J.P.Morgan

North America Fixed Income Strategy
15 November 2019

Municipal Markets Weekly

TARGET: Tax loss swap, Spread opportunities on curve, 50 State recession preparedness metrics

US Fixed Income Strategy

Peter DeGroot AC
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

J.P. Morgan Securities LLC

- UST yields fell by 5-9-10-12bps this week in reaction to net better news on the US-China trade front and disappointing economic data. Municipals lagged the rally in the UST market, by 3-7bps, against elevated gross supply of $12.4bn, comprised of $10.4bn (146% of 5yr avg.) tax-exempts and $2.0bn (5x 5yr avg.) taxable securities
- Next week's projected issuance is projected to be $12.5bn. Total tax-exempt issuance ($9.7bn) and taxable issuance ($2.7bn) are expected to be 126% and 5x the five-year average for the equivalent week, respectively
- Lipper reported combined weekly and monthly inflows of $3.2bn for the period ending November 13th, marking the 45th consecutive week of inflows. YTD inflows moved higher to $79.8bn, reaching the highest inflow year on record, eclipsing the previous record of $78.6bn (2009). YTD flows into high-yield ($16.7bn), Intermediate ($23.7bn), Long-term ($50.7bn), and California ($7.6bn) muni funds continued with new records for the period
- In a year where tax gains may be problematic, look for summer purchases to provide offsets and add some trading flexibility
- Swap 20yr NYS Environmentals purchased in early Sept., for similar structure NYC Transitional Finance Authority Future Tax bonds (at the eval), for a net 56bps increase in book yield and a $0.78 short-term loss
- Among the various spread alternatives available in the market, we prefer credit spreads inside of 10yrs vs longer dated credit exposure. We also would recommend AMT bonds through 2025, 3% coupon bonds 10yrs and shorter, as well as 4% bonds across the curve
- In terms of direct comparisons, the yield on 10yr 3's is now just 2bps lower than 20yr 5's, versus a three year average spread of 25bps. Further, AA-rated 10yr 3's are now 20bps wider than A-rated 10yr 5's
- Investors, issuers, and other stakeholders are increasingly concerned with the risk of recession as we move through the 10th year of economic expansion, pared with a slowing US economy, manufacturing weakness, and waning business activity
- A review of state demographics uncovers that, while 41 states recorded population increases in 2017/2018, we find that 28 states incurred losses based on domestic migration alone (ex-natural births/deaths, international immigration). In the labor markets, 29 states reported unemployment rates at the same level or better versus the national level (3.5%, Sept '19)
- Sales and income taxes typically show moderation and declines during the on-set/early stages of a recession, while property taxes typically do not show declines until 18-24 months later, due to the inherent lag in assessments and collections
- Further, many states' composition of tax revenue contain over/under exposure to certain tax streams (income, sales, severance, property, etc), which may be key in mitigating or exacerbating the effects of an economic slowdown
- According to an analysis done by the Pew Center, most (41) states have fully recovered to pre-recession rev collections (adj for inflation) as of 1Q19 revenue figures. However, despite the gains in tax revenue, legacy costs continue to pressure state budgets

See page 26 for analyst certification and important disclosures.

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Municipals lagged the rally in the UST market against elevated gross supply of $12.4bn, with $10.4bn (146% of avg.) tax-exempts and $2.0bn (5x avg.) taxable securities. YTD Lipper inflows established a new calendar year record at $79.8bn

Fed chair Powell spoke before Congress this week, with much of his comments taken verbatim from the prepared remarks at the last FOMC press conference. He maintained that "the current stance of monetary policy is likely to remain appropriate". There was little change on Powell's views on global growth and trade policy risks, and overall there wasn't much new ground broken in the Q&A.

Economic data kicked off the week with October consumer price index (CPI) rising 0.4% (vs expectations of 0.3%), while the ex-food and energy core measure increased 0.2% (matching expectations). However, the year-ago change for the core moderated from 2.4% to 2.3%. The weakness in core inflation was spread throughout many underlying components, including apparel (-1.8%), education and communication foods (-1.9%), and tenants rent (0.14%). **Our economists note that core services inflation may see upward pressure from a tight labor market and rising wages, but has not moved up in a meaningful way in recent years.**

Separately, the producer price index (PPI) increased 0.4% in October while the ex-food and energy core rose 0.3%, beating expectations of 0.3% and 0.2%, respectively. Even with the upside surprises, the trends for both headline and core PPI have softened lately. **With the moderation in PPI and select softness in CPI, our economists estimate that the core PCE price index increased 0.16% in Oct, which would keep the year-ago rate unchanged at 1.7% between September and October.**

Friday's release of October retail sales showed a 0.3% gain for headline figures and the control group (ex-gas, autos, food services, and building materials), beating and matching expectations of 0.2% and 0.3%, respectively. However, the control figures for September and August were revised down modestly, and our economists note that while they expected a slowdown in consumer spending, it appears to have happened more significant than expected, with the three-month run rate for control retail sales showing to 1.6% saar in October, the weakest pace since early 2019. **Our economists have now lowered their 4Q real GDP growth forecast to 1.25% from 1.75%, with an expectation that real consumer will only increase about 1.5% saar in 4Q.**

Lastly, manufacturing reports further supported a slowing economy, with the Empire State manufacturing survey's headline cooling from 4.0 in October to 2.9 in November, falling significantly short of expectations (6.0). Separately, the industrial production report showed a 0.8% drop in October, with manufacturing output falling 0.6%. While some of this weakness may be attributed to the recent United Automobile **Workers strike, even away from this, manufacturing output ex-autos slipped 0.1%, and it looks like manufacturing output will be weak in 4Q.**

UST yields declined by 5-9-10-12bps this week in 2-5-10-30yr spots. Benchmark municipal yields declined across the curve too, by 2-2-5-7bps in the 2-5-10-30yr, underperforming Treasuries by 3-7bps across the curve (Exhibit 1). **Tax-exempts lagged the rally in the UST market against this week's elevated gross supply of $12.4bn, comprised of $10.4bn tax-exempt and $2.0bn taxable securities. The**

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

week's tax-exempt supply was 146% of the average for the similar week over the past five-years and 5x average taxable issuance over the similar period.

Exhibit 1: Benchmark municipal yields declined across the curve, by 2-2-5-7bps in the 2-5-10-30yr spots on the curve, underperforming Treasuries by 3-7bps

	HG Municipal Yields		Treasury Yields		Relative	HG Muni/Tsy Ratio	
Sector	Current (%)	1wk chg (bps)	Current (%)	1wk chg (bps)	Change	Ratio (%)	change (% pts)
2yr	1.11	-2	1.61	-5	-3	69	1
5yr	1.19	-2	1.64	-9	-7	73	3
10yr	1.55	-5	1.83	-10	-5	85	2
30yr	2.15	-7	2.30	-12	-5	93	2

Source: Refinitiv, JP Morgan

Next week's projected issuance is $12.5bn. Total tax-exempt issuance ($9.7bn) and taxable issuance ($2.7bn) are expected to be 126% and 5x the five-year average for the equivalent week, respectively (Exhibit 2). The largest offering is Port Authority of New York & New Jersey, with $1.1bn in bonds ($700mn AMT and $400mn TE). The second largest expected deal is University of Pittsburgh, with $710mn in bonds. The third largest issue next week is New York State Dormitory Authority, with $656mn in bonds ($520mn taxable refunding and $136mn TE).

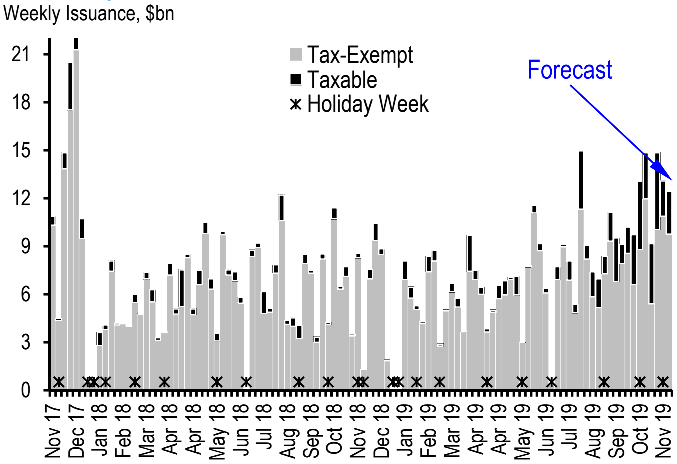
Port Authority of New York & New Jersey last issued revenue (Aa3/AA-/AA-) bonds in 2019, which are currently evaluated at a 1.63% yield or a spread of 8bps to the HG curve (73358WZ31, 9/1/2029 maturity, non-call, 5% cpn, spread to mty).

University of Pittsburgh-of the Commonwealth System of Higher Education last issued revenue (Aa1/AA+/--) bonds in 2014, which are currently evaluated at a 2.22% yield or a spread of 35bps to the HG curve (91335VJQ0, 9/15/2036 maturity, 9/15/2024 call, 4% coupon, spread to maturity).

New York State Dormitory Authority last issued revenue (Aa3/--/AA-) bonds in 2019, which are currently evaluated at a 1.61% yield or a spread of 22bps to the HG curve (64990GNK4, 10/1/2029 maturity, 10/1/2027 call, 5% coupon, spread to call).

Exhibit 2: We project $12.5bn in primary issuance next week. Tax-exempt issuance ($9.7bn) and taxable issuance ($2.7bn) are 126% and 5x of the five-year average for the equivalent week, respectively

Weekly Issuance, $bn



Source: IPREO, Bloomberg, JP Morgan

Peter DeGroot
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peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

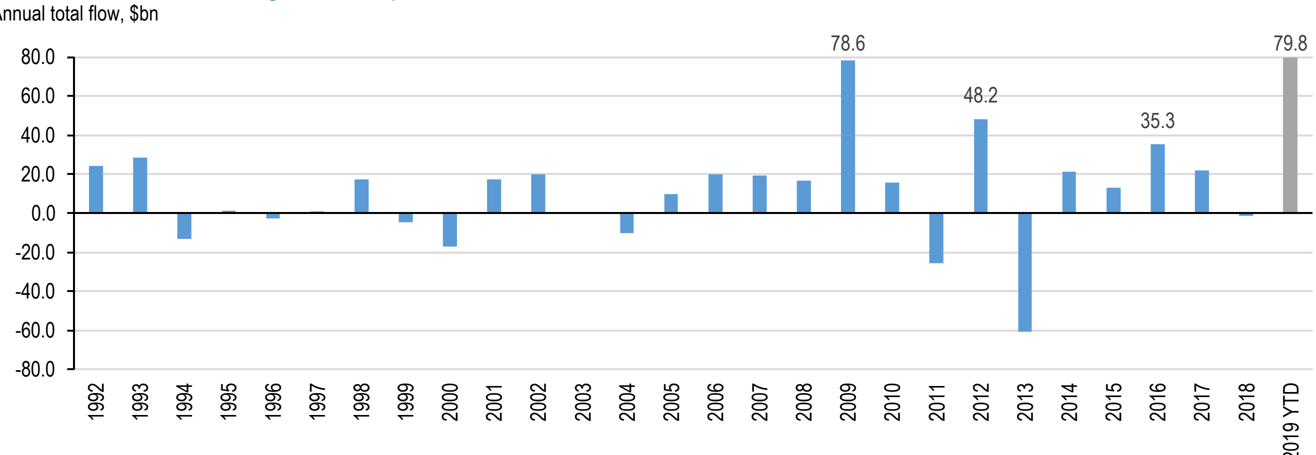
For the period ending 11/13/2019, Lipper's combined weekly and monthly reporting funds indicated inflows of $3.2bn. YTD inflows totaled $79.8bn, reaching the highest inflow year on record

Lipper Flows:

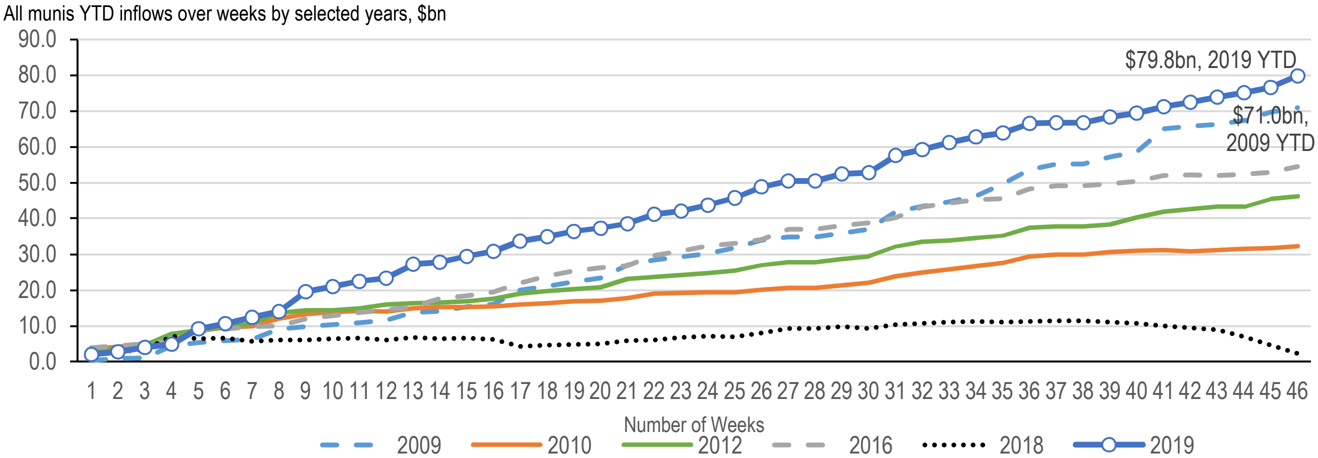
Lipper reported combined weekly and monthly inflows of $3.2bn for the period ending November 13th, marking the 45th consecutive week of inflows. YTD inflows moved higher to $79.8bn, **reaching the highest inflow year on record, eclipsing the previous record of $78.6bn (2009).** High Yield funds recorded $254mn of inflows, Intermediate funds saw $1.0bn of inflows, and Long Term funds saw $1.7bn of inflows. YTD flows into high-yield ($16.7bn), Intermediate ($23.7bn), Long-term ($50.7bn), and California ($7.6bn) muni funds continued with new records for the period. **Municipal ETF's registered $446mn of inflows.**

Exhibit 3: Thus far in 2019, year-to-date inflows are at record highs and eclipse historical full year results. Year-to-date inflows into municipal bond funds have been running at a record pace for 40 consecutive weeks

Annual total flow, $bn



All munis YTD inflows over weeks by selected years, $bn



Source: Lipper US Fund Flows, JP Morgan. Note: YTD inflows show 2018 as well as the five best yearly campaigns since the data has been collected in 1992

Weekly reporting funds were responsible for $1.3bn of inflows. Long Term funds reported $827mn of inflows, High Yield funds received $249mn of inflows, and Intermediate funds received $263mn of inflows.

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

California municipal bond funds experienced $350mn of inflows, and New York municipal funds were flat on the week.

For the period, Tax-exempt money market funds reported outflows of $441mn, while Taxable money market funds reported net inflows of $21.0bn.

Taxable Fixed Income funds reported inflows of $13.2bn, while Equity funds (US & Global) saw outflows of $513mn.

Exhibit 4: Municipal bond funds indicated inflows of $3.2bn for the period ending 10/30/2019

	Fund flows			Fund Assets	
Type of funds	Actual	YTD Total	4-wk. avg.	Actual	4-wk. avg.
All term muni funds	3,199	79,813	1,826	836,279	833,190
New York	0	1,745	25	33,668	33,607
California	350	7,589	144	82,129	81,823
National funds	2,748	67,812	1,593	650,348	647,634
High Yield	254	16,741	279	123,904	123,637
Intermediate	1,021	23,684	380	208,723	207,760
Long Term	1,726	50,744	1,298	484,821	483,199
Tax-exempt money market	-441	-9,809	-119	138,302	138,133
Taxable money market	20,951	476,654	24,086	3,329,200	3,288,081
Taxable Fixed Income	13,164	228,244	7,926	5,493,834	5,471,889
Equity	-513	-152,311	-2,470	13,185,169	13,027,524

Source: Lipper US Fund Flows, JP Morgan.

EPFR Flows:

For the period ending 11/13/19, EPFR weekly municipal bond funds indicated inflows of $873mn. Municipal ETFs registered $253mn of inflows.

Short Term funds saw $22mn of inflows, Intermediate funds indicated inflows of $413mn, and Long Term funds saw $435mn of inflows.

Classifying funds by rating, we find that Investment Grade funds indicated $773mn of inflows and High Yield funds saw inflows of $101mn.

California municipal funds reported inflows of $34mn, and New York municipal funds saw $9mn of inflows.

US Money market funds (taxable and tax-exempt combined) indicated $13.1bn of inflows.

Peter DeGroot
(1-212) 834-7293
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Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

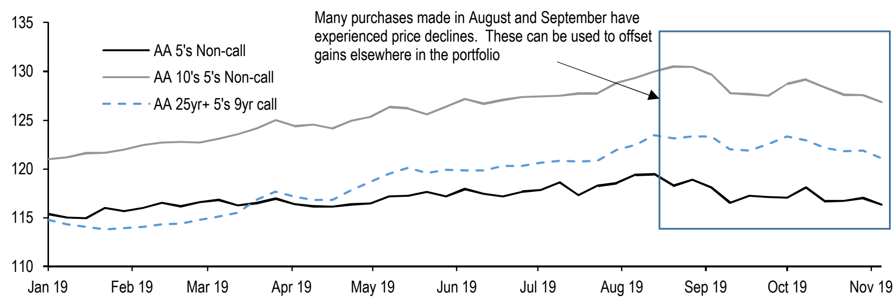
In a year where tax gains may be problematic, look for summer purchases to provide offsets and add some trading flexibility

In the summer of this year, benchmark 10yr and 30yr UST yields hit generational lows. **Not surprisingly, municipal bond yields across a large cross section of the market were also at or near historic lows levels.** As such, many of the purchases made in the July-September period were made at exceedingly low book yields. Since that time, longer dated tax-exempt municipal yields are higher by 30-35bps.

The sizable increase in municipal bond yields presents an opportunity to increase book yield and mitigate current and future tax liabilities. **Realized losses on municipal bonds can be used to offset investment gains in fixed income investments and across asset classes.**

Exhibit 5: Many municipal bond purchases made in the summer have embedded gains

Price, $



Source: ICE, JP Morgan

The example below (Exhibit 6) shows the sale of NYS Environmental Facilities Corp 5% 08/15/2039 (Aaa/AAA/AAA, callable 2029) that were purchased at $129.94 on September 3rd. We assume that these bonds are sold at the eval price ($124.89) on November 12th. We replace these bonds with NYC Transitional Finance Authority Future Tax revenue 5% 05/01/2039 (Aa1/AAA/AAA, callable 2029). **The net result of the trades is a sizable 56bps increase in book yield, a slight decrease in duration (0.13yrs), and a $0.78 short term tax loss. The only concession given by the investor is one notch lower in ratings by Moody's** (From Aaa to Aa1, while S&P and Fitch maintains AAA for both bonds)**.**

The tax loss may provide the flexibility to trade bonds that are no longer consistent with the investment strategy and have embedded gains that may be mitigated in the sale.

Peter DeGroot
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(1-212) 834-5674
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(1-212) 834-3051
ye.tian@jpmorgan.com

Exhibit 6: Investor could offset $0.78 in capital gains tax and increase book yield by 56bps with a modest give in credit quality (AA/AA/AAA vs Aa1/AAA/AAA) by swapping out of a Sept purchase of 20yr NYS Revolving fund bonds into NYC TFA's

Sell State of New York Revolving Fund, Buy NYC TFA tax secured revenue bond

Security	Capital Investment ($)	CUSIP	Issuer	Coupon	Maturity	Call Date	Book Yield (%)	Purchase Price	Par Amt Purchased ($)	Moody/S&P Rating	Sale Price	Sale Yield (%)	Capital Change ($)	OAD	Capital after Sale (Price * par)	Impact of new purchase: OAD Change (yrs)	Book Yield Change (bps)	Tax Value of Short-term Cap Loss ($)
Sell 5's	100.00	64985HC39	State of New York State Revolving Fund	5	8/15/2039	8/15/2029	1.71	129.94	76.96	Aaa/AAA	124.89	2.16	-3.89	8.11	96.11			
Buy 5's	96.11	64971XLG1	New York City Transitional Finance Authority Future Tax Secured Revenue	5	5/1/2039	5/1/2029	2.27	112.76	85.24	Aa1/AAA				7.99		-0.13	56	0.78

Source: ICE, Bloomberg, JP Morgan Note: Assume original date of buy is 09/03/2019 and date of tax swap is 11/12/2019. Please consult your tax advisor for your particular tax liabilities

Wash Sale Rule

When considering such trades, investors should be mindful of "wash sale" rules. Under IRS rules, an investor may sell a security that has lost value from initial purchase and buy a security that is not "substantially identical", and use the consequent loss to offset an unlimited amount of capital gains and up to $3,000 of ordinary income for tax purposes. Losses are first used to offset capital gains, followed by up to $3,000 in ordinary income. Any excess capital losses beyond that can be carried forward to offset futures gains and income. Long-term losses must be used to offset long-term gains (which have a lower tax rate), while short-term losses can be used to offset short-term gains. **To qualify as a long-term loss/gain, an investor must hold the asset in question for more than one year**.

The IRS defines a wash sale as the sale and repurchase, within 30 days before or after trade or settlement date, of either the same or a "substantially identical security", because losses resulting from wash sales cannot be used to offset gains or income. The IRS has not defined "substantially identical" but, in general, swaps into different issuers or bonds with significantly different coupon or maturity structures have been permitted.

Finally, investors should consult their tax advisors before considering the tax consequences of potential bond transactions.

We prefer credit spreads inside of 10yrs vs longer dated credit exposure. AMT bonds through 2025. 3% coupon bonds 10yrs and shorter, and 4% bonds across the curve

Current yields in the municipal market are within ~35bps of historic lows and both credit and curve spreads are near their lows as well. **Given the current fully valued market, and limited opportunity to add spread, we compare various alternatives, and suggest a go forward approach among the options discussed.**

In the following, we compare the spread achieved in benchmark spots on the curve, by: extending final maturity an additional 5yrs, A-rated credit spreads, AMT spread to non-AMT (like AA issuers), 3% coupon spreads, and 4% coupon spreads. We use the AAA high-grade to value the spots on the curve, as well as the basis for A-rated, and coupon spreads. We use same issuer comparisons to determine the AMT spread in each spot on the curve.

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

We have some general observations, before discussing spreads in each individual spot on the curve.

- The Tax Cut Jobs Act (TCJA) permanently removed AMT for corporations. As such, corporations should always consider AMT where the curve/credit parameters are appropriate. The primary concession is liquidity and to a lesser degree, the political risk that TCJA will be reversed (major tax reform has only been accomplished twice in the past 33 years or 3x including the Bush tax cuts in the early 2000's)
- 4% coupon spreads are attractive through out on the curve, given our views (as well as the Fed's and broad consensus) on inflation, rates, and the curve. The primary concessions are added extension/deminimis and liquidity risk
- 3% coupon spreads are attractive out to 10-years on the curve, given our rate views. We prefer 10yr AA 3% bonds to 20yr AA 5% bonds, as these bonds trade at about the same yield. Primary concessions are extension/deminimis and liquidity risk
- We like A-rated spreads 10yrs and in on the curve. The credit curve in tax-exempts is extremely flat with 2-5yr, 5-10yr, 10-30yr of 11bps, 7bps, and 7bps. This compares favorably to 28bps, 26bps, and 20bps for A-rated corporates

Taking a more granular look at the spreads in Exhibit 7, in 2yrs on the curve, AMT (22bps) and A-rated credit spreads (24bps) are preferable to extending maturity given the tight curve spread. The curve spread is the highest (41bps) in the 5yr spot to extend maturity out to the 10yr spot, but we again prefer AMT (30bps) and A-rated (35bps) exposure versus extending an additional 5yrs. 3% coupon bonds in 5yrs also makes good sense, as the roll down and liquidity are attractive**. AMT is particularly attractive inside of 5yrs as the tax reform bill (TCJA) extends AMT relief to many filers through 2025, when most provisions pertaining to individual tax payers sunset.**

Moving out on the curve to 10yrs, the spread for 3% bonds (48bps) is compelling, and the A-rated spread (42bps) is also solid, while low by historic compare (5yr avg 56bps). These spreads are preferred versus credit risk in 15-30yrs on the curve. **A-rated credit spreads are also compelling for 10yr and shorter bonds, with up to a 42bps pick up.**

In 15yrs on the curve, the spread on 3% coupon bonds is sizable at 55bps, but the extension risk for AA's is only about 45bps, which while well below our forecasted increase in rates, could be considered too close for comfort as a long-term holding. **That said, in 15-25yrs, we like the spread offered on 4% bonds, as the extension protection is a minimum of ~105bps.** The 4% coupon spread on our basket of AA's is compelling with a spread pick up of 27-34-30bps over 15-20-25yr AAA rated 5s.

Broadly speaking, credit spreads on the long-end are too tight to historical averages and we prefer credit risk be taken in the shorter regions on the market. Extending out past 25yrs on the curve also shows little value.

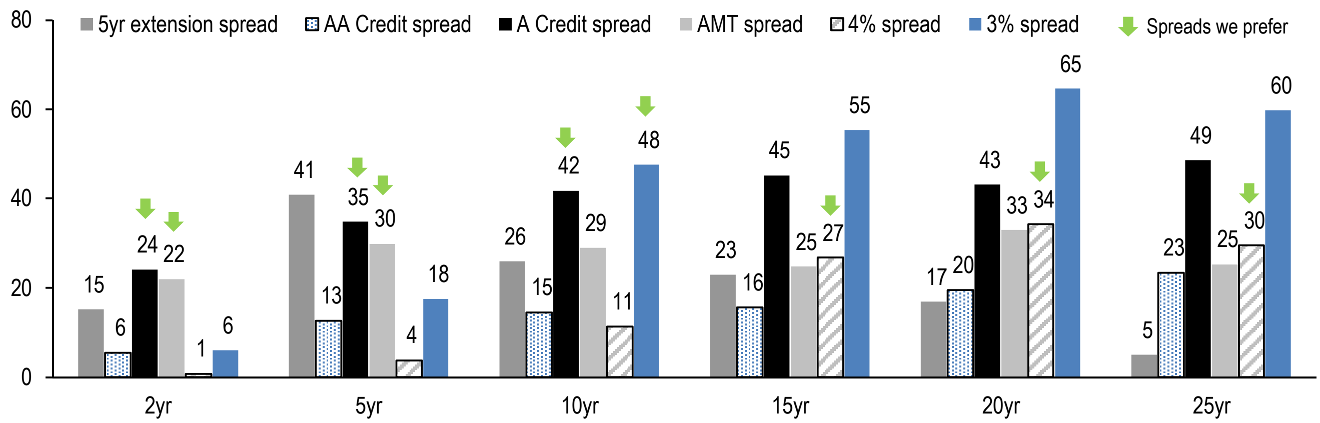
Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Exhibit 7: AMT, Extending maturity, lower credit quality provide higher yields than 4s and 3s in short end of the curve, while 4s and 3s outperform in long portion of the curve

Spread pick up over HG curve, bps



Source: ICE, JP Morgan. Note: Evaluated marks as of 11/12/2019. The 5yr extension spread for 2yr maturities are 5-2yr spread. Spreads were derived from ICE evaluations on broad baskets of securities. Specific valuations may differ based on individual security attributes and market conditions

Exhibit 8 displays the yield levels by rating, structure and maturities. With the spread pick up, the yields of 10-15-20-25yr AA 3s are 2.22-2.56-2.88-3.00%.

Exhibit 8: We like 10yr or shorter 3s, A or better rated, given more than 65bps extension protection. Extension protection on A-rated 4s in 10yrs and longer is a minimum of 85bps

Evaluated yields, %

Coupon	Rating	2y	5y	10y	15y	20y	25y
5s	AAA	1.15	1.27	1.65	1.93	2.17	2.22
	AA	1.19	1.34	1.75	2.01	2.24	2.40
	A	1.37	1.56	2.02	2.30	2.47	2.66
	BBB	1.77	2.02	2.48	2.83	3.08	3.34
4s	AAA	1.16	1.36	1.80	2.16	2.53	2.62
	AA	1.19	1.37	1.86	2.27	2.58	2.70
	A	1.42	1.72	2.15	2.56	2.83	2.92
	BBB	1.93	2.39	3.06	2.96	3.22	3.34
3s	AAA	1.22	-	2.16	2.47	2.81	-
	AA	1.24	1.51	2.22	2.56	2.88	3.00

Source: ICE, JP Morgan. Note: Evaluated marks as of 11/12/2019. AMT excluded. Spreads were derived from ICE evaluations on broad baskets of securities. Specific valuations may differ based on individual security attributes and market conditions

We pointed out earlier that we prefer 3% coupon bonds in 10yr and shorter to extending out further on the curve. Exhibit 9 displays the historical yield comparison of 10yr 3's vs 20yr 5's. **As shown, the yield on 10yr 3's is now just 2bps lower than 20yr 5's versus a three year average of 25bps.** The collapse in spread is a result of the flattening curve given the broader bond market rally. Additionally, **the yield on 3's in 10yrs is now 20bps above the A-rated credits in 10yrs, after trading at similar yields over the past three years (Exhibit 9).**

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
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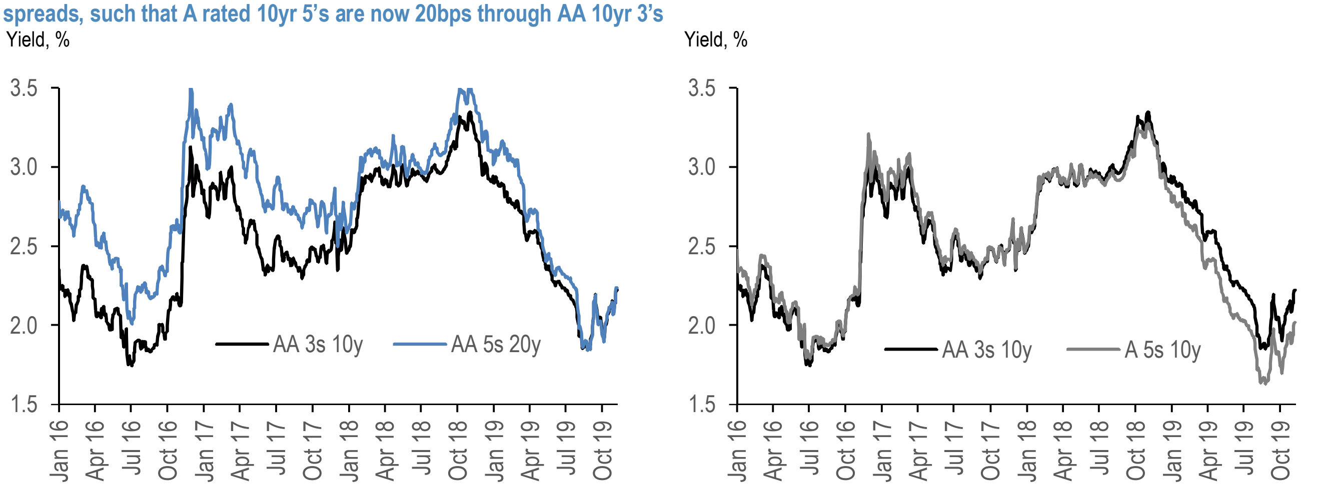
ye.tian@jpmorgan.com

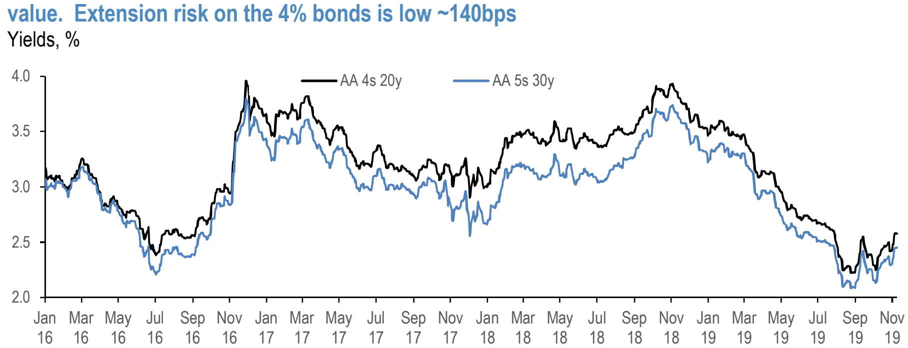
Exhibit 9: The yield on 10yr 3's is now just 2bps lower than 20yr 5's versus a three year average of 25bps. Record inflows tightened credit spreads, such that A rated 10yr 5's are now 20bps through AA 10yr 3's



Source: ICE, JP Morgan Note: AMT excluded. Spreads were derived from ICE evaluations on broad baskets of securities. Specific valuations may differ based on individual security attributes and market conditions

The yield on 20yr 4's is 13bps above the yield on 30yr 5's (Exhibit 10).

Exhibit 10: In our view, the 13bps spread in AA 20yr 4% bonds to AA 30yr 5% bonds represents value. Extension risk on the 4% bonds is low ~140bps



Source: ICE, JP Morgan Note: AMT excluded. Spreads were derived from ICE evaluations on broad baskets of securities. Specific valuations may differ based on individual security attributes and market conditions

Many states appear prepared for a potential recession, with population growth, healthy labor markets, historically high tax revenue, and rebuilt reserves. However, fixed cost pressures continue to persist, and select states continue to see weakness in certain areas

As we enter into the tenth year of the US economic expansion, we find increasing recession rhetoric fears among investors, issuers, and other market stakeholders. According to the National League of Cities FY2019 survey, **63% of large city finance officers and 49% of larger mid-sized cities predict a recession will occur in the next one to two years.** The pessimism comes as we witness a slowdown in the US economy, manufacturing weakness, and waning business activity.

While we believe that growth will stabilize at a slower rate, the recession fears are not without warrant, with the JPM 12 month economic recession indicator flashing 47.9% as of 11/14. Thus, we present the below analysis on some of the recessionary

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

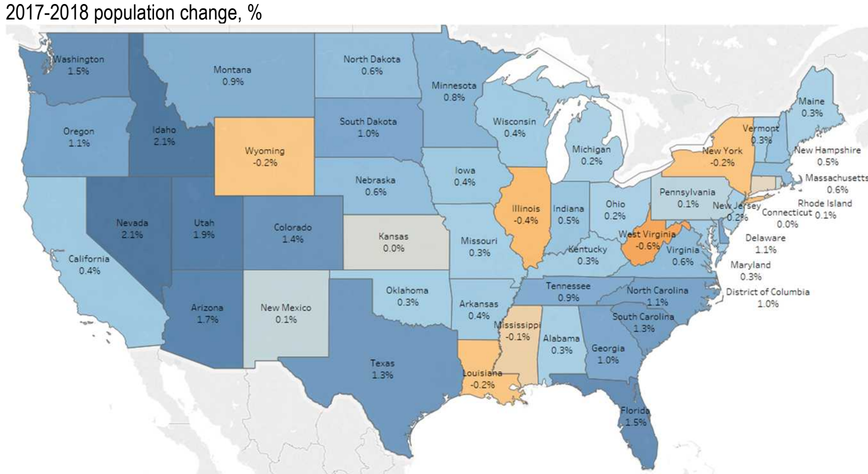
factors and metrics for all 50 states, in an effort to identify the states potentially most prepared and potentially most vulnerable for a recession, as well as current spreads.

Demographics:

One of the important underlying factors for a state is its ability to attract and build its tax base. While there are many factors that play a role, we find that primary drivers include economic opportunity/jobs, high quality of life, low cost of living, access to transportation networks, and quality educational systems. While most (47) states reported a net gain in population between 2010-18, the number fell to 41 when looking at the latest 2017-18 reports (Exhibit 11). **Further, we find that 28 states recorded net population losses based on domestic migration alone - meaning that if it wasn't for natural births/deaths in the state and international migration, more than half of states would have lost population (Exhibit 12).** While we do not believe this is a material risk to states yet, the patterns are worth keeping an eye on.

Exhibit 11: While a majority of states (47) reported a net gain in population between 2010-18, the number fell to 41 when looking at the latest 2017-18 reports

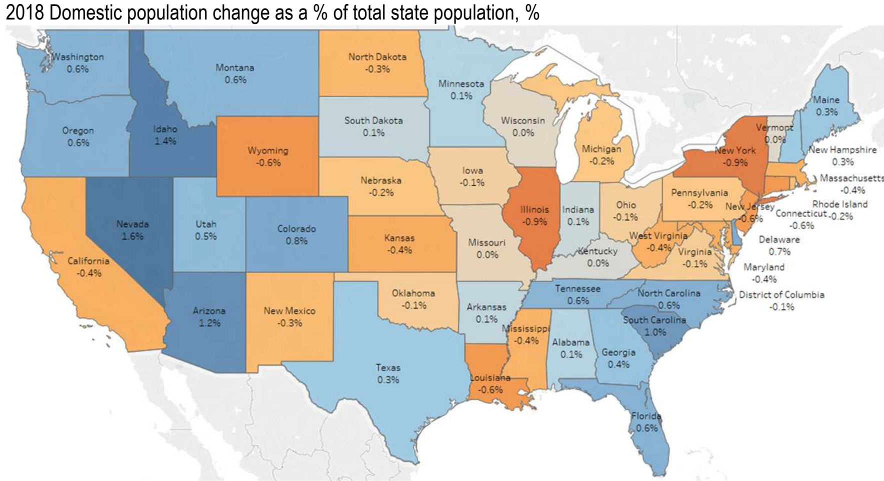
2017-2018 population change, %



Source: US Census Bureau, JPMorgan

Exhibit 12: However, 28 states recorded net population losses based on only domestic migration

2018 Domestic population change as a % of total state population, %



Source: US Census Bureau, JPMorgan

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

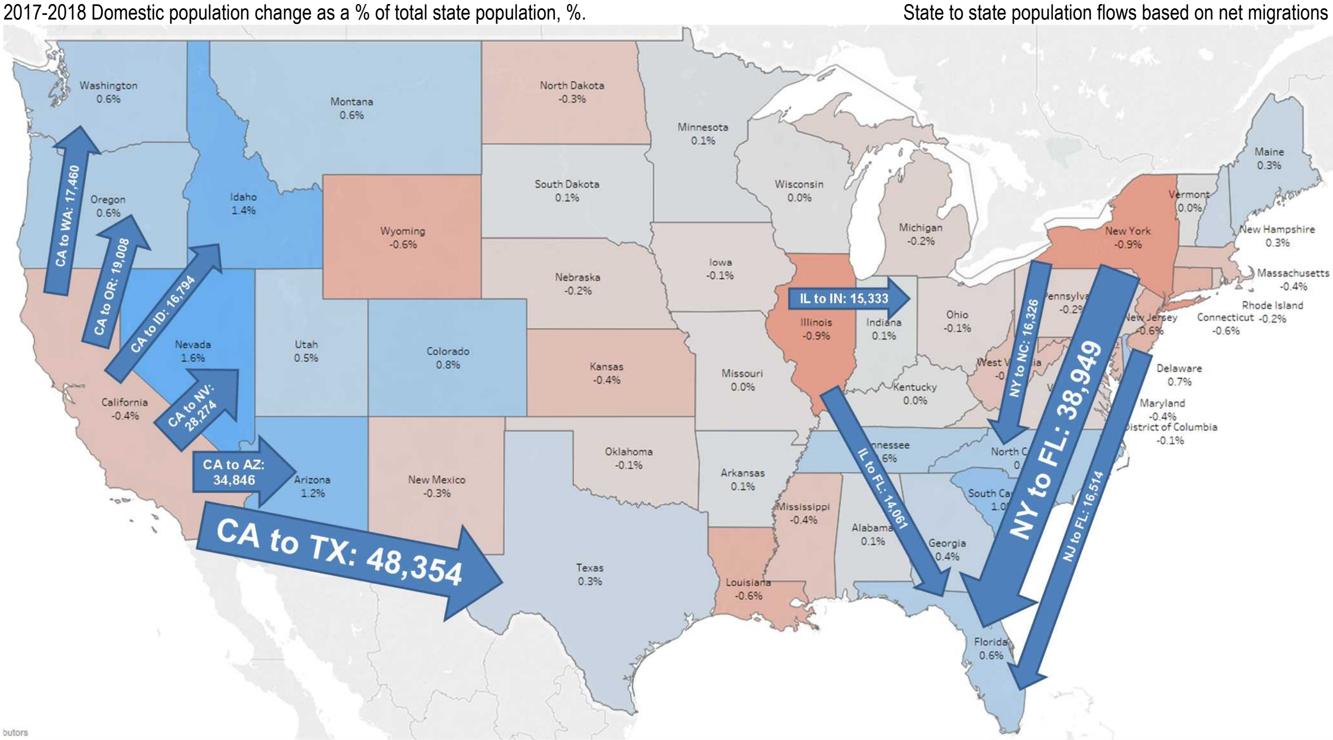
Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Diving deeper into the state-to-state migration patterns, we find that **generally speaking, states in the West and Southeast saw net inflows of domestic migration, while the Northeast and Midwest generally saw net outflows of population.** More specifically, Florida, Texas, and the neighboring states of California are saw the highest net domestic population flows (Exhibit 13).

Exhibit 13: We find that Florida, Texas, and the neighboring states of California are saw the highest net domestic population flows

2017-2018 Domestic population change as a % of total state population, %. State to state population flows based on net migrations



Source: US Census Bureau, JPMorgan. Note: Largest and select state to state population flows shown. Population flows between states represent net migrations – i.e. 100 movements from NY to FL and 50 movements from FL to NY nets to 50 movements from NY to FL.

Unemployment:

On the employment front, states have also enjoyed the decade long recovery and economic expansion. We find that generally speaking, a majority (29) of states reported their September 2019 unemployment rate at or below the national rate (3.5%). That being said, select states such as Alaska (6.2%) still report higher unemployment rates, and may find themselves in an even weaker labor market in the event of a recession.

Sales and income tax collections typically show first sign of distress, with property taxes weakening several quarters later

With fluctuating tax bases and labor markets, we shift our attention to potential signs and impacts in tax revenues. We find that historically, sales and income taxes typically show moderation and declines during the on-set and early stages of a recession as layoffs occur, consumer and business spending cools, and markets decline. Property taxes usually continue to show growth during recessionary periods, due to the inherent lag in assessment and collections, and typically do not show declines until 18-24 months later. Even still, we find that property tax declines have

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

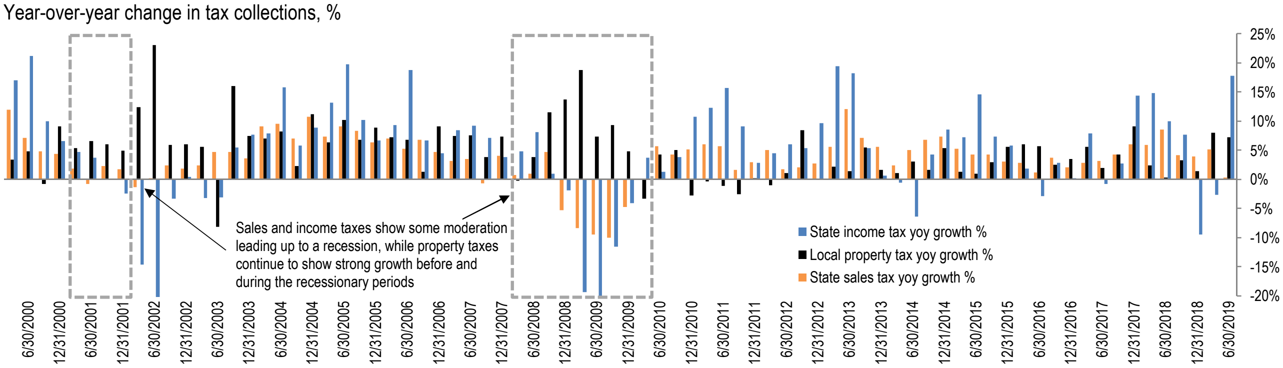
Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

been more muted compared to income and sales, showcasing the resiliency and robustness of property values and associated taxes (Exhibit 14).

Exhibit 14: Historically, we find that sales and income taxes typically show greater declines leading up to and during recession, while property taxes do not show weakness until quarters later, likely due to the inherent lag in assessments and collections

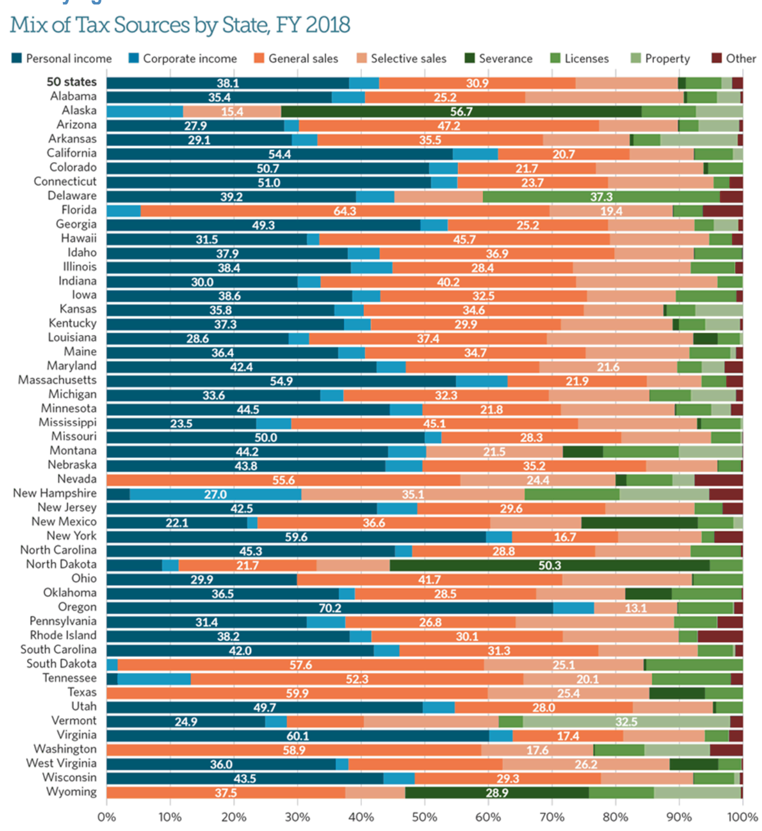
Year-over-year change in tax collections, %



Source: US Census Bureau, JPMorgan. Note: Non-seasonally adjusted, as of most recent 2Q19 data

Further, due to the significant variations and compositions of states' tax revenue make up, inevitably, we find that states differ in their exposure to certain tax streams (income, sales, corporate, severance, etc), which may be key in mitigating or exacerbating an economic slowdown (Exhibit 15).

Exhibit 15: Due to states' different exposure and composition of tax revenue streams, states may feel varying effects in the next recession



Source: Pew Charitable Trusts

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Generally speaking, states with higher concentration of revenue from personal income tend to be more at risk in the next recession. In analyzing the revenue streams of each state however, we emphasize a healthy mix with lesser dependencies on any individual revenue sources.

We highlight select states with tax revenue mixes that are 1 sigma or above the 50 state average. This has posed idiosyncratic effects for the individual states, such as oil revenue dependent states of Alaska seeing significant declines in tax revenue in the last recession as energy prices dropped sharply, as well as states with higher composition of property taxes such as Vermont, which saw an overall smaller peak to trough decline of tax revenues (Exhibit 16).

Exhibit 16: We highlight select states with tax revenue composition that are ≥ 1 sigma of the 50 state average

State	Tax revenue	% of total tax rev	50 state avg
Alaska	Severance (Oil and gas)	56.7%	1.2%
North Dakota		50.3%	
Wyoming		28.9%	
New Mexico		18.4%	
Florida	General sales	64.3%	30.9%
Texas		59.9%	
Washington		58.9%	
South Dakota		57.6%	
Nevada		55.6%	
Tennessee		52.3%	
Arizona		47.2%	
Oregon	Personal income	70.2%	38.1%
Virginia		60.1%	
New York		59.6%	
New Hampshire	Corporate income	27.0%	4.7%
Tennessee		11.5%	
Delaware	Licenses	37.3%	5.6%
South Dakota		15.2%	
New Hampshire		14.9%	
Tennessee		12.4%	
Montana		12.0%	
Oklahoma		11.0%	
Vermont	Property	32.5%	1.7%
New Hampshire		14.0%	
Wyoming		13.6%	
Arkansas		12.3%	
Washington		10.4%	
Montana		10.0%	
Kansas		7.5%	

Source: US Census Bureau, JPMorgan

Revenue recovery for states reaches highest levels since recession – real tax revenue in 41 states have recovered to pre-recession levels

According to an analysis done by the Pew Center, adjusted for inflation, most (41) states have fully recovered to pre-recession revenue collections, as of 1Q19 collection reports. Just 9 states collected fewer (inflation adjusted) revenues, due to a host of reasons including energy market weakness, slower economic growth, and higher pre-recession benchmark tax collections. Further, the disparity under/outperformance is significant, with North Dakota posting 69.3% above pre-recession levels, while Alaska is still at an underperformance of 82% (Exhibit 17). We believe that states that are now at or above their pre-recession levels are better positioned to handle a potential economic downturn.

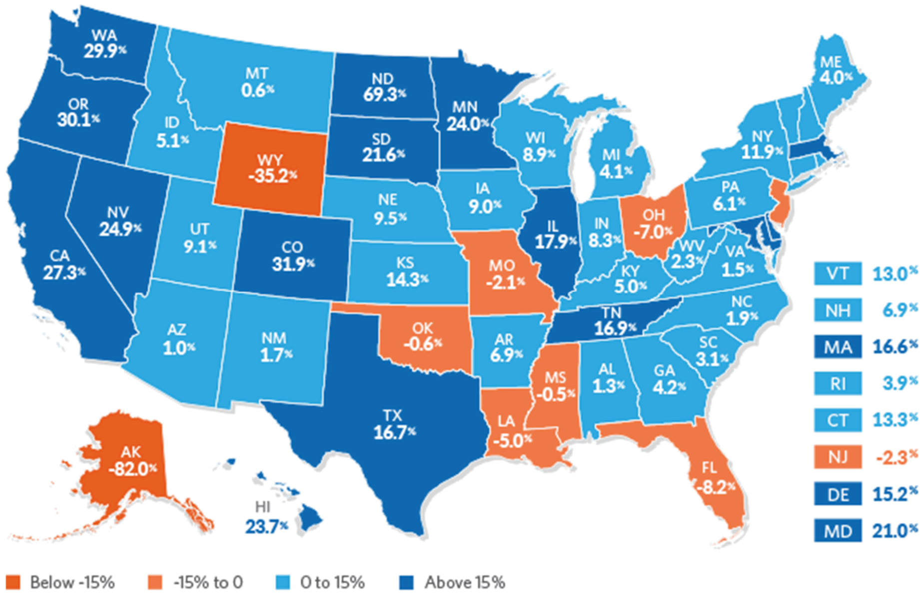
Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Exhibit 17: Inflation adjusted tax revenue in 41 states have reached or surpassed pre-recession peaks

% difference between 1Q19 tax collections and pre-recession revenue peak



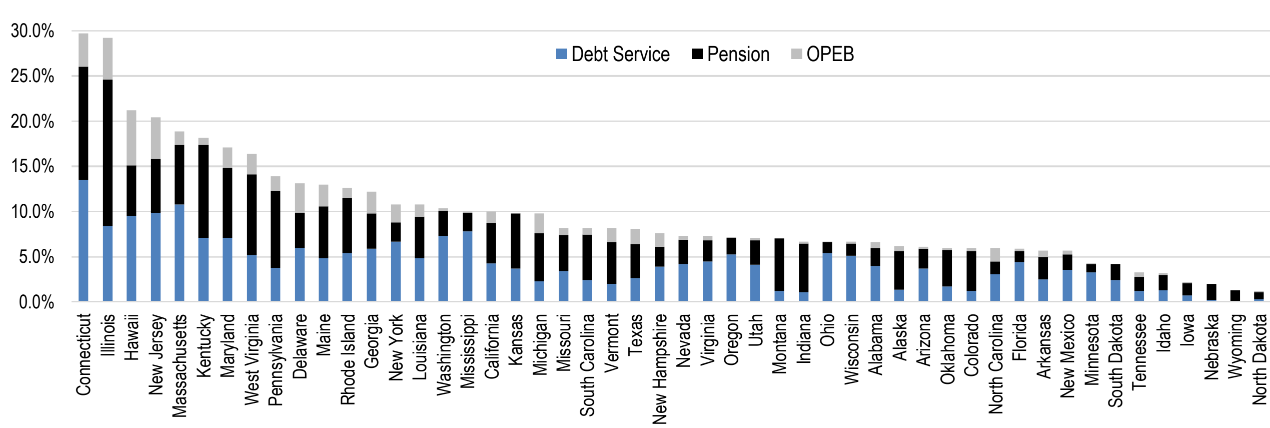
Source: Pew Charitable Trusts

Fixed costs:

Despite the gains in tax revenue, legacy costs continue to pressure state budgets. Fixed costs (debt service+pension+OPEB) as a percentage of own-source revenue continue to tick higher for many states, at the same time that many funded ratios have stagnated in recent years (Exhibit 18). **We now see a collection of pensions and states that have well-funded plans (>90%) that has translated to lower relative state contributions and costs, and states/plans that are lower funded, with increasingly escalating contributions, taking a significant bite out of state budgets and funding for services.** Obviously, states with weaker funded pensions and high fixed costs will be increasingly pressured in the next economic downturn.

Exhibit 18: Fixed cost obligations (debt service+pension+OPEB) have continued to tick higher for many states, taking a bite out of many state budgets. States with lower funded ratios will have an increasingly difficult task of fully funding pension obligations and service expenditures in the next recession

Fixed costs as a % of own-source revenue, %



Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
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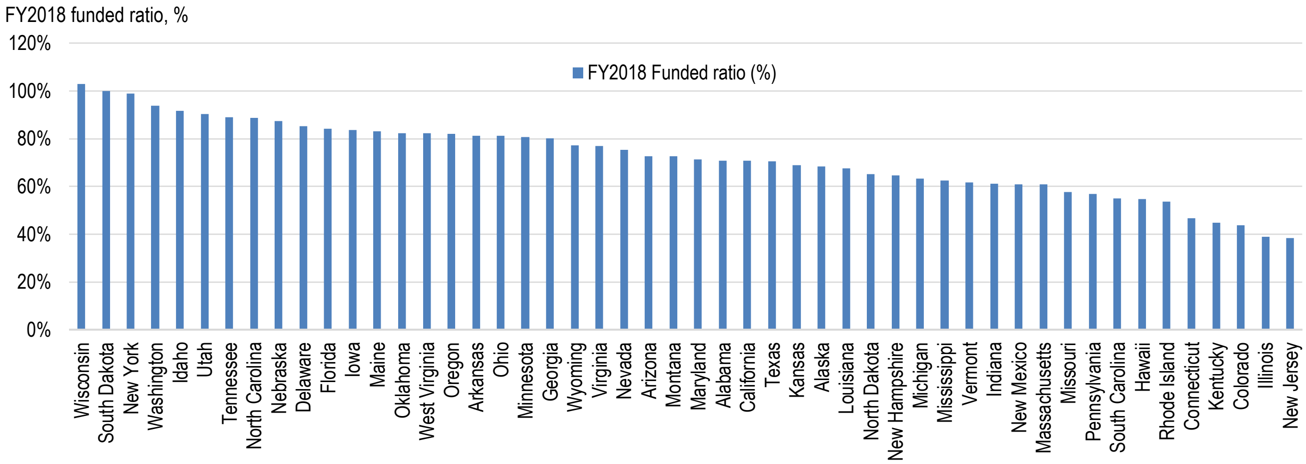
daniel.c.zheng@jpmorgan.com



Source: Moody's, S&P, individual pension CAFR's, JPMorgan

We present the above metrics and other factors, with an equivalent ranking and 50 state spreads (Exhibit 19).

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Exhibit 19: We present select metrics, factors, and spreads to measure potential preparedness/vulnerability of a state to a potential recession, with an equivalent ranking of said metrics

Higher rank = more vulnerable to a recession

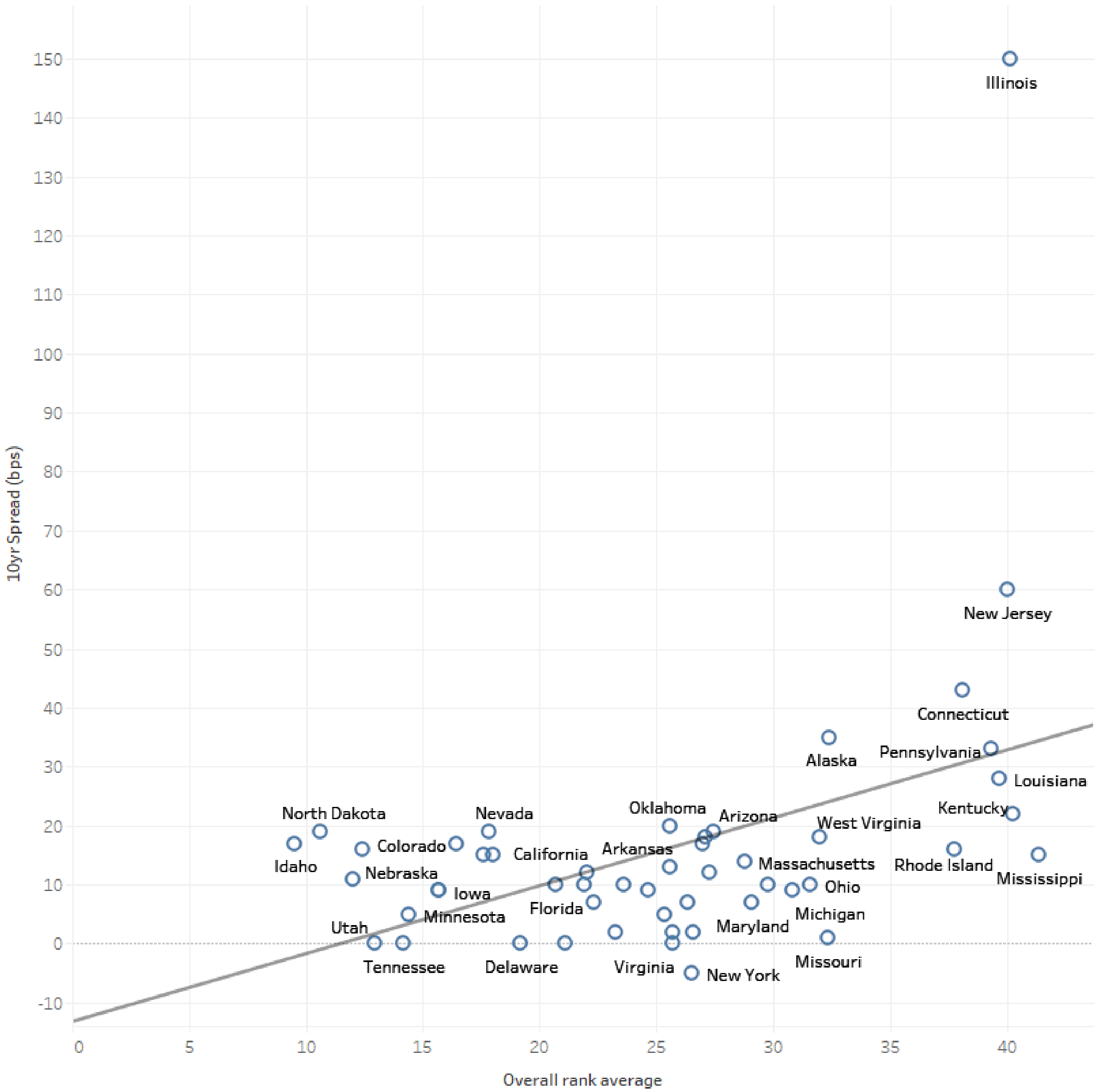
State	2013-18 pop change, %	2017-18 pop change, %	Sept unemployment rate, %	% Diff between 1Q19 tax revenue and pre-recession peak	Total balances (ending bal + rainy day fund) as a % of GF exp	Fixed cost as a % of own-source revenue, %	FY2018 pension funded ratio, %
Idaho	8.9%	2.1%	2.9%	5.1%	19.0%	3.2%	91.6%
North Dakota	5.3%	0.6%	2.5%	69.3%	17.0%	1.2%	65.2%
South Dakota	4.7%	1.0%	3.0%	21.6%	11.5%	4.2%	100.0%
Nebraska	3.4%	0.6%	3.1%	9.5%	18.2%	2.0%	87.4%
Utah	9.1%	1.9%	2.7%	9.1%	13.3%	7.1%	90.3%
Tennessee	4.3%	0.9%	3.4%	16.9%	14.0%	3.3%	89.1%
Minnesota	3.6%	0.8%	3.2%	24.0%	14.7%	4.3%	80.7%
Iowa	2.0%	0.4%	2.5%	9.0%	10.3%	2.2%	83.6%
Oregon	6.8%	1.1%	4.1%	30.1%	22.3%	7.2%	82.1%
Colorado	8.1%	1.4%	2.7%	31.9%	12.2%	6.0%	43.8%
Texas	8.4%	1.3%	3.4%	16.7%	20.0%	8.1%	70.6%
Nevada	9.3%	2.1%	4.1%	24.9%	15.1%	7.3%	75.3%
Washington	8.2%	1.5%	4.6%	29.9%	16.4%	10.4%	93.8%
Delaware	4.7%	1.1%	3.5%	15.2%	18.2%	13.1%	85.1%
Florida	8.9%	1.5%	3.2%	-8.2%	9.6%	5.9%	84.3%
North Carolina	5.5%	1.1%	4.1%	1.9%	12.5%	6.0%	88.6%
Wisconsin	1.3%	0.4%	3.2%	8.9%	5.3%	6.7%	102.9%
California	3.3%	0.4%	4.0%	27.3%	18.2%	10.0%	70.8%
New Hampshire	2.3%	0.5%	2.5%	6.9%	12.3%	7.6%	64.7%
South Carolina	6.7%	1.3%	2.9%	3.1%	15.0%	8.2%	55.1%
Alabama	1.2%	0.3%	3.0%	1.3%	16.6%	6.6%	70.9%
Indiana	1.9%	0.5%	3.2%	8.3%	11.7%	6.7%	61.1%
Wyoming	-0.8%	-0.2%	3.8%	-35.2%	100.5%	1.3%	77.2%
Arkansas	1.8%	0.4%	3.5%	6.9%	2.3%	5.7%	81.2%
Oklahoma	2.3%	0.3%	3.2%	-0.6%	7.5%	6.0%	82.4%
Georgia	5.5%	1.0%	3.5%	4.2%	11.6%	12.2%	80.1%
Virginia	3.2%	0.6%	2.7%	1.5%	3.2%	7.3%	77.0%
Maine	0.8%	0.3%	2.9%	4.0%	10.3%	13.0%	83.1%
New York	-0.4%	-0.2%	3.9%	11.9%	13.5%	10.8%	99.0%
Vermont	0.0%	0.3%	2.2%	13.0%	7.1%	8.2%	61.7%
Montana	4.8%	0.9%	3.3%	0.6%	8.1%	7.0%	72.5%
Kansas	0.6%	0.0%	3.2%	14.3%	11.5%	9.9%	68.9%
Hawaii	0.9%	-0.3%	2.7%	23.7%	14.4%	21.2%	54.8%
Arizona	8.1%	1.7%	4.9%	1.0%	9.2%	6.1%	72.7%
Massachusetts	2.8%	0.6%	2.9%	16.6%	5.6%	18.9%	60.7%
Maryland	2.0%	0.3%	3.7%	21.0%	8.4%	17.1%	71.2%
New Mexico	0.1%	0.1%	4.9%	1.7%	19.3%	5.7%	61.0%
Michigan	0.8%	0.2%	4.2%	4.1%	17.0%	9.8%	63.2%
Ohio	1.0%	0.2%	4.2%	-7.0%	10.2%	6.7%	81.1%
West Virginia	-2.6%	-0.6%	4.7%	2.3%	25.7%	16.4%	82.3%
Missouri	1.4%	0.3%	3.1%	-2.1%	8.6%	8.2%	57.5%
Alaska	0.1%	-0.3%	6.2%	-82.0%	56.4%	6.2%	68.4%
Rhode Island	0.2%	0.1%	3.6%	3.9%	6.6%	12.6%	53.6%
Connecticut	-0.6%	0.0%	3.6%	13.3%	6.3%	29.7%	46.7%
Pennsylvania	0.2%	0.1%	4.0%	6.1%	0.1%	13.9%	56.8%
Louisiana	0.8%	-0.2%	4.3%	-5.0%	6.5%	10.8%	67.6%
New Jersey	0.6%	0.2%	3.1%	-2.3%	2.8%	20.4%	38.4%
Illinois	-1.2%	-0.4%	3.9%	17.9%	0.4%	29.2%	39.0%
Kentucky	1.4%	0.3%	4.4%	5.0%	1.1%	18.2%	44.8%
Mississippi	-0.1%	-0.1%	5.4%	-0.5%	5.3%	10.0%	62.6%
United States	3.5%	0.6%	3.5%	13.0%	11.9%	9.6%	72.0%

State	2013-18 pop change, %	2017-18 pop change, %	Sept unemployment rate, %	% diff between 1Q19 tax revenue and pre-recession peak	Total balances (ending bal + rainy day fund) as a % of GF exp	Fixed cost as a % of own-source revenue, %	FY2018 pension funded ratio, %	Overall rank avg	10yr GO Spread (bps)
Idaho	4	2	9	28	7	5	5	10	17
North Dakota	13	18	2	1	11	1	33	11	19
South Dakota	15	13	13	9	27	7	2	12	11
Nebraska	19	20	15	20	8	3	9	12	16
Utah	2	3	5	21	21	22	6	13	0
Tennessee	17	15	25	12	19	6	7	14	0
Minnesota	18	17	18	7	17	8	19	14	5
Iowa	25	25	2	22	29	4	12	16	9
Oregon	9	11	38	3	4	23	16	16	9
Colorado	8	7	5	2	24	12	48	16	17
Texas	5	8	25	13	5	27	29	18	15
Nevada	1	1	38	6	15	24	23	18	19
Washington	6	6	45	4	14	35	4	18	15
Delaware	16	12	27	15	8	41	10	19	0
Florida	3	5	18	48	32	11	11	21	10
North Carolina	11	10	38	36	22	12	8	21	0
Wisconsin	31	26	18	23	43	18	1	22	10
California	20	24	36	5	8	33	28	22	12
New Hampshire	24	22	2	26	23	26	34	22	7
South Carolina	10	9	9	34	16	28	43	23	2
Alabama	32	33	13	39	13	17	27	24	10
Indiana	27	23	18	24	25	18	38	25	9
Wyoming	48	44	33	49	1	2	21	25	5
Arkansas	28	27	27	25	47	10	17	26	13
Oklahoma	23	32	18	43	37	14	14	26	20
Georgia	12	14	27	30	26	38	20	26	2
Virginia	21	19	5	38	45	24	22	26	0
Maine	36	34	9	32	29	40	13	26	7
New York	46	46	34	19	20	37	3	27	-5
Vermont	44	31	1	18	38	28	37	27	2
Montana	14	16	24	41	36	21	25	27	17
Kansas	38	41	18	16	27	32	30	27	18
Hawaii	34	47	5	8	18	48	44	27	12
Arizona	7	4	47	40	33	15	24	27	19
Massachusetts	22	21	9	14	42	46	40	29	14
Maryland	26	29	32	10	35	44	26	29	7
New Mexico	42	39	47	37	6	9	39	30	10
Michigan	35	37	41	31	11	31	35	31	9
Ohio	33	36	41	47	31	18	18	32	10
West Virginia	50	50	46	35	3	43	15	32	18
Missouri	30	30	15	44	34	30	41	32	1
Alaska	43	48	50	50	2	16	31	32	35
Rhode Island	41	40	30	33	39	39	45	38	16
Connecticut	47	42	30	17	41	50	46	38	43
Pennsylvania	40	38	36	27	50	42	42	39	33
Louisiana	37	45	43	46	40	36	32	40	28
New Jersey	39	35	15	45	46	47	50	40	60
Illinois	49	49	34	11	49	49	49	40	150
Kentucky	29	28	44	29	48	45	47	40	22
Mississippi	45	43	49	42	43	34	36	41	15

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com



Source: US Census Bureau, Bureau of Labor Statistics, National Association of State Budget Officers, Pew Charitable Trusts, Moody's, S&P, Refinitiv, JPMorgan. Population change weighted as one category. Higher rank is more vulnerable to a recession. Spreads as of 11/14/2019.

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Summary of trade ideas in 1H19

01/04/2019: We expect that carry will drive total return in 2019 as episodic periods of outflows represent buying opportunities in longer dated and lower rated assets

01/28/2019: We believe the larger multi-state health-care systems and regional powerhouse providers are better positioned to face the growing challenges within the sector versus their smaller/local counterparts

02/01/19: At 60bps, spreads on 6th ranked BJC Health are ~10bps wider than similar rated and ranked securities and traded wider than all but 4 credits in our comparison

02/08/2019: We believe that it is unlikely that a meaningful out-migration will follow in New York in response to the SALT limitation

02/22/2019: Debt service coverage on COFINA bonds is expected to be strong in 2019, at 3.33x, with a 10yr avg of 3.18x and 40yr avg of 2.46x. Sales taxes would need to decrease by more than 0.71% annually for collections to be insufficient

03/08/19: MTA bonds represent a significant yield pick-up over other local/in-state alternatives, with a spread of 58bps for its 2029 Transportation Revenue Bonds. We recognize the system's essentiality to the metro NYC region, natural monopoly

03/15/2019: Given our view on rates, we expect intermediate 4s will outperform 5s as a function of higher initial yield, greater roll down, and longer duration

03/22/2019: Given the ubiquitous need for yield in shorter/intermediate bonds, we highlight debt from several corporate backed issuers that offer above market spread, even as they have richened relative to pari corporate market debt

03/29/2019: Current market conditions suggest taking profits on higher volatility tobacco structures, given record inflows into broad and HY specific municipal bond funds and extremely thin HY municipal supply over the past two years

04/05/2019: In the current and expected flat curve environment, FRNs can provide elevated yield with lower duration when compared to similar term/rated bonds. The net pick up for a 3-year put FRN over 3yr AA HG bond is 35bps

04/12/2019: We suggest 3:1 levered investment in 12yr AA 4% coupon bonds

05/03/19: We analyze IL State Toll Authority, CT Special Tax, and NJ Turnpike as transportation special revenue credits that offer spread opportunities for investors

06/07/19: Trade data suggests value in 5yr tax-exempt corporate backed bonds, such as gas prepay bonds. Central Plains Energy Project (Goldman) and Black Belt Energy (Morgan Stanley) gas bonds are at YTD cheap levels versus pari corporates

06/14/19: We recommend 11-15yr AAA and AA 3s which trade at a spread of approximately 35-60bps to similar 5s, and have relatively low extension risk, in our opinion. We would take the carry on 20yr 4s and sell long 3% coupons trading at a premium, as the dollar price is near four year highs and price return over the past 7 months is over 2x the return on similar 5s. AMT spreads for bonds maturing inside of 2026, are compelling as changes to individual AMT criteria remain until 2026

Peter DeGroot
(1-212) 834-7293
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Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Municipal Sub-Sector Credit Playbook:

In this section, we provide a thematic summary of various municipal sub-sectors from a credit perspective. For an in-depth review, please refer to the original publications.

Airports (09/06/2019): Sector continues to benefit from defensive characteristics, strong fundamentals, and growth in enplanements in 2018. However, early 2019 enplanements have shown some signs of deceleration as trade tensions rise, global growth slows, and consumer sentiment weakens. The Boeing 737 MAX grounding is not expected to materially affect the sector, with airlines bearing the blunt of the impact. Financials and liquidity remains resilient with stable leverage, even as many airports undertake expansion and renovation plans

Ports (04/06/2018): Sector remains pressured by trade tariffs levied on US imports and exports. With tariff levies from China and Europe already implemented, both East Coast and West Coast ports remain vulnerable to lower shipping volumes and revenues. Adverse material impact is unlikely in the near term, given high minimum annual guarantee contracts, strong reserves, competitive rates, and a surge in late 2018 activity ahead of a new round of tariffs in Jan 2019, but prolonged tariff disputes may strain port financials and credit quality.

Tobacco (12/15/2017, 07/27/2018, 03/29/2019): The tobacco sector has outperformed the broader muni and muni high yield indices in six of the last eight years, and currently trades at rich valuations. Current market conditions suggest taking profits on higher vol tobacco structures, given record inflows into HY muni funds and lower HY supply. We estimate 4-5% annual decline in US cigarette consumption from 2018-2025, due to increased FDA regulation, heightened health awareness, lower affordability, and the rise of e-cigs/vapors. The FDA has recently shifted its attention/regulatory actions on e-cigs, given rampant usage among underage teens, which we believe is a positive to incumbent cig companies and tobacco bond investors.

Healthcare (01/25/2019, 02/01/2019): Health-care sector spreads have compressed significantly in the past few years, justified by years of growth, healthy financials, improved patient base/utilization trends, and decade low uncompensated care costs. However, the sector continues to face challenges in 2019, with increased competition, shift to value-based reimbursement models, flat revenue growth/rising expenses, and uncertainty in Federal policy/ACA ruling. M&A activity continues to be brisk, and we believe the larger multi-state and regional powerhouse providers are better positioned to face the growing challenges, especially with increasing disparity to their smaller/local counterparts.

Water/Sewer (02/02/2018): The water/sewer sector provides strong defensive credit characteristics, legal protections, and low volatility for investors looking to take some liquidity and credit risk off the table. Improvements in the broader economy along with necessary rate increases/expenditure cuts have resulted in continued improvement within the sector. Maintenance, continued capital spending, and rate affordability will be the biggest challenges throughout the next decade. In fiscally challenged States such as Connecticut, we favor local utilities as an alternative versus general obligation bond exposure.

Public Power (02/09/2018): Like water/sewer, the public power sector also provides investors with defensive characteristics, legal protections, and lower volatility. Lower energy costs and increased efficiency have resulted in affordable rates and improvement in financials/liquidity. Biggest challenges include prior and current underinvestment in capital projects, continued pressure to reduce carbon emissions/generation, and environmental regulatory uncertainty.

Primary & Secondary (K-12) Education (11/02/2018): K-12 education remains the largest component of state and local spending. In the last recession, state and federal aid/funding declined and exhibited increased volatility, which placed greater strains on local/property tax funding. Despite a rebound in recent years, 16 states still trail their pre-recession K-12 edu spending (on a per pupil basis). National enrollments have grown 1.9% from 2009-14, and are projected to grow 2.8% from 2014-26, with the Northeast and Central states expected to witness declines, while South, Midwest, and West states expected to see above avg growth.

Higher Education (9/14/2018): The higher ed sector faces headwinds in the coming years as enrollment growth is projected to stagnate and international applicant interest declines. While state and federal grants/aid have begun to rebound after years of decline, 39 states are still below their state higher education appropriation levels from 2007. Dichotomy between larger and smaller schools will likely increase, as many smaller schools do not have the resources to compete with their larger counterparts. Despite isolated challenges, fundamentals for the sector appear robust.

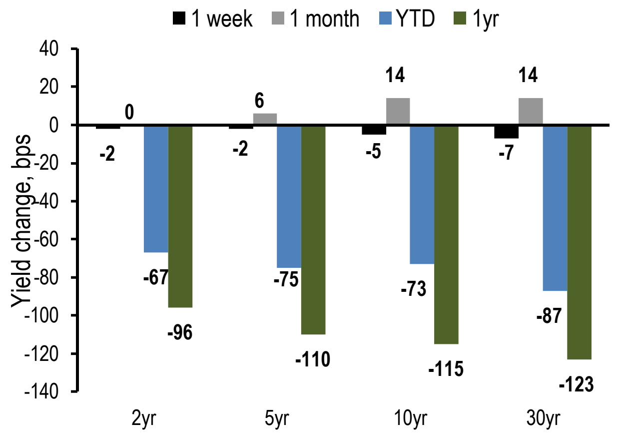
Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Markets at a glance

Yields across the HG curve have declined by 67bps, 75bps, 73bps, and 87bps in the 2yr, 5yr, 10yr, and 30yr spots, respectively, YTD



Source: Thomson Reuters, JP Morgan

We expect 10yr municipal high-grade yields will increase by only 5bps to 1.60% by 3Q20

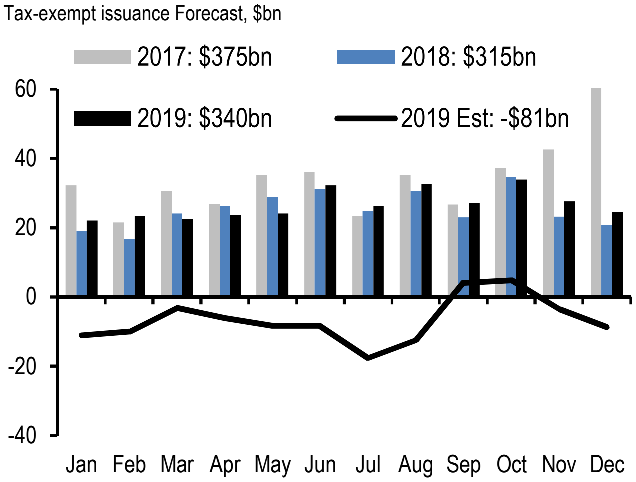
Yields, %

Treasury	11/15/2019	4Q19 Forecast	1Q20 Forecast	2Q20 Forecast	3Q20 Forecast
2yr	1.61	1.55	1.55	1.65	1.70
5yr	1.64	1.55	1.55	1.65	1.75
10yr	1.83	1.65	1.70	1.80	1.85
30yr	2.30	2.15	2.25	2.30	2.30
AAA Tax-exempt					
2yr	1.11	1.05	1.10	1.15	1.20
5yr	1.19	1.10	1.15	1.20	1.30
10yr	1.55	1.40	1.45	1.55	1.60
30yr	2.15	2.00	2.10	2.20	2.20
AAA / TSY Ratios					
2yr	69%	68%	71%	70%	71%
5yr	72%	71%	74%	72%	74%
10yr	85%	85%	85%	86%	86%
30yr	93%	93%	93%	96%	96%

Source: Bloomberg, Refinitiv, JP Morgan

We project 2019 tax-exempt gross supply of $340bn with net supply of -$81bn

Tax-exempt issuance Forecast, $bn



Source: Bloomberg, Refinitiv, JP Morgan

5-10yr Benchmark AA municipal yields look cheap versus Corporates

AAA tax-exempt yield / Treasury yield (%)						Z-score	
	Last	Min	Max	Mean	St. Dev.	3mo	12mo
2yr	69.8	61.0	81.6	70.0	4.4	-0.1	0.6
5yr	73.3	65.6	84.2	74.2	4.1	-0.2	0.4
10yr	85.4	77.0	88.2	82.9	2.5	1.0	1.4
30yr	93.6	89.2	95.2	92.8	1.6	0.5	0.0

AA corporate yield - AA tax-exempt yield (bp)						Z-score	
	Last	Min	Max	Mean	St. Dev.	3mo	12mo
3-5yr	78	58	95	77	8.2	0.1	-1.3
5-7yr	82	74	106	87	7.7	-0.6	**-1.6**
7-10yr	82	78	103	89	5.9	-1.1	**-1.8**
25yr	92	92	111	100	4.8	**-1.7**	-1.2

values over last 3 months displayed, as of 11/14/19, Z-Score +/- 1.5 Rich / Cheap

yy indicates rich **yy** indicates cheap

Source: TRACE, Refinitiv, JP Morgan

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

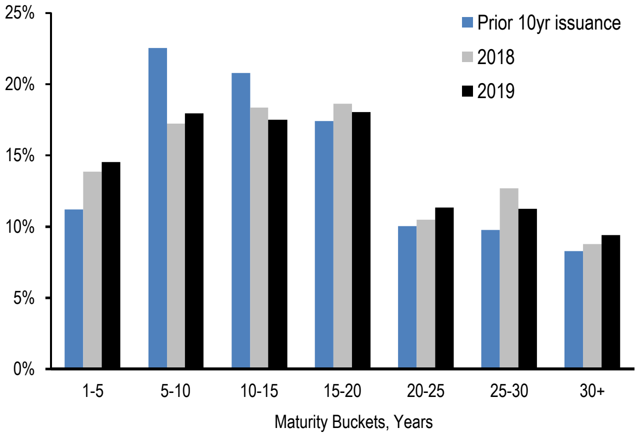
Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Issuance and Trading Trends

15-20yr maturities are about 18% of YTD 2019 issuance

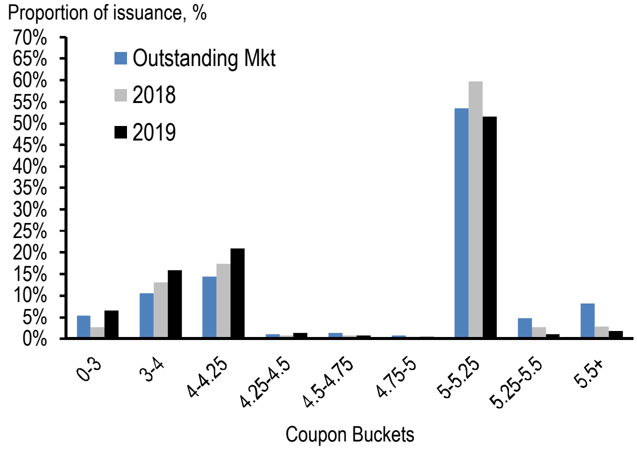
Proportion of issuance, %



Note: Long term, fixed coupon, tax-exempt bonds only
Source: ICE, JP Morgan

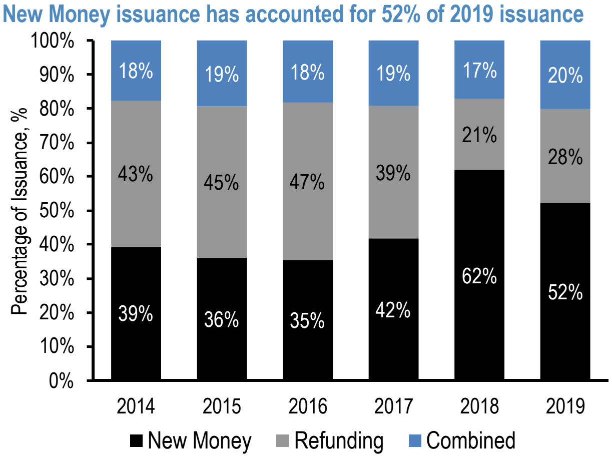
37% of YTD 2019 issuance has been in 3-4.25% coupon bonds

Proportion of issuance, %



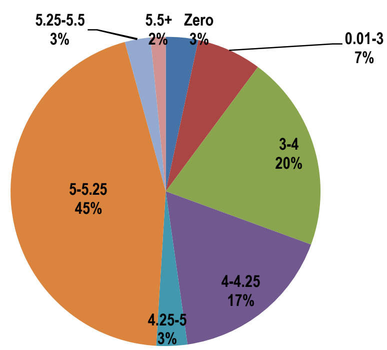
Note: Long term, fixed coupon, tax-exempt bonds only
Source: ICE, JP Morgan

New Money issuance has accounted for 52% of 2019 issuance



Note: Long term bonds only
Source: Bloomberg, JP Morgan

3% to 4% coupon bonds have accounted for 20% of YTD trading volume



Note: Long term, fixed coupon, tax-exempt bonds only
Source: MSRB, ICE, JP Morgan.

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
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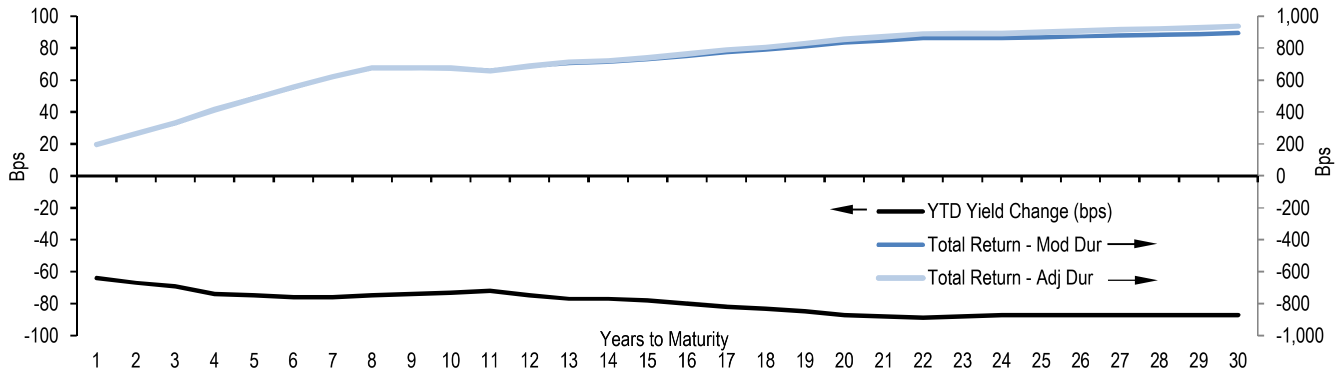
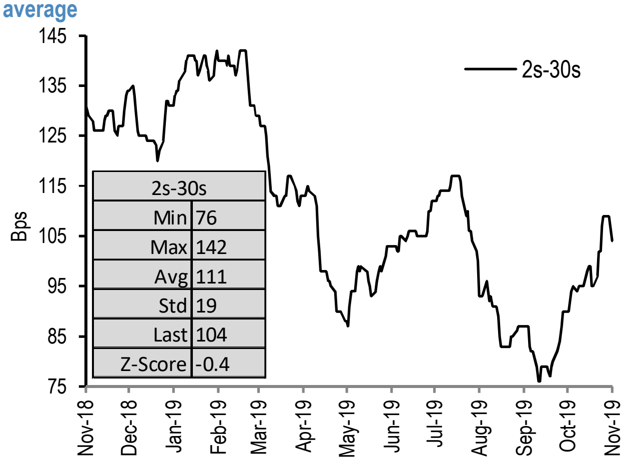
Total return and Curve Spreads

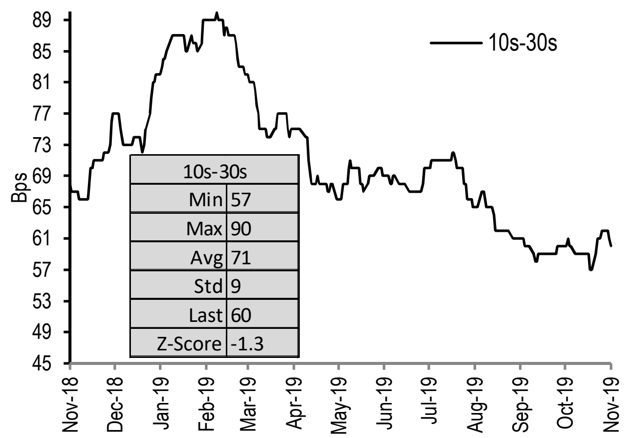
YTD total returns remain positive across the curve



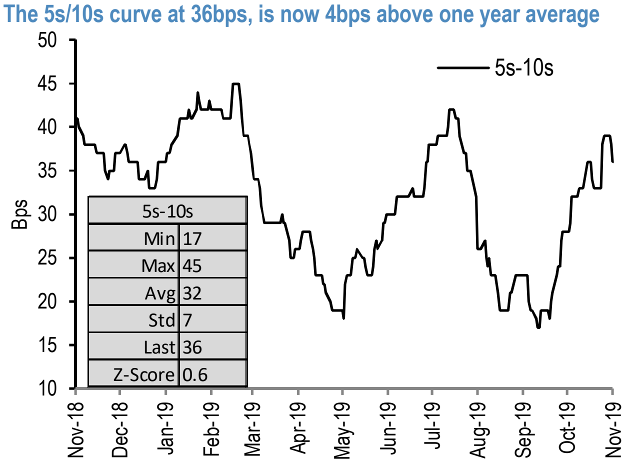
The 2s/30s curve at 104bps is now 0.4 sigma below its one year average



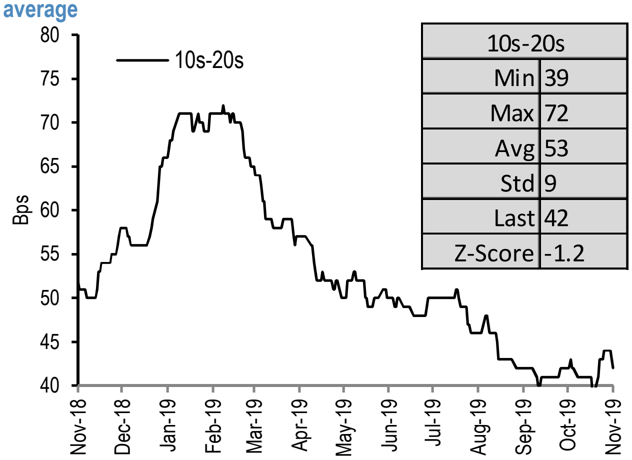
At 60bps, the 10s/30s curve is 1.3 sigma below its one year average



The 5s/10s curve at 36bps, is now 4bps above one year average



At 42bps, the 10s/20s curve is now 1.2 sigma below its one year average



Source: Thomson Reuters, Bloomberg, JP Morgan. Note: As of 11/14/2019.

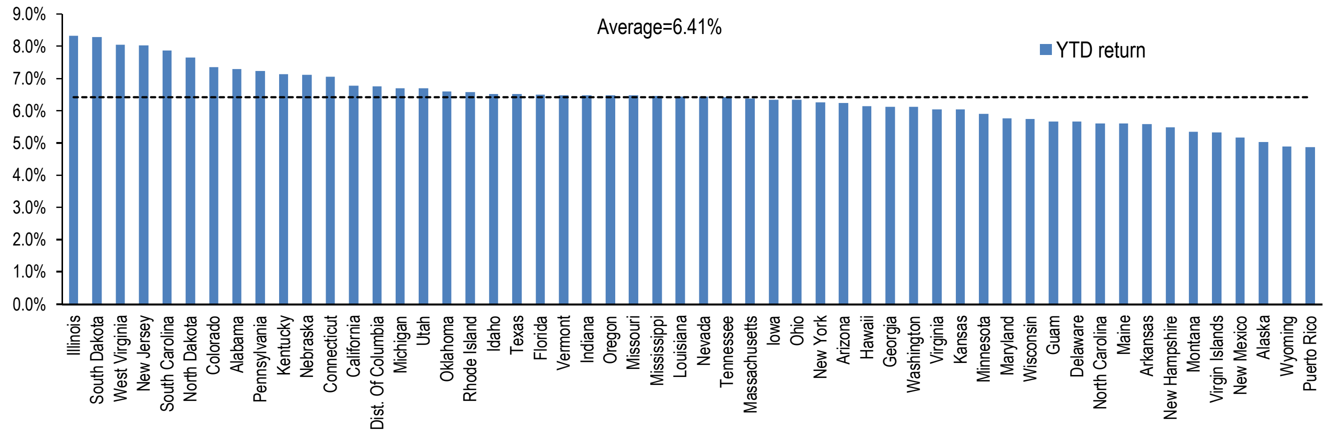
Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

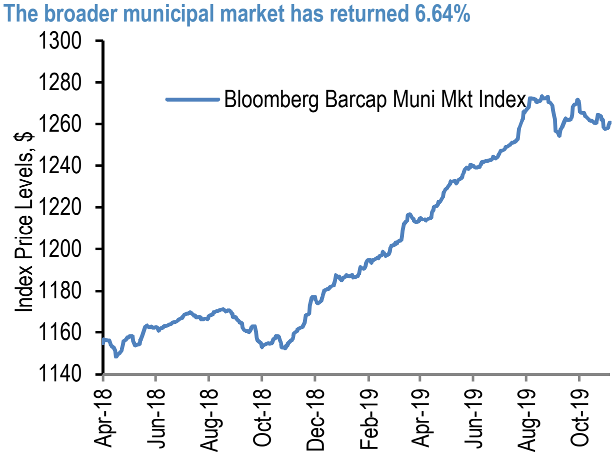
Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Total return by State and Sector

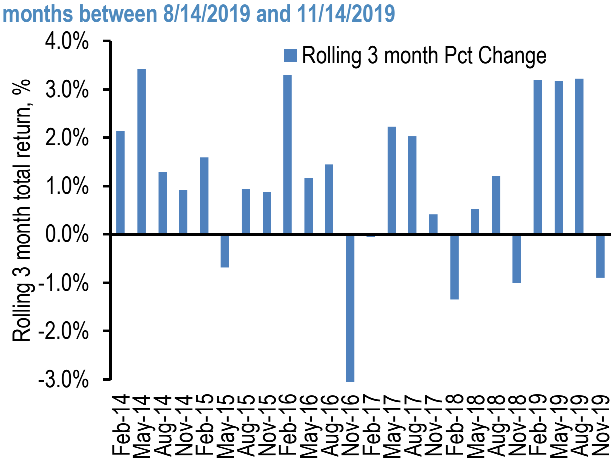
The average YTD total return for Bloomberg municipal bond indices by state is 6.41%



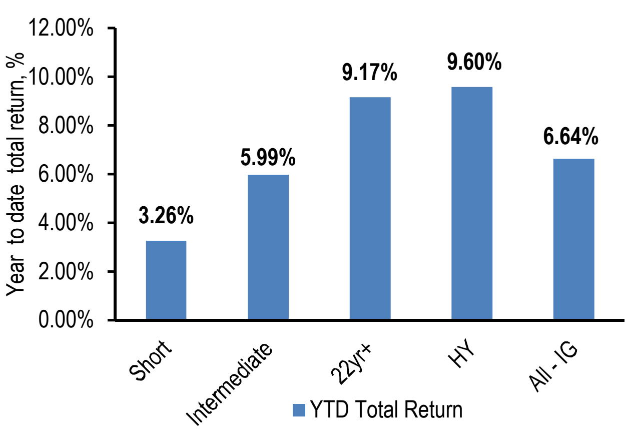
The broader municipal market has returned 6.64%



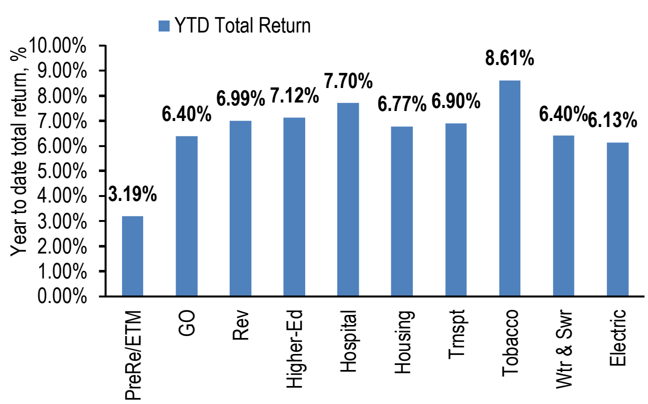
The Bloomberg Muni index has increased -0.90% in the three months between 8/14/2019 and 11/14/2019



The HY index has the highest YTD returns, of 9.60%



The Tobacco sector exhibits the best YTD return of 8.61%



Source: Bloomberg, JP Morgan, as of 11/14/2019. Note: Total return calculated as the percentage change in index levels. Bloomberg Municipal bond total return indices used

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

Glossary of Publication Topics

Sector Overviews

- Airports: 03/11/2016, 05/20/2016, 11/18/2016, 12/08/2017, 04/13/2018, 04/20/2018, 09/06/2019
- Bond Insurance: 03/18/2016, 6/23/2017, 10/27/2017
- Double-Barreled Bonds: 05/13/2016, 6/24/2016
- Energy: 10/23/2015, 01/22/2016, 01/29/2016, 02/05/2016, 02/19/2016
- Environmental, Social, Governance (ESG)/Green Bonds: 04/10/2015, 06/01/2018
- Housing: 04/17/2015, 1/20/2017, 10/20/2017, 07/26/2019, 08/02/2019
- Healthcare: 04/29/2016, 1/27/2017, 3/03/2017, 1/19/2018, 1/28/2019, 2/1/2019
- Higher-Education: 12/18/2015, 01/08/2016, 3/03/2017, 5/19/2017, 9/14/2018
- High/Enhanced Yield: 12/18/2015, 01/29/2016, 06/03/2016, 10/21/2016, 9/8/2017, 9/15/2017, 7/27/2018, 8/03/2018
- Infrastructure: 12/11/2015, 11/18/2016, 5/12/2017
- Local Government Credit: 04/01/2016, 6/24/2016, 11/23/2016, 4/07/2017, 11/10/2017
- Low beta/defensive: 08/25/2017
- Pensions: 10/14/2016, 11/23/2016, 10/20/2017, 10/27/2017, 11/03/2017, 10/12/2018, 10/19/2018, 10/26/2018, 04/05/2019, 04/17/2019, 08/16/2019, 08/23/2019, 10/18/2019
- Pre-paid Gas: 3/10/2017, 06/07/2019
- Pre-refunded bonds: 1/29/2018
- Primary and secondary (K-12) education: 11/02/2018
- Public Power/Electric: 08/28/2015, 10/30/2015, 04/22/2016, 05/06/2016, 6/02/2017, 2/09/2018
- U.S. Ports: 04/15/2016, 05/20/2016, 11/18/2016, 04/06/2018
- Secured Credits: 08/07/2015, 09/18/2015, 09/25/2015,
- Special Tax Bonds: 03/31/2015, 05/01/2015, 07/31/2015, 09/25/2015, 01/29/2016, 5/5/2017, 09/29/2017, 5/18/2018, 04/26/2019, 05/03/2019
- States: 06/26/2015, 02/26/2016, 6/24/2016, 8/5/2016, 11/23/2016, 11/03/2017
- SIFMA/Floating Rate notes: 03/15/2016, 08/26/2016, 3/31/2017, 4/28/2017, 04/13/2018, 9/14/2018, 02/20/2019, 04/26/2019
- Taxable bonds: 10/13/2017, 01/19/2018, 02/23/2018, 5/11/2018, 12/14/2018, 03/29/2019, 05/31/2019, 09/27/2019
- Toll Roads: 02/20/2015, 9/16/2016, 5/12/2017, 09/15/2017
- Tobacco: 11/20/2015, 12/15/2017, 7/27/2018, 03/29/2019
- Water & Sewer: 05/06/2016, 6/24/2016, 02/02/2018

Specific Credits

- Assured Guaranty: 03/18/2016, 6/23/2017, 10/27/2017
- National Public Finance Guarantee Corporation: 6/23/2017, 10/27/2017
- Chicago & related credits: 05/29/2015, 08/21/2015, 09/18/2015, 09/25/2015, 10/30/2015, 9/23/2016, 2/10/2017, 04/13/2018, 10/25/2019
- Dallas/Fort Worth & related credits: 02/19/2016, 12/16/2016, 3/10/2017, 6/02/2017, 08/04/2017, 04/13/2018
- Houston & related credits: 02/19/2016, 6/02/2017, 08/04/2017, 09/01/2017
- New York City & related credits: 03/31/2015, 6/17/2016, 9/9/2016, 8/17/2018, 08/23/2019
- Puerto Rico: 07/08/2016, 07/29/2016, 8/19/2016, 1/27/2017, 3/17/2017, 5/5/2017, 5/12/2017, 6/02/2017, 09/22/2017, 5/04/2018, 9/7/2018, 02/22/2019, 04/26/2019, 05/10/2019, 05/17/2019
- Philadelphia & related credits: 12/12/2014, 07/20/2015
- Santee Cooper / MEAG / Westinghouse Bankruptcy: 3/17/2017, 3/24/2017, 3/31/2017, 9/21/2018, 9/28/2018
- Seattle: 9/23/2016
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- State of Alaska: 07/28/2017, 06/15/2018
- State of California & locals: 04/24/2015, 04/08/2016, 8/19/2016, 9/30/2016, 11/4/2016, 03/02/2018, 03/09/2018, 06/08/2018
- State of Connecticut & locals: 02/06/2015, 07/20/2015, 08/18/2017, 5/18/2018, 10/04/2019
- State of Florida & locals: 03/06/2015, 09/25/2015
- State of Illinois & related credits: 5/19/2017, 6/02/2017, 6/09/2017, 6/16/2017, 7/07/2017, 9/29/2017, 7/13/2018, 1/11/2019, 03/01/2019, 05/31/2019, 07/26/2019
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- State of New York: 5/16/2014, 09/29/2017, 2/8/2019
- State of New Jersey & locals: 02/20/2015, 09/25/2015, 6/17/2016, 8/05/2016, 3/24/2017, 3/31/2017, 4/27/2018, 5/04/2018, 03/15/2019
- State of Pennsylvania: 7/15/2016
- State of Texas: 10/2/2015, 02/05/2016, 07/28/2017, 08/04/2017, 08/16/2019
- State of Wisconsin & locals: 03/15/2015, 9/30/2016
- U.S. Virgin Islands & Guam: 07/15/2016, 07/29/2016, 2/24/2017

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- Chapter 9/Distressed locals: 10/31/2014, 11/21/2014, 06/30/2015, 07/08/2016
- Defaults: 04/15/2016, 06/17/2016, 07/08/2016, 08/26/2016
- GO Security/Statutory Lien: 10/2/2015, 11/4/2016

Tax Policy

- AMT: 05/20/2016, 11/18/2016, 03/16/2018, 5/18/2018, 10/19/2018, 06/14/2019
- Deminimis: 5/31/2013, 1/3/2014, 12/9/2016, 03/02/2018, 06/14/2019
- State and local tax (SALT) deduction cap: 1/26/2018, 7/6/2018
- Tax-exemption: 3/1/2013, 3/15/2013, 05/20/2016
- Tax swapping: 7/19/2013, 1/24/2014, 10/28/2016, 2/09/2018, 10/12/2018
- Tax reform: 2/28/2014, 12/16/2016, 4/28/2017, 5/05/2017, 6/16/2017, 09/29/2017, 10/272017, 11/03/2017, 11/10/2017, 1/26/2018

Other Federal Public Policy

- State and Local Bond Issue Ballots: 11/06/2015, 11/09/2018
- Fundamental Review of Trading Book: 04/01/2016
- Regulatory reform/High-Quality Liquid Assets: 04/01/2016, 07/14/2017, 03/09/2018, 8/24/2018
- Highway Transportation Fund: 12/11/2015
- Health-care reform/Medicaid funding: 3/10/2017, 3/17/2017, 3/24/2017, 6/23/2017, 07/28/2017, 11/22/2017
- Trade war and tariffs: 04/06/2018, 06/07/2019

Periodic Updates

- Coupon performance: 5/9/2014, 10/17/2015, 04/08/2016, 9/21/2018, 03/15/2019, 06/14/2019, 06/28/2019, 10/18/2019
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- Federal Reserve Flow of Funds: 06/17/2016, 01/05/2018, 03/16/2018, 06/08/2018, 9/21/2018, 12/07/2018, 03/08/2019, 06/14/2019, 09/27/2019
- State and Local revenues: 3/31/2017, 6/16/2017, 9/29/2017, 01/05/2018, 04/13/2018, 9/21/2018, 1/11/2019, 05/17/2019, 06/21/2019, 09/20/2019
- Make-Whole Call: 04/22/2016, 07/12/2019
- Short call bonds: 08/28/2015, 12/11/2015, 03/04/2016, 3/3/2017, 3/10/2017, 08/04/2017
- Taxable advance refunding: 09/06/2019, 09/13/2019, 10/25/2019
- Total Return & Performance: 05/13/2016, 06/10/2016, 5/19/2017, 07/07/2017, 11/10/2017, 02/23/2018, 1/4/2019
- Sovereign Government Relative Value: 09/09/2016, 01/19/2018, 8/17/2018
- Relative sector value analysis: 6/09/2017
- Appropriation debt: 8/19/2016

Municipal Market Outlook

- 2019 Outlook: 11/20/2018
- 2H2019 Outlook: 06/21/2019

Weekly Updates

- Economic and policy updates
- Next week's supply
- Trading volumes and dealer inventory
- Fund flows
- Comparisons versus Corporates, Treasuries, and Global Sovereigns
- Full year gross and net-supply estimates
- Interest rate forecast

Peter DeGroot
(1-212) 834-7293
peter.degroot@jpmorgan.com

Daniel Zheng
(1-212) 834-5674
daniel.c.zheng@jpmorgan.com

Ye Tian
(1-212) 834-3051
ye.tian@jpmorgan.com

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