Winds of Change

Big Things Are Happening In The Bond Market

April 11, 2018
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Bond Basics
What is a Bond?

❖ A bond is an instrument of indebtedness of the bond issuer to the holders

❖ It is a debt security, under which the issuer owes the holders a debt and, depending on the terms of the bond, is obliged to pay them interest (the coupon) and/or to repay the principal at a later date, termed the maturity date.

❖ Interest is usually payable at fixed intervals (semiannual, annual, sometimes monthly).

❖ Very often the bond is negotiable, that is, the ownership of the instrument can be transferred in the secondary market.

❖ This means that once the transfer agents at the bank medallion stamp the bond, it is highly liquid on the second market.
What is a Bond?

❖ Thus, a bond is a form of loan or IOU: the holder of the bond is the lender (creditor), the issuer of the bond is the borrower (debtor), and the coupon is the interest.

❖ Bonds provide the borrower with external funds to finance long-term investments, or, in the case of government bonds, to finance current expenditure.

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**Life of a 4 Year Bond at 2% Interest**

<table>
<thead>
<tr>
<th>Year</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$100</td>
</tr>
<tr>
<td>2</td>
<td>$100</td>
</tr>
<tr>
<td>3</td>
<td>$100</td>
</tr>
<tr>
<td>4</td>
<td>$5,100</td>
</tr>
</tbody>
</table>

---

$6,000 $5,000 $4,000 $3,000 $2,000 $1,000 $0

$100 $100 $100 $5,100

Year 1 Interest Year 2 Interest Year 3 Interest Last Interest and Principal
Basic Components of an Interest Rate

Components of an interest rate:

❖ Risk free rate of return
❖ Default risk premium
❖ Inflation expectation
❖ Maturity premium
❖ Liquidity premium
❖ Tax treatment
The risk free rate of return is typically based off of the short-term US Treasury rate.

Because the chance of a US default is so remote, it is a good basis for credit risk.

The only problem with the US Treasury as a basis is that it also is subject to supply and demand issues.

For example, in the late 1990s when the government stopped issuing the 30 year bond, it became tough to determine a good basis for long-term rates.

Negative interest rates around the world and the high level of outstanding US debt are having impacts on the “risk free” rates around the world.
Default risk premium is also known as credit risk

This premium is how an investor gets compensated for the risk that they may not receive their principal back.

In the municipal market the default risk premium often identified by a credit rating.

The major credit rating agencies are Moody’s Investor Service, Standard and Poor’s and Fitch Rating Service.
Credit Ratings

How do the rating agencies determine your ability and willingness to make your payments?

❖ How high is your debt load?
  - Summary of outstanding obligations including debt service schedules

❖ How necessary is the project?
  - Description of the proposed borrowing

❖ How capable of payment are your taxpayers?
  - Summary of economic and demographic information

❖ What is the quality of management?
  - A call with management and discussion of management structure

What Do You Need for A Credit Rating?

Information Requirements

❖ 3 Years of Audited Financial Statements
❖ Current Year’s Budget
❖ Proposed Future Budget
❖ Capital Improvement Plan
❖ Comprehensive Plan for Sources and Uses of the Financing
## Credit Ratings

<table>
<thead>
<tr>
<th>Credit Risk</th>
<th>Moody’s</th>
<th>S&amp;P</th>
<th>Fitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>RISK FREE</td>
<td>Aaa</td>
<td>AAA</td>
<td>AAA</td>
</tr>
<tr>
<td>EXCELLENT</td>
<td>Aa</td>
<td>AA</td>
<td>AA</td>
</tr>
<tr>
<td>UPPER MEDIUM</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>LOWER MEDIUM</td>
<td>Baa</td>
<td>BBB</td>
<td>BBB</td>
</tr>
<tr>
<td>SPECULATIVE</td>
<td>Ba</td>
<td>BB</td>
<td>BB</td>
</tr>
<tr>
<td>VERY SPECULATIVE</td>
<td>B, Caa</td>
<td>B, CCC, CC</td>
<td>B, CCC, CC, C</td>
</tr>
<tr>
<td>DEFAULT</td>
<td>Ca, C</td>
<td>D</td>
<td>DDD, DD, D</td>
</tr>
</tbody>
</table>
An inflation expectation is how an investor takes into account the time value of money.

In order to agree to be without your cash, you must make some assumption of what the cost of goods and services will be once you receive your money back.

An inflation expectation can be positive or negative.

An expectation of deflation is how one can justify negative interest rates.
❖ All other things being equal longer dated bonds will be more sensitive to interest rates

❖ Changes to the expectations can greatly change the value of longer termed bonds

❖ A bond’s sensitivity to changes in interest rates can be expressed by a bond’s duration

❖ Fixed income portfolio managers will closely watch their durations to determine their risk
The liquidity premium is what investors will charge issuers for the marketability of the securities issued.

If a security does not have a very deep market with clear interest rate visibility, then investors will charge accordingly.

Compared to New York Stock Exchange listed stocks, municipal bonds, particularly smaller local governments, are not as liquid.

Viewed from the buyers perspective, bonds that are hard to liquidate will require a premium.
The tax treatment of securities will have a great impact on pricing.

Any change to tax status or income tax levels will have a material impact on the pricing of tax-exempt bonds.

Political uncertainty that creates tax status uncertainty could be a problem for the market.

No changes are expected any time soon but 30 years is a long time to hold a tax-exempt security.

Current combination of President and Congress makes a grand tax bargain more likely.
### Tax Treatment Premium or Discount

Analysis of the 2 Year Municipal bond using Bloomberg 2 Year Muni Benchmark:

<table>
<thead>
<tr>
<th>Component</th>
<th>3/21/2016</th>
<th>3/21/2017</th>
<th>4/13/2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk free rate of return*</td>
<td>0.30%</td>
<td>0.73%</td>
<td>1.76%</td>
</tr>
<tr>
<td>Default risk premium</td>
<td>0.15%</td>
<td>0.15%</td>
<td>0.15%</td>
</tr>
<tr>
<td>Inflation premium</td>
<td>0.25%</td>
<td>0.25%</td>
<td>0.30%</td>
</tr>
<tr>
<td>Maturity premium</td>
<td>0.20%</td>
<td>0.20%</td>
<td>0.05%</td>
</tr>
<tr>
<td>Liquidity premium</td>
<td>0.05%</td>
<td>0.05%</td>
<td>0.05%</td>
</tr>
<tr>
<td>Pre-tax municipal rate</td>
<td>0.95%</td>
<td>1.38%</td>
<td>2.31%</td>
</tr>
<tr>
<td>Tax advantaged discount</td>
<td>-0.24%</td>
<td>-0.09%</td>
<td>-0.56%</td>
</tr>
<tr>
<td>Total for 2 Year Municipal Bond</td>
<td>0.71%</td>
<td>1.29%</td>
<td>1.75%</td>
</tr>
<tr>
<td>Equivalent 2 Year US Treasury</td>
<td>0.87%</td>
<td>1.29%</td>
<td>2.35%</td>
</tr>
</tbody>
</table>

* 3 Month US Treasury
Tax Cuts and Jobs Act Effects
Effects of Tax Cuts and Jobs Act

❖ Reduction of corporate tax rates
  ▪ Reduces the value of tax-exemption on municipal bonds for banks and insurance companies
  ▪ Could trigger interest rate adjustments on private placements

❖ Repeal of corporate alternative minimum tax
  ▪ May increase value of AMT private activity bonds for corporate taxpayers

❖ Increases tax rate on insurance companies with tax-exempt interest

❖ Taxes large, private university endowments

❖ $10,000 limitation on deductions of state and local taxes (SALT)
  ▪ Raises after-tax cost to taxpayers of state and local taxes
  ▪ May increase value of state or local tax-exemption
Eliminated ability to issue tax-exempt advance refunding bonds after December 31, 2017
- Advance refunding bonds are issued more than 90 days before the call date of the refunded bonds

Eliminated ability to issue tax credit bonds after December 31, 2017
- Qualified Zone Academy Bonds
- New Clean Renewable Energy Bonds
- Qualified Energy Conservation Bonds

No repeal of private activity bonds and no repeal of stadium bonds

No transition rules
Historically, state and local taxpayers could claim a federal tax deduction for the amount of their state and local taxes paid (income tax, property tax, etc.)

Taxpayers in high tax states have been the main beneficiaries of this deduction
- If you paid $1,000 in local taxes
- Claim $1,000 deduction on federal tax return
- At 35% federal tax rate, value of $350

Tax Cuts and Jobs Act imposes a $10,000 limitation on deduction for state and local taxes

Individual investors in taxable bonds may have an increased interest in taxable municipal bonds that are exempt from their state or local income taxes
Elimination of Tax-Exempt Refundings

- In an advance refunding, during the escrow period there are double the amount of tax-exempt bonds outstanding until the old bonds are paid off.

- Potential changes in the municipal market following the tax bill are:
  - Shorter par call dates
  - Calls with premiums
  - Make-whole calls prior to call date
  - Synthetic advance refundings, including derivatives and options
  - Taxable refunding issues
  - Cinderella structures
Post Tax Reform Refunding Options Matrix

Refunding Options

High Execution Risk / Low Complexity
- Formal Tender
- Informal Tender (Negotiate with Bondholders)
- Cash Optimization

High Execution Risk / High Complexity
- Cinderella Bonds
- Sale of Call Option

Low Execution Risk / Low Complexity
- Tax-Exempt Advance Refunding of Build America Bonds (BABs)
- Forward Delivery Refunding
- Taxable Advance Refunding
- Wait for Current Refunding

Low Execution Risk / High Complexity
- Forward Starting Swap (Rate Lock)
- Swaption
High Execution Risk / Low Complexity

- **Cash Optimization**: For a project that would be funded with cash on hand, reprogram that cash to escrow outstanding bonds to the call date, separately and at a later date issue new money bonds to fund the project.

- **Negotiate with Bondholders (Informal Tender)**: If major current bondholders can be easily identified, an informal tender offer can be pursued. Issuer can give authorization to contact current bondholders and, informally, solicit interest in a bond buyback or exchange. A premium to current market valuation will be required to spur current bondholders to participate.

- **Formal Tender**: A formal process designed to reach all current (small & large) bondholders. A premium to current market valuation will be required to spur current bondholders to participate.

Low Execution Risk / Low Complexity

- **Wait for Current Refunding**: Wait to issue current refunding bonds during 90-day period preceding call date.

- **Taxable Advance Refundings**: Use taxable bonds to advance refund tax-exempt bonds.

- **Forward Delivery Refunding**: A forward delivery is used to currently refund outstanding bonds while pricing in advance of the 90-day period prior to the optional redemption date.

- **Tax-Exempt Advance Refunding of Build America Bonds (BABs)**: Issue tax-exempt bonds to advance refund callable taxable BABs, thereby foregoing the BAB subsidy payment (normal advance refunding, not a crossover). New prohibition on advance refunding does not apply because there are not two tax-advantaged issues outstanding at the same time.
Refinancing Tools Available

**Low Execution Risk / High Complexity**

- **Swaption**: A derivative product to lock in the savings for a future refunding at current interest rates, and receive the savings as a cash payment paid today.

- **Rate Lock (i.e. Forward Starting Swap)**: A derivative product used to lock in an interest rate today, for a refunding to be completed at the call date.

**High Execution Risk / High Complexity**

- **Sale of Call Option**: “Detach” call option from outstanding bonds and offer to sell to investors. In exchange for paying cash today, investor owns the right to purchase the issuer’s bonds on the call date.

- **Cinderella Bonds**: Advance refunding bonds initially issued as taxable, with the expectation of converting to predetermined tax-exempt rates on the call date of the refunded bond.
The Big Picture
How Demographics Moves Economics

- Country’s economic fates are tied to the demographic changes in their populations.

- Population demographics may be changed by immigration but for the most part they offer a glimpse into the future.

- The peak earning years of 45-54 also correspond with peak spending years.

- When a country’s working age population grows it adds stimulus to an economy.

- A similar but opposite effect happens when large populations head towards retirement.

- Mandatory 401(k) withdrawals begin at age 70 ½.
The Six Living Generations in America

- GI Generation
- Silent Generation
- Baby Boomers
- Generation X
- Millennials
- Generation Z
Millennials

BORN 1980-2000

❖ They experienced the rise of the Internet, Sept. 11 and the wars that followed. Sometimes called Generation Y.
❖ Because of their dependence on technology, they are said to be entitled and narcissistic. They schedule everything.
❖ They feel enormous academic pressure.
❖ They feel like a generation and have great expectations for themselves.
❖ Prefer digital literacy as they grew up in a digital environment.
❖ Have never known a world without computers! They get all their information and most of their socialization from the Internet.
❖ Prefer to work in teams.
❖ With unlimited access to information tend to be assertive with strong views.
❖ Envision the world as a 24/7 place; want fast and immediate processing.
❖ They have been told over and over again that they are special, and they expect the world to treat them that way.
❖ They do not live to work, they prefer a more relaxed work environment with a lot of hand holding and accolades.

Generation Z

BORN 2001-2013

❖ These kids were the first born with the Internet and are suspected to be the most individualistic and technology-dependent generation. Sometimes referred to as the iGeneration.

❖ In 2006 there were a record number of births in the US and 49% of those born were Hispanic, this will change the American melting pot in terms of behavior and culture. The number of births in 2006 far outnumbered the start of the baby boom generation, and they will easily be a larger generation.

❖ Since the early 1700’s the most common last name in the US was ‘Smith’ but not anymore, now it is Rodriguez.

❖ 4 million will have their own cell phones. They have never known a world without computers and cell phones.

❖ With the advent of computers and web based learning, children leave behind toys at younger and younger age. It’s called KGOY-kids growing older younger, and many companies have suffered because of it, most recognizable is Mattel, the maker of Barbie dolls. In the 1990’s the average age of a child in their target market was 10 years old, and in 2000 it dropped to 3 years old.

❖ As children reach the age of four and five, old enough to play on the computer, they become less interested in toys and begin to desire electronics such as cell phones and video games.

Population Distribution: US

United States of America
2016
Population: 324,118,000

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: US 2041

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: Europe

EUROPE 2016

Population: 738,849,000

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: Europe 2041

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: China

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: China 2041

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: India 2041

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: India

Sub-Saharan Africa 2016

Population: 988,088,000

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
Population Distribution: India 2041

Source: United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2015 Revision. (Medium variant)
The collision of demographics, automation and inequality is likely to create decades of disruption.

**Labor 2030**

- **Demographics**
  - Aging workforces across the world reduce potential supply growth

- **Automation**
  - Oncoming automation wave increases potential supply growth

- **Inequality**
  - Rising income inequality reduces potential demand growth

- Several turbulent decades of transition
- Resetting of government–market relationship
- Complex macro environment changes for business

Source: Bain Macro Trends Group analysis, 2017
Labor Market Trends Forecast

Figure 36

Labor’s share of GDP is already declining; increased automation may accelerate this trend.

US labor share of output: 1951 64%, 2016 57%

US growth in productivity vs. growth in compensation, indexed to 1948

300%
200
100
0

Net productivity
Compensation gap goes to owners of capital
Hourly compensation

Notes: US labor share of output is five-year moving average; labor share is for nonfarm sector; data is for average hourly compensation of production/nonsupervisory workers in private sector and net productivity of total economy; net productivity is growth of output of goods and services minus depreciation per hour worked.

Total Population Is Still On Trend

Shaded areas indicate U.S. recessions

Source: U.S. Bureau of the Census

myf.red/g/UfW
Difference Between Unemployment and Not Looking

- U3 Unemployment Rate
- Participation Rate Adjusted Unemployment Rate

Data Courtesy: Bureau of Labor Statistics
Labor Force Participation Still Low

[Graph showing the trend of the Civilian Labor Force Participation Rate from 1994 to 2018. The graph indicates a decreasing trend with shaded areas representing U.S. recessions.]

Source: U.S. Bureau of Labor Statistics

Shaded areas indicate U.S. recessions.
Labor Force Participation For Prime Working Age

Shaded areas indicate U.S. recessions

Source: U.S. Bureau of Labor Statistics
Prime Working and Earning Years

[Graph showing the civilian noninstitutional population aged 25 to 54 years from 1950 to 2010, with shaded areas indicating U.S. recessions.]

Source: U.S. Bureau of Labor Statistics
People Continue To Work Longer
Even As The Boomers Head Towards Retirement

FRED: Civilian Noninstitutional Population - 55 years and over

Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org
Big Picture – The Good
Brighter Prospects

Global economic activity continues to firm up.

Source: IMF World Economic Outlook Update – January 22, 2018
Risks

The global economy is expected to maintain near-term momentum, but challenges loom.

**Financial Market Correction**
- Triggered by tighter U.S. monetary policy in response to inflation
- Buildup of financial vulnerabilities

**Investment Growth**
- Lower-than-expected impact from U.S. tax policy changes
- Policy uncertainties

**Inward-Looking Policies**
- Increased regulatory/trade barriers

**Noneconomic Factors**
- Geopolitical tensions
- Political uncertainty
- Reform implementation risks
- Extreme weather and climate events

Source: IMF World Economic Outlook Update – January 22, 2018
IMF – Brighter Prospects

**Priorities for Policymakers**

Common policy objectives: (1) raise potential growth, (2) proactively increase resilience, (3) ensure more inclusive growth

- **Promote global cooperation and free & fair trade**
- **Advanced Economies**
  - Monitor inflation and carefully adjust monetary policy; structural reforms to boost potential growth
- **Emerging Markets**
  - When needed, use monetary policy to support demand; avoid deferring reforms and budgetary adjustments
- **Low-Income Countries**
  - Diversify economies and build resilience-enhancing buffers

Source: IMF World Economic Outlook Update – January 22, 2018
Median Household Income

Real Median Household Income in the United States

Shaded areas indicate U.S. recessions

Source: U.S. Bureau of the Census
Building Permits Are Trending Up

Source: Bloomberg
Financial Conditions Are Still Supportive
Consumer Sentiment is Good

University of Michigan Consumer Sentiment Index

Source: Bloomberg
Home Prices Have Recovered
Housing Starts Are Trending Up

U.S. Housing Starts, Thous, SAAR

Source: Bloomberg
Clermont County Home Prices

All-Transactions House Price Index for Clermont County, OH

Shaded areas indicate U.S. recessions

Source: U.S. Federal Housing Finance Agency

myf.red/g/j149
Butler County Home Prices

All-Transactions House Price Index for Butler County, OH

Shaded areas indicate U.S. recessions

Source: U.S. Federal Housing Finance Agency

myf.red/g/j13O
Hamilton County Home Prices
Pike County Home Prices

[Graph showing the All-Transactions House Price Index for Pike County, OH, from 2000 to 2016. The graph indicates shaded areas representing U.S. recessions, and the source is the U.S. Federal Housing Finance Agency.]
Athens County Home Prices
Big Picture – The Bad
While Debt Levels Have Been Rising
Debt to GDP at Record Levels

Exhibit 1: Total Debt and GDP for the US

Source: Federal Reserve; Bureau of Economic Analysis
Equity Valuations Are High

Lawrence McDonald @Convertbo... · 12m
NDX 100 (Nasdaq 100)

Equity Market Capitalization to US GDP

2018: 38%
2008: 10%
2007: 13%
2006: 15%
2005: 16%
2004: 15%
2003: 14%
2002: 8%
2001: 25%
2000: 37%

Bloomberg
#technology
#FANG
Home Prices Relative to Income at High Levels

Source: JP Morgan as of December 31, 2017
The Fed Is Looking to Tighten

[Graph showing the Effective Federal Funds Rate from 2004 to 2018.]
And Reduce Its Balance Sheet

Fed’s Asset Holdings ($bn)

Balance sheet run-off starting Q4 2017 at $10bn per month. Cap raised by $10bn each quarter until it reaches $50bn a month.

Sources – Federal Reserve, Thomson Reuters, CE

Source: Capital Economics
Monetary Base Growth Has Stalled

[Graph showing the growth of the St. Louis Adjusted Monetary Base from 1985 to 2015. Shaded areas indicate U.S. recessions. Source: Federal Reserve Bank of St. Louis.]
Have Low Interest Rates Deterred Savings?
Price to Sales Ratio: S&P 500 vs. S&P Equal Weight
GMO 7-Year Asset Class Real Return Forecasts

As of December 31, 2017

Source: GMO

*The chart represents real return forecasts for several asset classes and not for any GMO fund or strategy. These forecasts are forward-looking statements based upon the reasonable beliefs of GMO and are not a guarantee of future performance. Forward-looking statements speak only as of the date they are made, and GMO assumes no duty to and does not undertake to update forward-looking statements. Forward-looking statements are subject to numerous assumptions, risks, and uncertainties, which change over time. Actual results may differ materially from those anticipated in forward-looking statements. U.S. inflation is assumed to mean revert to long-term inflation of 2.2% over 15 years.
A new Hoover Institution report entitled “Hidden Debt, Hidden Deficits” released this week highlights the coming pension problem.

In an interview on CNBC Joshua Rauh, a senior fellow stated: “The amounts of money [officials] are setting aside [for pensions] are far short of adequate.”

“Most public pension systems across the United State still calculate both their pension costs and liabilities under the assumption that their contributed assets will achieve returns of 7.5 [to] 8 percent per year”

“The trouble is we’ve lived through an amazing bull market in all asset classes. And what state and local governments are doing is betting that bull market is going to continue indefinitely”

Current Market Environment
History of US Interest Rates
US 10 Year Treasury History
US 10 Year Treasury History

Shaded areas indicate U.S. recessions. Source: Board of Governors of the Federal Reserve System (US). myf.red/g/j5Rx
Rate Increases Have Caused Problems In The Past

[Graph showing US Treasury 10Y Yield with significant events marked: Black Monday, S&L Crisis, Japan Bubble Bursts, Tequila Crisis, DotCom Bubble Bursts, Global Financial Crisis]
Interest Rate Forecast

- Market consensus and Stifel expect the Fed to have three rate hikes in 2018
  - Fed meeting on December 13th hiked the federal funds rate from 1.25% to 1.50%
- Federal Reserve expected to continue “gradual” pace of rate increases with economic recovery
  - Probability of a rate hike in March is 100%
Fed Projections vs Market Expectations

Source: Gerard Minack, The Downunder Daily
Forecasts Are Hard
Forecasts Are Hard

Evolution of Atlanta Fed GDPNow real GDP estimate for 2018: Q1
Quarterly percent change (SAAR)

Sources: Blue Chip Economic Indicators and Blue Chip Financial Forecasts
Note: The top (bottom) 10 forecast is an average of the highest (lowest) 10 forecasts in the Blue Chip survey.
Federal Funds Rate History

Board of Governors of the Federal Reserve System
Inflation or Deflation

Selected US Consumer Goods and Services, and Wages

- More Expensive
- More Affordable

- Overall inflation (+55.6%)
- Housing
- Food and Beverage
- Wages
- Medical Care Services
- Childcare
- College Textbooks
- College Tuition
- New Cars
- Household Furnishings
- Clothing
- Cellphone Service
- Software
- Toys
- TVs

Source: BLS

Carpe Diem
AEI
Core CPI and NY Fed Underlying Inflation Gauge

Correlation with 16 Month Lead: 80%

January 1998 through March 2, 2018
CPI = Consumer Price Index is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food, and medical care. YoY = year-over-year.
You cannot invest directly in an index.
ISM PMI and Core CPI (YoY)

- ISM PMI tends to lead core CPI by 18-24 months. Elevated ISM indicates higher core inflation.

**Correlation with 21 Month Lead: 78%**

<table>
<thead>
<tr>
<th>Core CPI YoY on 2/28/18 (R1)</th>
<th>1.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISM PMI Manufacturing (21mo lead) (L1)</td>
<td>60.8</td>
</tr>
</tbody>
</table>

- CPI = Consumer Price Index is a measure that examines the weighted average of prices of a basket of consumer goods and services, such as transportation, food, and medical care. PMI = Purchase Managers Index (PMI) is an indicator of the economic health of the manufacturing sector based on five major indicators: new orders, inventory levels, production, supplier deliveries, and the employment environment. YoY = year-over-year. You cannot invest directly in an index.
Historic Interest Rates

Source: US Treasury Department, Thompson Reuters. As of 3/08/18
Municipal Market Information

- **Municipal supply in 2017: $410 billion**\(^1\)
  - Spike in year end volume fueled by federal tax reform debate

- **Municipal supply in 2018 YTD: $48 billion**\(^1\)
  - Volume down over 30% compared to same period in 2017
  - SIFMA projects 2018 issuance at $323 billion\(^1\)

- **Investor demand remaining strong**
  - Nearly constant weekly inflows into municipal mutual funds
  - Uncertain how equity volatility will affect flows

\(^1\)Long term issues only. Weekly averages of estimated 30-day visible supply.

Sources: SDC, Thomson Reuters, Investment Company Institute. As of 3/08/18
# Global Bond Comparison

## Mar-17

<table>
<thead>
<tr>
<th>Bond Type</th>
<th>2 Year</th>
<th>5 Year</th>
<th>10 Year</th>
<th>30 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States Treasury</td>
<td>1.31%</td>
<td>2.02%</td>
<td>2.50%</td>
<td>3.11%</td>
</tr>
<tr>
<td>Germany Bund</td>
<td>-0.79%</td>
<td>-0.34%</td>
<td>0.43%</td>
<td>1.17%</td>
</tr>
<tr>
<td>United Kingdom Gilt</td>
<td>0.08%</td>
<td>0.60%</td>
<td>1.24%</td>
<td>1.82%</td>
</tr>
<tr>
<td>Japan Government Bond</td>
<td>-0.26%</td>
<td>-0.14%</td>
<td>0.07%</td>
<td>0.83%</td>
</tr>
<tr>
<td>Australia Bond</td>
<td>1.82%</td>
<td>2.36%</td>
<td>2.86%</td>
<td>3.23%</td>
</tr>
</tbody>
</table>

## Mar-18

<table>
<thead>
<tr>
<th>Bond Type</th>
<th>2 Year</th>
<th>5 Year</th>
<th>10 Year</th>
<th>30 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States Treasury</td>
<td>2.26%</td>
<td>2.65%</td>
<td>2.90%</td>
<td>3.16%</td>
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<tr>
<td>Germany Bund</td>
<td>-0.58%</td>
<td>0.02%</td>
<td>0.64%</td>
<td>1.29%</td>
</tr>
<tr>
<td>United Kingdom Gilt</td>
<td>0.82%</td>
<td>1.16%</td>
<td>1.49%</td>
<td>1.91%</td>
</tr>
<tr>
<td>Japan Government Bond</td>
<td>-0.16%</td>
<td>-0.12%</td>
<td>0.04%</td>
<td>0.76%</td>
</tr>
<tr>
<td>Australia Bond</td>
<td>2.00%</td>
<td>2.36%</td>
<td>2.78%</td>
<td>2.99%</td>
</tr>
</tbody>
</table>
## Current Yield Curve (March 8, 2018)

<table>
<thead>
<tr>
<th>Year</th>
<th>Maturity</th>
<th>MMD AAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2019</td>
<td>1.42</td>
</tr>
<tr>
<td>2</td>
<td>2020</td>
<td>1.54</td>
</tr>
<tr>
<td>3</td>
<td>2021</td>
<td>1.66</td>
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<tr>
<td>4</td>
<td>2022</td>
<td>1.81</td>
</tr>
<tr>
<td>5</td>
<td>2023</td>
<td>1.96</td>
</tr>
<tr>
<td>6</td>
<td>2024</td>
<td>2.06</td>
</tr>
<tr>
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<td>2.29</td>
</tr>
<tr>
<td>9</td>
<td>2027</td>
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<tr>
<td>10</td>
<td>2028</td>
<td>2.47</td>
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<tr>
<td>11</td>
<td>2029</td>
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<tr>
<td>12</td>
<td>2030</td>
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<tr>
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<td>2031</td>
<td>2.65</td>
</tr>
<tr>
<td>14</td>
<td>2032</td>
<td>2.70</td>
</tr>
<tr>
<td>15</td>
<td>2033</td>
<td>2.75</td>
</tr>
</tbody>
</table>
Yield Curve Is Getting Flatter

Percent

- MMD AAA Rate 3/20/2017
- MMD AAA Rate 3/31/2016
- MMD AAA Rate 4/17/2018
Flat or Inverted Yield Curves

- A flat yield curve signals no maturity premium
- Investors are charging issuers no premium for being without their money
- Inverted yield curves signal that investors would rather have their money invested over a longer period of years than to get their money back sooner
- Because the federal reserve largely controls the short-term rate, they often cause inverted yield curves
- Flat or inverted yield curves often signal economic problems ahead
What Does This Mean as a Issuer of Bonds?

- The current trend of interest rates may be changing
- The next year will be critical for determining future path
- We have started to see a pick up in rates globally which will only put more pressure on Treasury rates
- If we start to see inflation pick up, then building costs will start to go up (labor, steel, etc.) and cost to finance will go up
- Will the Fed hike its way to a flat yield curve?
- Can rates go up without breaking the economy?
Thank You, Time for Questions

WHO'S AWESOME?
You're awesome!