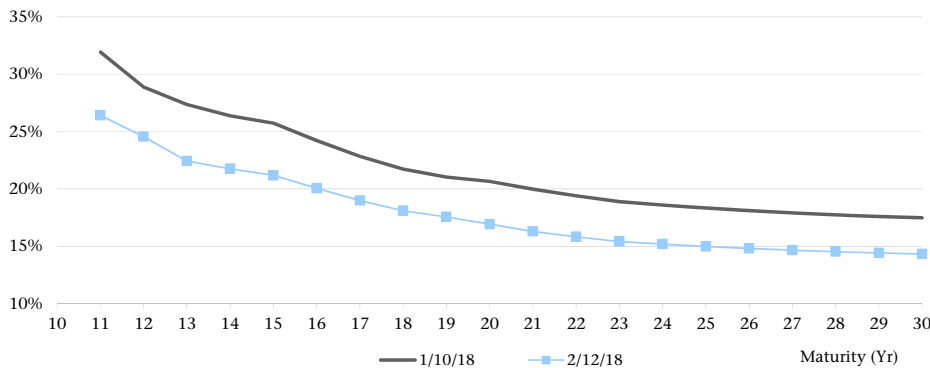
Source: Loop Capital Markets | *Callable AAA-rated G.O. bonds

Figure 7 Monthly Price Change — AAA GO Bonds* (1/19/18 — 2/20/18)



Source: Loop Capital Markets | *Price Change Only

Figure 8 Implied Municipal Volatilities



Source: Loop Capital Markets | *10-year call

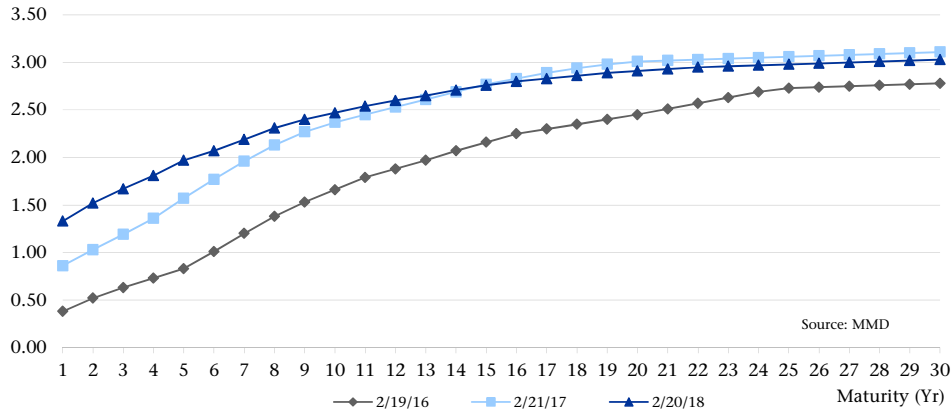
The chart shows rich points on the MMD curve (6-yr, 9 to 11-yr, 22+ yr), based on one year holding period returns and assuming no change in the yield curve a year from now. Maturities that were cheap 3 weeks ago (13 to 19-yr) have since reverted to neutral.

Actual returns will depend on the level and shape of the yield curve a year from now.

Yields rose 31 bps, on average, in the 8 to 30 year range of the yield curve over the last 4 weeks, causing bond prices to drop.

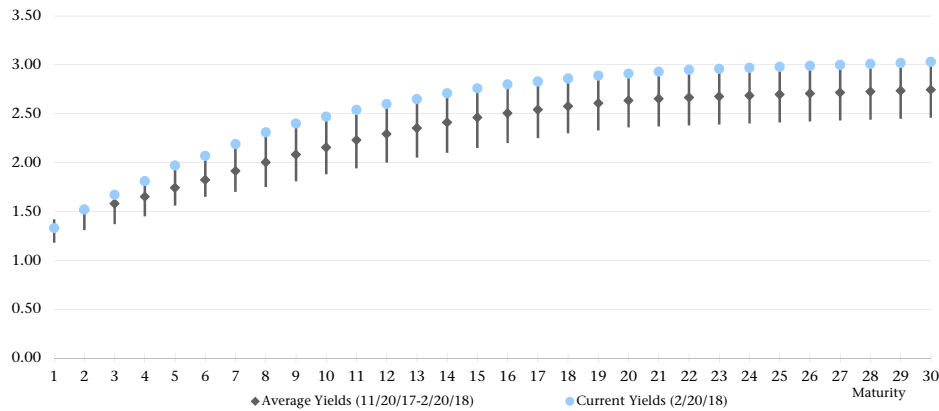
Implied volatilities declined last month as yields rose across the curve. Since non-callable bonds depreciate faster in rising interest rate environment than their callable counterparts, the price differential between the two, and the respective implied volatilities, declined as a result.

Figure 9 Current vs. Historical Municipal Yield Curves (%)



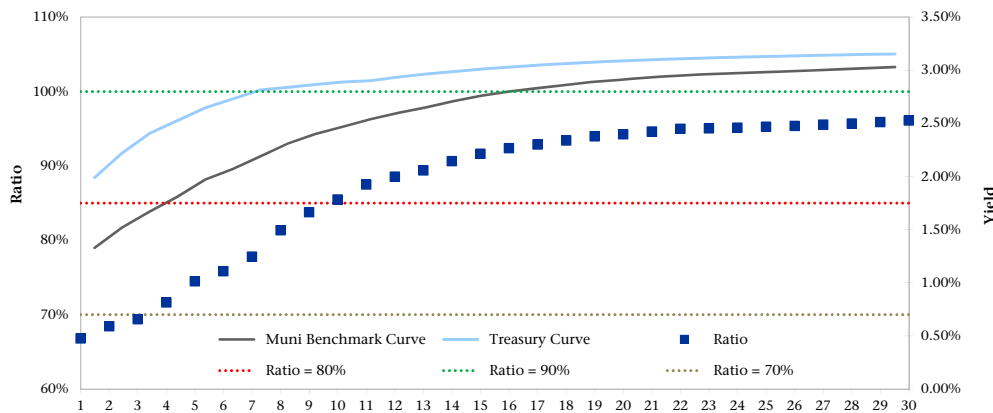
In the course of the Fed's tightening cycle, the yield curve has flattened compared to the curve from one and two years ago. Yields are about 8 bps lower on the long end today than they were in February 2017.

Figure 10 3-Month Average Benchmark Muni Curve Yield



The yields are at their highest points in 3 months in the 3 to 30-yr range of the curve.

Figure 11 Muni and Treasury Yield Curves and Ratios



The ratio curve has finally returned to its familiar upward sloping shape.

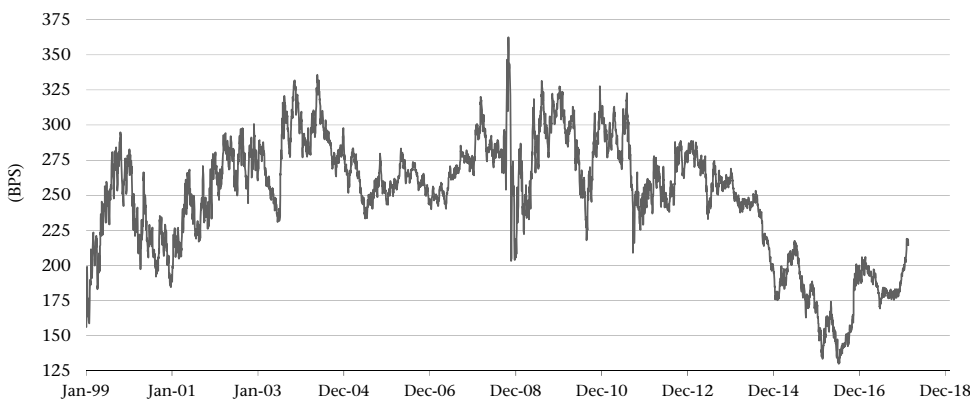
Market Conditions

Figure 12 2 to 30-Yr Muni Spread (bps)



The curve has steepened 53 bps since the beginning of January. Currently the 2 to 30-yr spread is 151 bps.

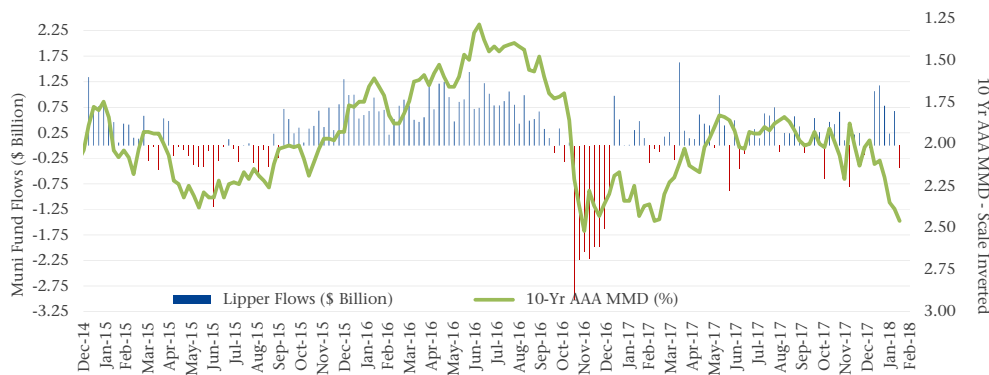
Figure 13 Inflation Expectations



Fed's five-year forward breakeven inflation rate, derived from TIPS and regular Treasury yields, continued to rise in 2018 and is currently 2.15%.

Source: FRED

Figure 14 Lipper Weekly Municipal Mutual Fund Flows (\$ Billion)



Muni bond funds have experienced an outflow last week after 5 consecutive weeks of strong inflows.

Source: Lipper

Loop Capital Markets Upcoming Negotiated Calendar

Date	Par Amount (\$ mil)	Issue	Loop Capital's Role
2/22/18	892.2	The City of New York General Obligation Bonds	Co-Senior Manager
2/22/18	164.5	Illinois Fin. Authority, The University of Chicago Rev. Bonds (Taxable, Tax-Exempt)	Co-Senior Manager
2/27/18	64.8	City of Syracuse IDA School Facility Revenue Bonds (Syracuse City SD Project)	Co-Manager
Week of Feb 26	105.0	State of New York Mortgage Agency Homeowner Mortg. Rev. Bonds (AMT, non-AMT)	Co-Manager



"I think we are in agreement. I want my Siri to get together with your Siri to work out the details."

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