MINNESOTA STATE BOARD OF INVESTMENT

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DATE: February 11, 2021

TO: Legislative Reference Library

FROM: Mansco Perry III MP3
Executive Director and Chief Investment Officer

SUBJECT: Report on Investment Consultant Activities

The provisions of Minnesota Statutes, Section 11A.27 require the State Board of Investment to file with the Legislative Reference Library a report on investment consultant activities.

The State Board of Investment (SBI) contracts with Aon Investments USA Inc. (Aon), Chicago, Illinois and Meketa Investment Group, LLC (Meketa), Portland, Oregon. Aon serves as the SBI's general consultant and the annual contract fees are $515,000. Meketa serves as the SBI's special projects consultant and the contract fees are $285,000 per year.

As part of their consultant services, AON and Meketa are available to the Board, staff and Investment Advisory Council to provide perspective, counsel and input on relevant investment related issues.

During the period July 1, 2019 through June 30, 2020, Aon and Meketa were involved in the following project:

- Aon and Meketa presented on various topics at the SBI's Fiduciary Responsibility & Governance Principles Training in January 2020.
    - Aon provided material on Fiduciary Duty, Asset Allocation, and Benchmarking;
    - Meketa provided information around Investment Risk and Environmental, Social, and Governance (ESG) investing.

- Periodic background information for evaluating SBI investment managers.

Attached is an example of the work product each has provided.

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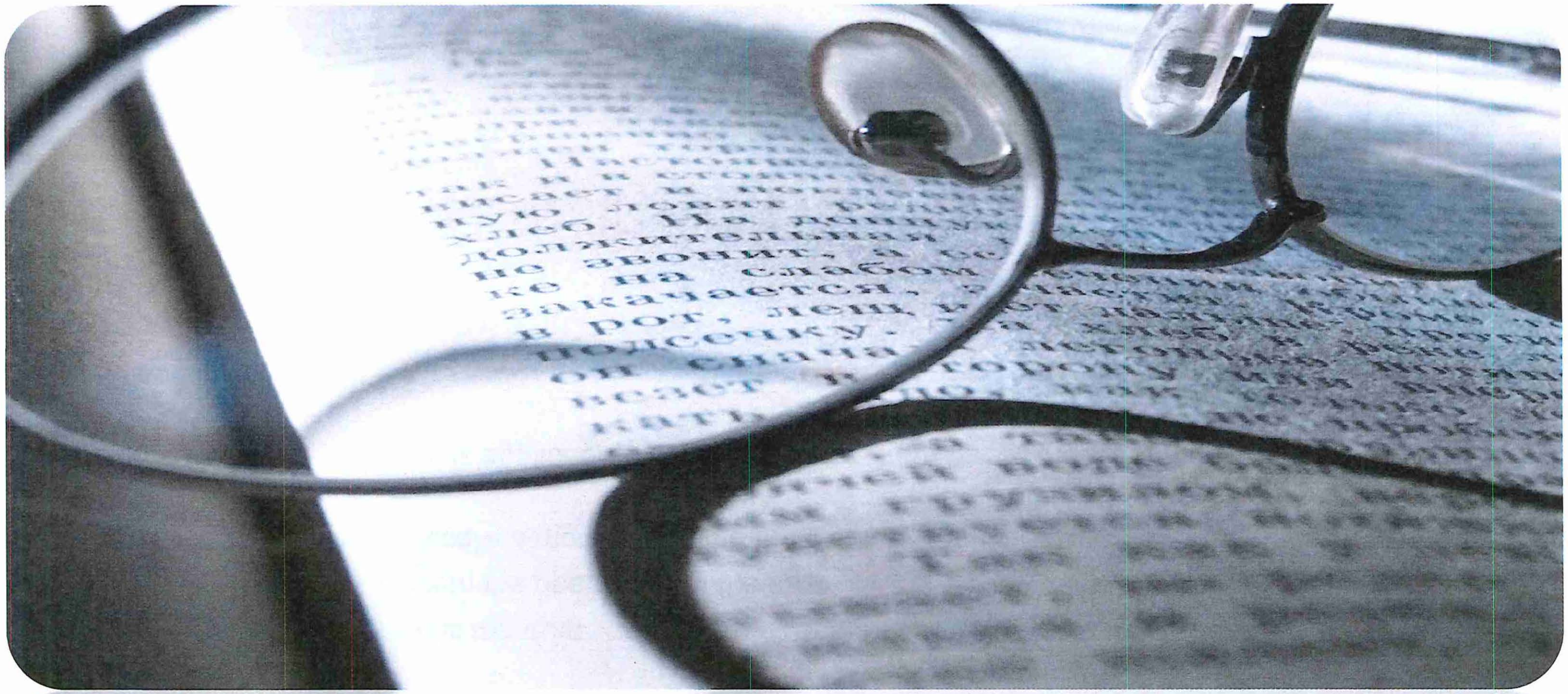

Minnesota State Board of Investment
Fiduciary Responsibility & Governance Principles Training
January 21, 2020

Empower Results®

Why Fiduciary Training Is Important?

As a member of the Minnesota State Board of Investment, you are a fiduciary.

This session is to assist you to understand your role, your responsibilities as a fiduciary, and to help you act accordingly.

Fiduciary law stems from the common law of trusts

General trust law

- Settlor = Creates the trust
- Trustees = Govern the operations of the trust
- Beneficiary= Receives money from the trust

Primary Source: State laws applicable to the Minnesota State Board of Investment

- Other sources

SBI Prudent Person Rule

The members of the state board, director, board staff, and members of the council and any other person charged with the responsibility of investing money [...] shall act in good faith and shall exercise that degree of judgment and care, under circumstances then prevailing, which persons of prudence, discretion, and intelligence exercise in the management of their own affairs, not for speculation, but for investment, considering the probable safety of their capital as well as the probable income to be derived therefrom.

Minn. Stat. §11A.09

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- In addition to the Prudent Person Rule, Minnesota Statutes Chapter 356A establishes a separate, but very similar fiduciary duty standard with respect to pensions.

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Persons to whom the duty is owed

1. The active, deferred, and retired members of the plan, who are its beneficiaries
2. The taxpayers of the state or political subdivision, who help finance the plan; and
3. The state of Minnesota, which established the plan.

Minn. Stat. §356A.04, subd. 1

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Purpose of activities

Activities must be carried out solely for the following purposes:

1. To provide authorized benefits to plan participants and beneficiaries;
2. To incur and pay reasonable and necessary administrative expenses; or
3. To manage a covered pension plan in accordance with the purposes and intent of the plan document

Minn. Stat. §356A.05(a)

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Fiduciary Duties Overview

Fiduciary Duties

Duty of Loyalty	Duty of Prudence	Diversification	Follow Plan Document	Prohibited Transactions
-Exclusive benefit rule -Exclusive purpose of providing benefits	–Skill, prudence & diligence –Prevailing circumstances –Like capacity & familiar with such matters –Conduct of an enterprise of like character with like aims	–Diversify to minimize risk unless imprudent to do so	–To the extent consistent with applicable law	–No self-dealing –No transactions benefiting nonparticipants –No acting against plan interests –Limited exceptions

AON
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What is "Good Governance" And Why is it Important?

- Governance is the structure, manner and process by which authority or control is exercised
- "Good governance" begins with a clear understanding of fiduciary duty
- "Good governance helps to ensure better organizational performance, fewer conflicts of interest, higher probability that goals and objectives will be attained, and less opportunity for misuse of corporate or fund assets" - *The Stanford Institutional Investors' Forum*
- Good governance adds value – tangible and intangible

Governance – State Board of Investment

The Minnesota Constitution establishes the Board. Minnesota Constitution Article 11 § 8. Minn. Stat. § § 11A.03 and .04 establish the framework with express authority for the Board.

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Executive Director

- Appointing and evaluating a qualified Executive Director with an appropriate level of knowledge is key.
- Minn. Stat. § 11A.07 statutorily gives authority to the Executive Director to implement investment policy.
- The Board has retained consultants and investment managers to advise board not just SBI Executive Director and staff.

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IAC

By statue there is an Investment Advisory Council that has

- 10 of 17 members that must have investment knowledge and
- 7 members are representatives of various constituencies and some of which in practice do have some general investment experience.

Minn. Stat. § 11A.08.

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Administrative Committee

Administrative Committee has representation from the IAC, each of the pension fund directors, and a designee of each board member to review budget, compensation and administrative matters.

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Proxy Committee

- The Board has adopted proxy guidelines.
- The Board has established proxy committee with designees from each board member to implement procedures to vote on proxies.

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Conflict of Interest

There are statutes and policies in place to limit the potential for conflicts of interest and self-dealing. *See* Minn. Stat. § § 11A.04 (5), 11A.075.

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Fiduciary Education

- A fiduciary must make reasonable effort to obtain knowledge and skills sufficient to enable the fiduciary to perform fiduciary activities adequately.
- The SBI maintains a fiduciary education program that it reviews each year as part of its budget process.

Minn. Stat. §356A.13

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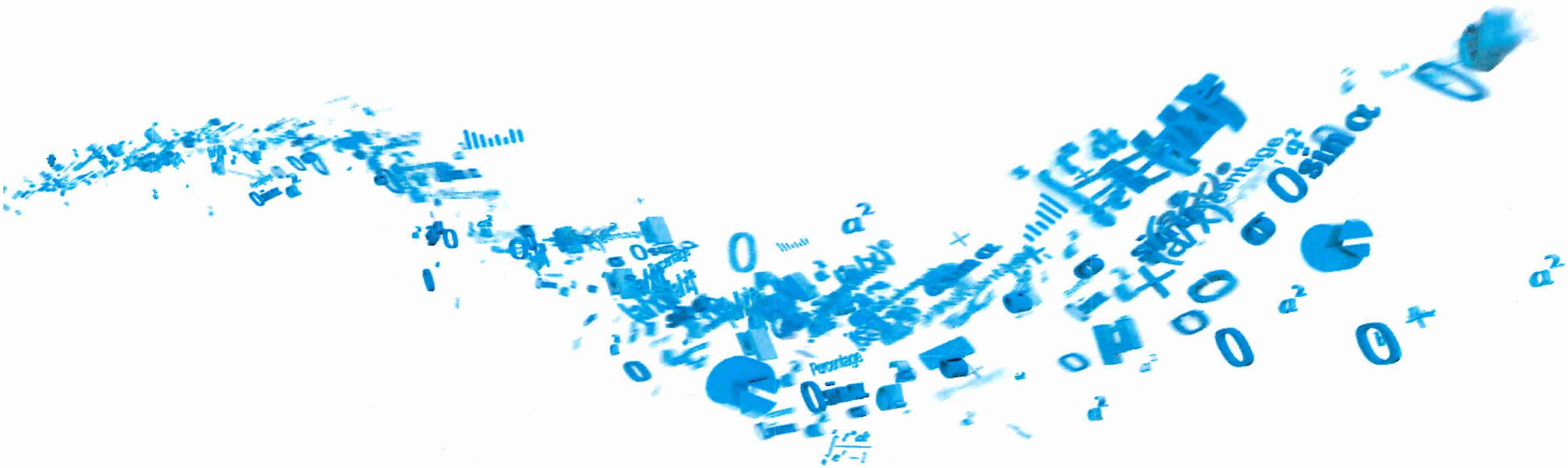
Different Public Fund Plan Structures

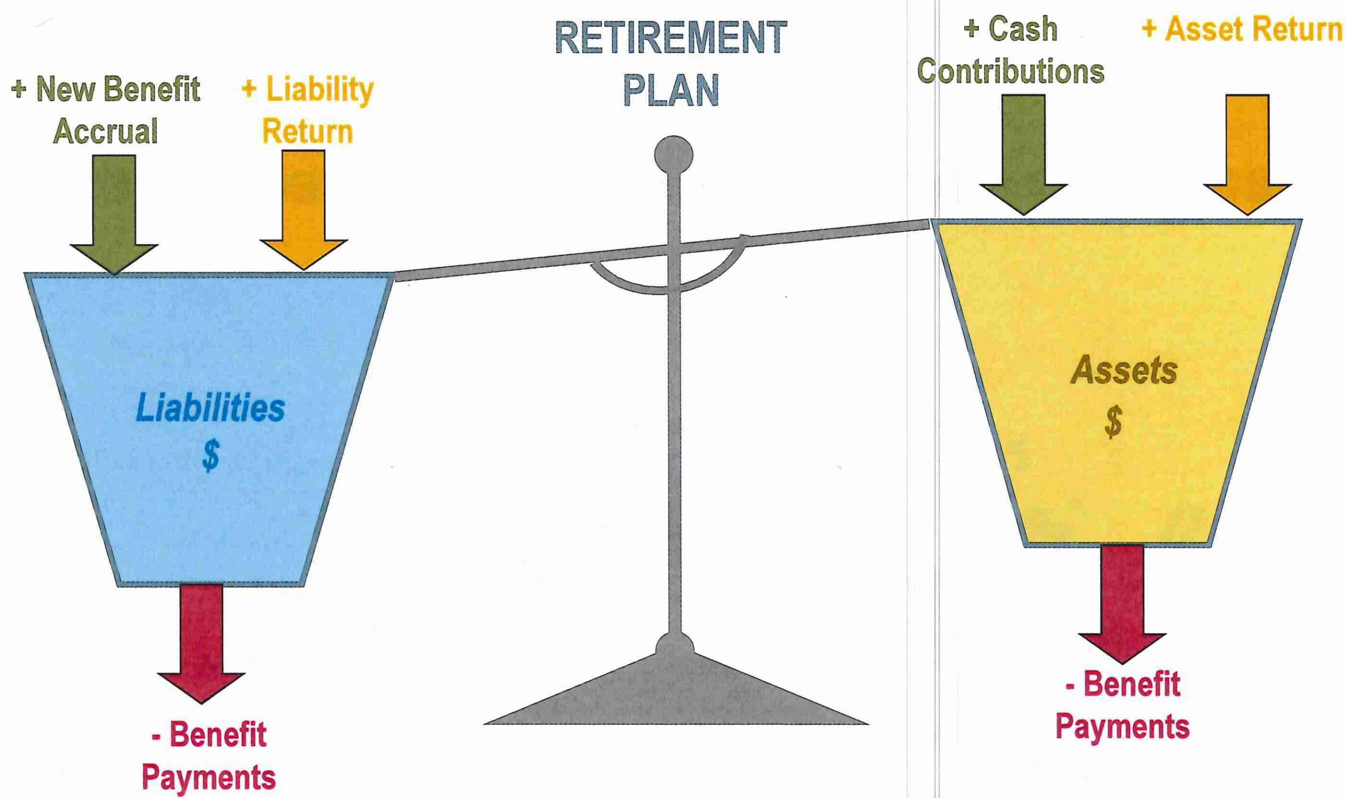
- Examples of Separate Investment Entities:
  - Alaska State Pension Investment Board
  - Florida State Board of Administration
  - Illinois State Board of Investment
  - Massachusetts Pension Reserves Investment Management Board
  - State of Michigan Investment Board
  - Minnesota State Investment Board
  - Montana Board of Investments
  - Nebraska Investment Council
  - New Jersey State Investment Council
  - Oregon Investment Council
  - Rhode Island State Investment Commission
  - South Carolina Retirement Systems Investment Commission
  - South Dakota Investment Council
  - State of Wisconsin Investment Board
  - Washington State Investment Board



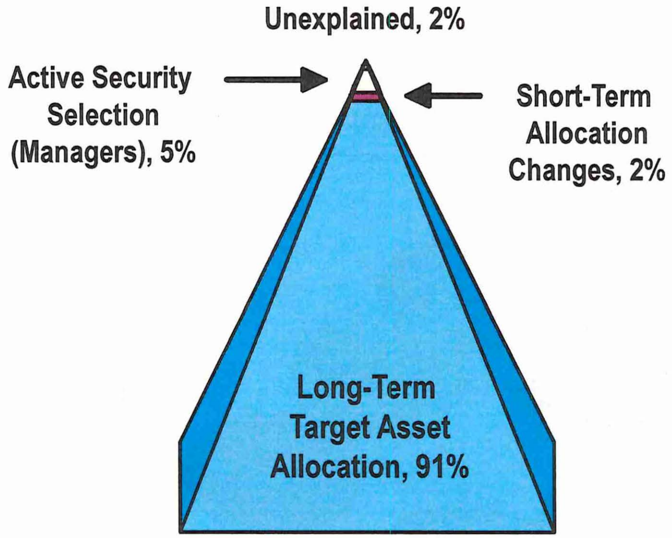
Minnesota State Board of Investments – Asset Allocation

January 2020

Pension Accounting
Balance of Liabilities and Assets



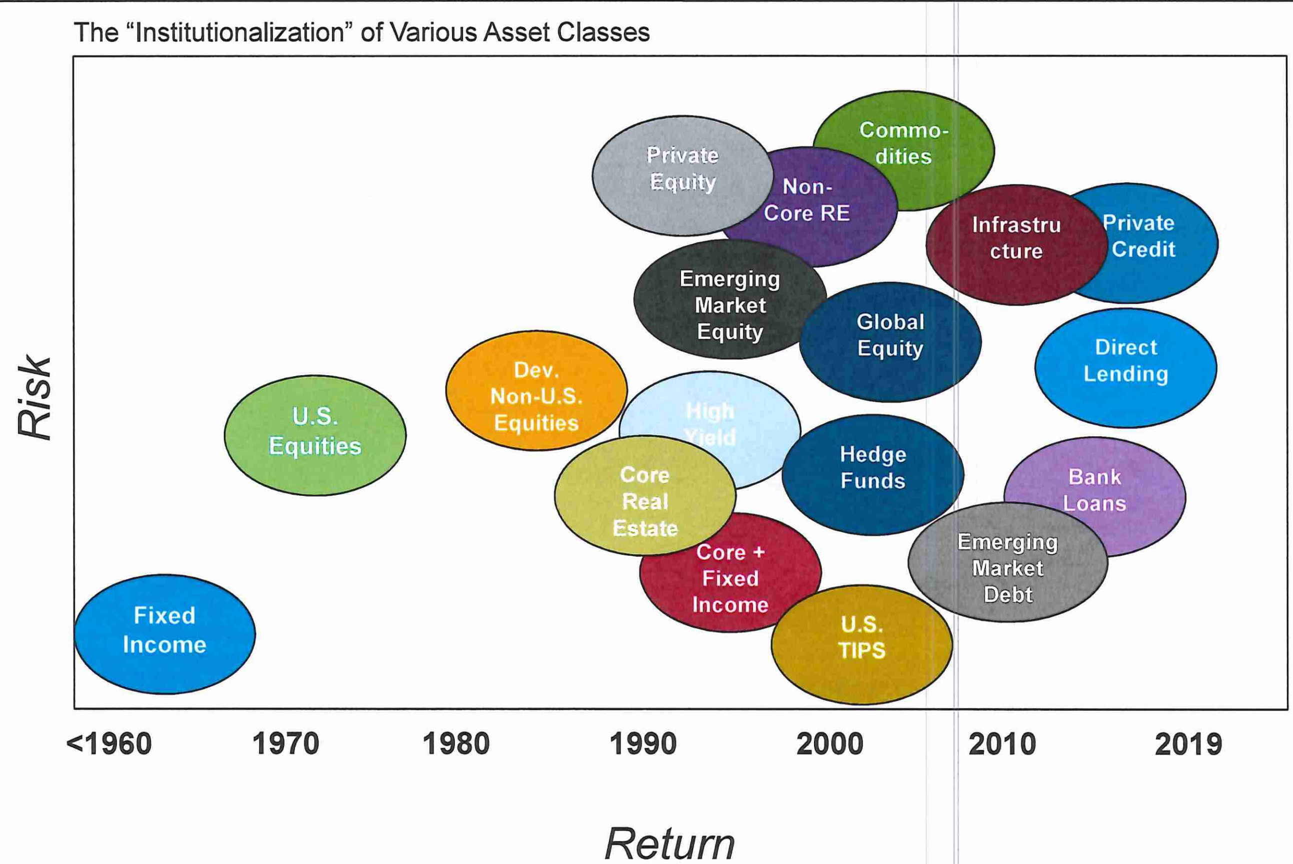
Asset Allocation—The Most Important Decision



Asset allocation refers to the implementation of an investment strategy that seeks to balance reward (investment return) and risk (volatility of returns) by mixing various assets based on investor's risk profile and return goal

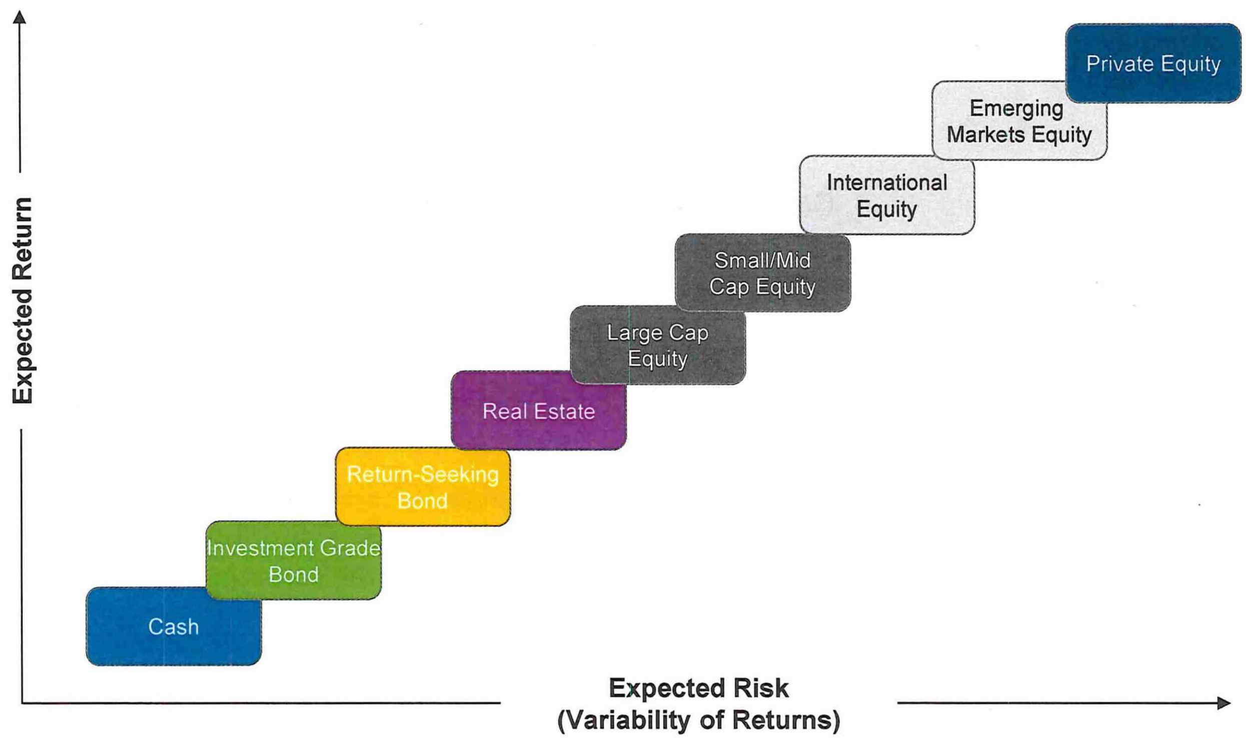
Asset allocation is the most important investment decision as it explains more than 90% of investment return based on multiple historical studies

The Evolution of Institutional Investors' Asset Allocation



- The asset allocation of institutional investors has and likely will continue to evolve over time.

Risk-Return Spectrum (Illustrative)



Importance of an Asset-Liability Study for Setting Asset Allocation

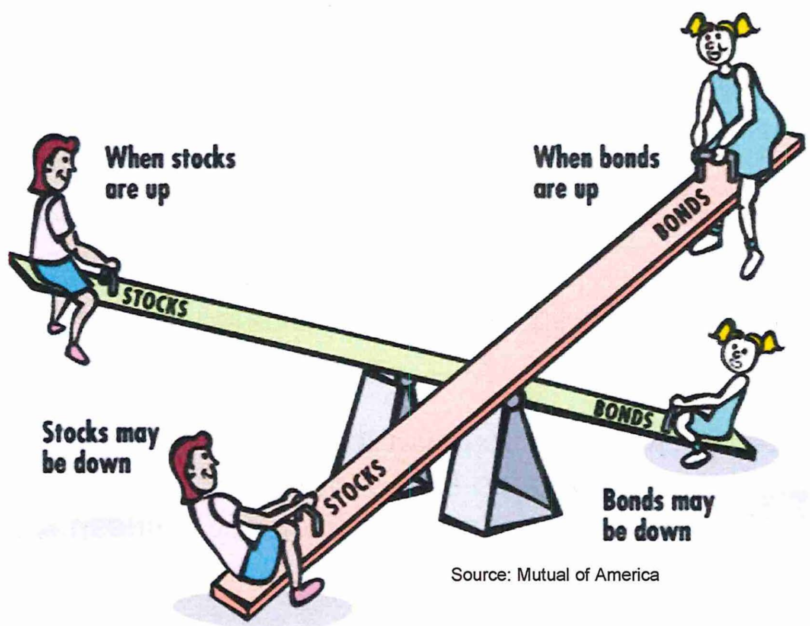
- Provides fiduciaries with an understanding of the dynamic relationship between plan assets and liabilities over time
- Illustrates the impact of various asset allocations on key financial metrics, such as required contributions and funded status, under a range of different macro-economic scenarios
- Helps determine the level of risk that is appropriate in the context of the Plan's liabilities
- **The key take-away from the asset-liability study is the allocation between equity ("return-seeking") vs. fixed income ("risk-reducing")**

*An asset-liability study is a **comprehensive toolkit** for **making decisions** on a fund's **asset allocation** and investment risk **that align with the liabilities** those funds support.*

Diversification

Diversification is a requirement in the definition of prudent fiduciary investing

- Diversified portfolios are meant to **reduce risk** while maintaining an expected return
- All asset classes do not produce the same results in a particular economic environment



Source: Mutual of America

Benchmarking: Purposes & Types

- Benchmarks are used to measure the performance of the Total Fund, asset classes, and individual managers over various time periods and across methodologies to determine the effectiveness of implementation of an investment program

- There are many types of benchmarks that can be used to analyze relative performance of an investment
  - Broad market (MSCI ACWI IMI Index)
  - Style-specific (S&P 500 Value Index)
  - Risk adjusted returns (vs. benchmark Sharpe ratio)
  - Absolute return metric (i.e. 7% return target)
  - Real return target (i.e. CPI + 3%)
  - Peer universe (i.e. Public Funds >$1 billion)

- Careful attention should be paid to appropriateness when selecting the benchmark for a given asset class, manager, or strategy

Q & A

Minnesota State Board of Investment: Investment Programs

Introduction

- The SBI manages investments for several investment programs:
  - Combined Pension Funds
  - Participant Directed Investment Program
  - Fire Funds
  - Non-Retirement Investment Program
  - State Cash

Combined Pension Plans: Overview

- Represent the three statewide pension plans: MSRS, TRA, PERA
- $74.21 billion AUM as of December 31, 2019
- Board sets asset allocation and reviews investments in public equities, fixed income, private markets, and cash

Combined Pension Plans: Asset Allocation

- SBI's current asset allocation is as follows:
  - Public Equity: 53%
  - Fixed Income/Treasuries: 20%
  - Private Markets: 25%
  - Cash: 2%
- Board reviews the SBI asset allocation periodically.

SBI's Strategic Asset Category Framework

Asset Category	Actual % As Of 9/30/19	Category Ranges
Growth - Appreciation	**76.5%**	**50 – 75%**
Public Equity	62.9%	
Private Equity	8.5%	
Non-Core Real Assets	3.5%	
Distressed/Opportunistic	1.5%	
Growth-Income Oriented	**11.3%**	**15 – 30%**
Core Fixed Income	10.4%	
Private Credit	0.9%	
Return-Seeking Fixed Income	0.0%	
Real Assets	**0.7%**	**0 – 10%**
Core Real Estate	0.0%	
Real Assets	0.7%	
Inflation-Protection	**0.0%**	**0 – 10%**
TIPS	0.0%	
Commodities	0.0%	
Protection – U.S. Treasuries	**10.6%**	**5 – 20%**
Liquidity – Cash	**0.9%**	**0 – 5%**
Opportunity	**0.0%**	**0 – 10%**

Participant Directed Investment Program

- Retirement and benefit programs in which participants select investments from options made available by the SBI.
- Total AUM of $11.32 billion. Programs Include:
  - Deferred Compensation Program
  - Unclassified Retirement Plan
  - Health Care Savings Plan
  - PERA Defined Contribution Plan
  - Hennepin County Supplemental Plan
  - Minnesota Achieving a Better Life Experience (ABLE) Plan
  - Minnesota College Savings Plan

Firefighter Plans

- The SBI provides investment options for various volunteer fire departments across the state.
- Statewide Volunteer Firefighter Retirement Plan:
  - Combined fire plans administered through PERA and invested in a balanced fund constructed by the SBI.
  - Total AUM $120.06 million
- Local Volunteer Fire Relief Plans:
  - Individual plans who choose investment options through the SBI's Supplemental Investment Fund (SIF) platform
  - Total AUM: $716.41 million

Non-Retirement Investment Program

- Includes various state trusts and other programs for which the SBI provides investment options.
- Total AUM of $4.30 billion. Programs include:
  - Environmental Trust Fund
  - Permanent School Fund
  - Closed Landfill Investment Fund
  - Other Postemployment Benefits (OPEB)
  - Assigned Risk Plan
  - City and County Equity Investment Program
  - Other various programs for which the SBI provides investment options

State Cash

- The SBI manages state cash not currently needed for general fund expenditures through the Invested Treasurer's Cash account
- Total AUM of $13.64 billion
- State cash is managed internally in short-term investments such as treasuries and repurchase agreements.

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Minnesota State Board of Investment

January 21, 2020

A Brief Discussion of Investment Risk

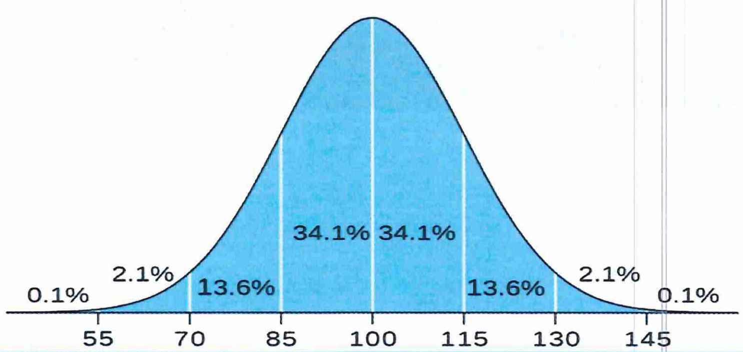
What is Risk?

"Risk is the chance an outcome or investment's actual return will differ from the expected"[1]

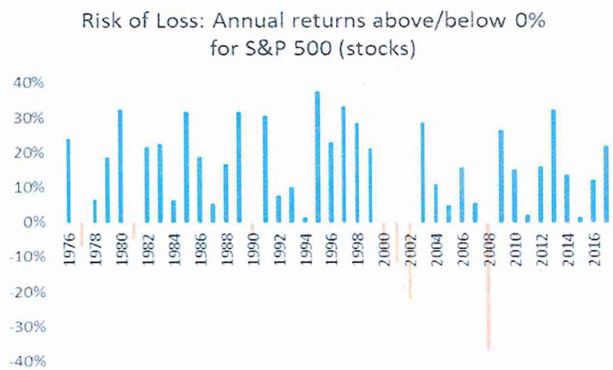
"The possibility of something bad happening. Something bad that might happen"[2]

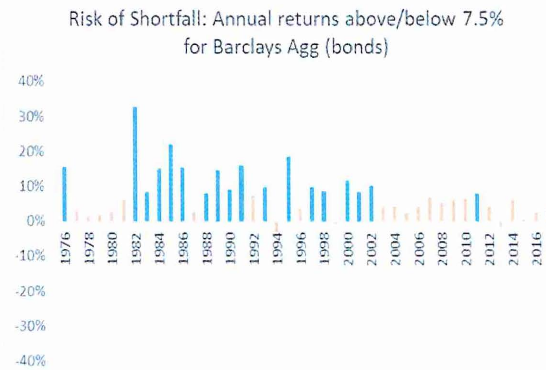
- Two perspectives - consensus boils down to "something bad happening".
- Traditional measure of risk is standard deviation (a measure of volatility). Key challenge: downside and upside treated equally

A Normal Distribution Curve



[1] Investopedia
[2] Cambridge Dictionary





- Investors' objectives and tolerance for different outcomes vary. Therefore, no single number can measure all the myriad types of risks
  - Left graph: Risk of Loss
  - Right graph: Risk of Falling Short

- Which is riskier? It depends. In either case, volatility does not provide a clear answer.

Different Measurements of Risk

- Permanent Impairment (returns too poor to recover from)
- Loss (negative returns, over some timeframe)
- Shortfall (returns less than a threshold, over some timeframe)
- Failure to meet spending obligations
- Volatility (standard deviation of returns)
- Inflation (losing purchasing power from returns less than inflation rate)
- Underperformance (returns less than a benchmark)
- Peer comparison (returns less than peer institutions)
- Reputation
- Behavioral (poor returns cause lack of conviction and deviations from strategy)
- Liquidity (likelihood of having to access hard-to-sell assets at the wrong time)

Additional Risk Considerations

- Adequate resources and well-qualified staff

- Economic Regime Change:
  - Examples: shift to low-carbon economy; secular change in interest rates

- Economic Regime Change is very hard to identify in advance

Addressing Economic Regime Change

- Requires time and resources
- Misidentifying regime change is problematic
- The impacts of regime change are complex and nuanced
- Policy responses requires significant resources and time.

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Minnesota State Board of Investment

January 2020

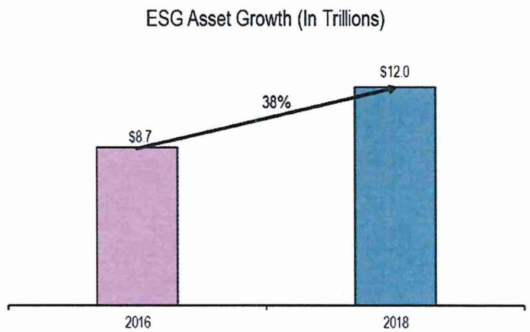
Environmental Social Governance Overview

Introduction

- The Minnesota State Board of Investments (SBI) is among a growing number of U.S. public investment entities taking steps to understand how material Environmental, Social and Governance (ESG) issues may be integrated in to their investment decision-making process to support their fiduciary duties
- Today we provide an overview of institutional investor approaches to ESG and offer a range of potential investment strategy/policy options

ESG Investing

- ESG investing: Using Environmental, Social, and Governance factors in investing
- Active managers always considered ESG factors - to varying degrees
- Today ESG factors are being formalized, reflecting increased concern of investors



- All versions of ESG investments combined grew 38% from 2016 to 2018 in the US[1]
- ESG investing encompasses shareholder proxy voting and engagement

[1] US SIF 2018 Report.

Common ESG Considerations

Environment	Social	Governance
Climate change	Consumer rights	Board structure
Energy transition	Health and safety	Board diversity
Sustainability best practice	Product safety	Independent directors
Environmental policy & mgmt.	Labor relations	Chairman / CEO split
Water supply	Community / stakeholder relations	Executive pay
Sustainable transport		Shareowner rights
Waste management		Accounting / audit

Materiality

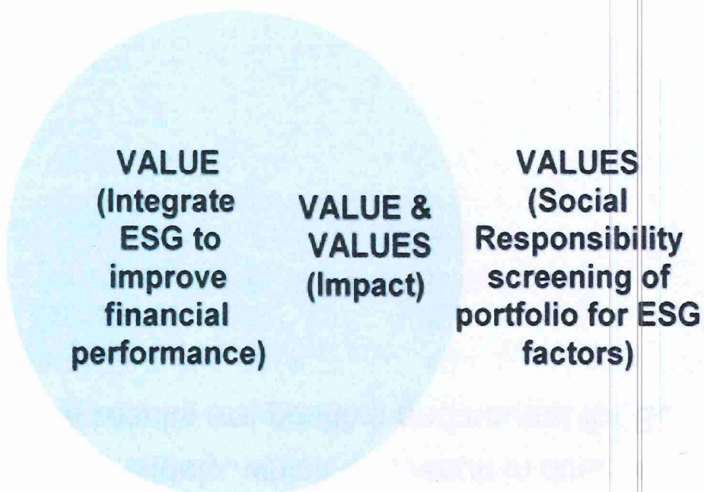
Growing focus on material impact of ESG factors on investment performance

Investment Performance and ESG

- ESG data availability, and regulation increased dramatically in the last few years
- ESG data and scores vary widely, which can result in different performance
- Many ESG performance results are positive and neutral for ESG, but not all

Examples of ESG Investing

ESG Investing spans three types: Integrate, Impact, and Social Responsibility



- Integrating material ESG factors into investment strategy squarely fits within a US public pension plan's fiduciary duty
- ESG integration can be costly, time consuming, and require more staff and external resources

ESG at U.S. Public Pension Plans

- ESG approaches may be incorporated throughout a plan's investment approach
  - Investment beliefs
  - Investment policy
  - Asset allocation
  - Investment manager selection
  - Monitor investment managers
  - Monitor investment portfolio
    - Select ESG factors
    - Climate change reporting
  - Engagement
    - Investment Managers
    - Regulators/Government
    - Companies

Summary

- ESG institutional investor investment standards continue to evolve
- Approaches to ESG vary widely among U.S. public pension plans
- SBI actively incorporates ESG into its investment approach; additional strategies/approaches may be worth exploring
- Time and costs to implement ESG strategies range from some low resource to high internal and external resource and time intensive

Minnesota State Board of Investment
Proxy Voting and ESG Overview

SBI Investment Belief

Utilizing engagement initiatives to address environmental, social, and governance related (ESG) issues can lead to positive portfolio and governance outcomes.

Proxy Voting: Procedures

- U.S. securities are voted internally;
- Non-U.S. securities are voted by investment managers;
- The Board delegates voting authority to a four person committee to execute proxy voting rights for U.S. securities.

Proxy Voting: Committee Meetings

- The proxy committee meetings are scheduled on an as-needed basis to vote resolutions not covered by precedent.
- SBI staff provide applicable materials in advance of the meeting.
- The proxy committee votes by majority and may set precedent with a unanimous vote.

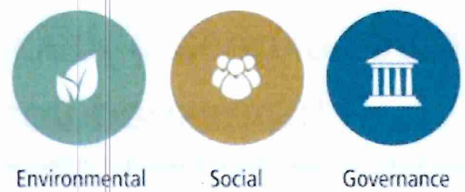
Proxy Voting: Precedent

- Most proxy ballots are voted according to precedent

Example of Proxy Precedent:

Performance Based Stock Options [Executive Compensation]
Vote FOR shareholder proposals to adopt a policy of executive compensation that utilizes performance based stock options.

Environmental, Social and Governance (ESG) Introduction



The SBI engages in environmental, social and governance (ESG) initiatives to address long-term, material risks and opportunities that are expected to lead to positive portfolio outcomes.

ESG Initiatives Include: Proxy voting, Coalitions and Memberships, and Engagement.

ESG: Coalitions and Memberships

- Council of Institutional Investors (CII)
- United Nations Principles of Responsible Investing (PRI)
- Ceres Investor Network
- Institutional Limited Partners Association (ILPA)
- Climate Action 100+ (PRI and Ceres)
- Thirty Percent Coalition
- Midwest Investors Diversity Initiative

ESG: Recent Initiatives

- Engagement activities through Ceres and Climate Action 100+
- Signatory to initial engagement letters sent on behalf of the Midwest Investors Diversity Initiative and Thirty Percent Coalition
- Signatory to the Investor Agenda Global Investor Statement to Governments on Climate Change (Ceres; Investor Agenda)
- Signatory to Investor Expectations on Deforestation (Ceres)

ESG: Recent Initiatives

- Signatory to initial engagement letters sent on behalf of the Midwest Investors Diversity Initiative and Thirty Percent Coalition
- Signatory to several letters to regulatory agencies on shareholder and limited partner rights and protections (ILPA; CII)
- Signatory to resolution calling for increased corporate transparency regarding gender diversity (As You Sow)

ESG: Examples of Engagement Successes

- In September 2019, Duke Energy committed to a goal of being carbon neutral by 2050. CalSTRS led the engagement effort with the support of other public plans and organizations including the Climate Action 100+.
- TPG, an SBI private markets manager added 64 female directors to 53 portfolio company boards over the last two years. TPG partnered with the Thirty Percent Coalition to find qualified candidates.

ESG: Future Development

- Continue to incorporate ESG into investment management process;
- Devote additional SBI resources and expand engagement efforts;
- Continue to conduct research on material ESG issues; and
- Continue education efforts.

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Market Environment

Third Quarter 2020

Aon

Investment advice and consulting services provided by Aon Investments USA Inc.

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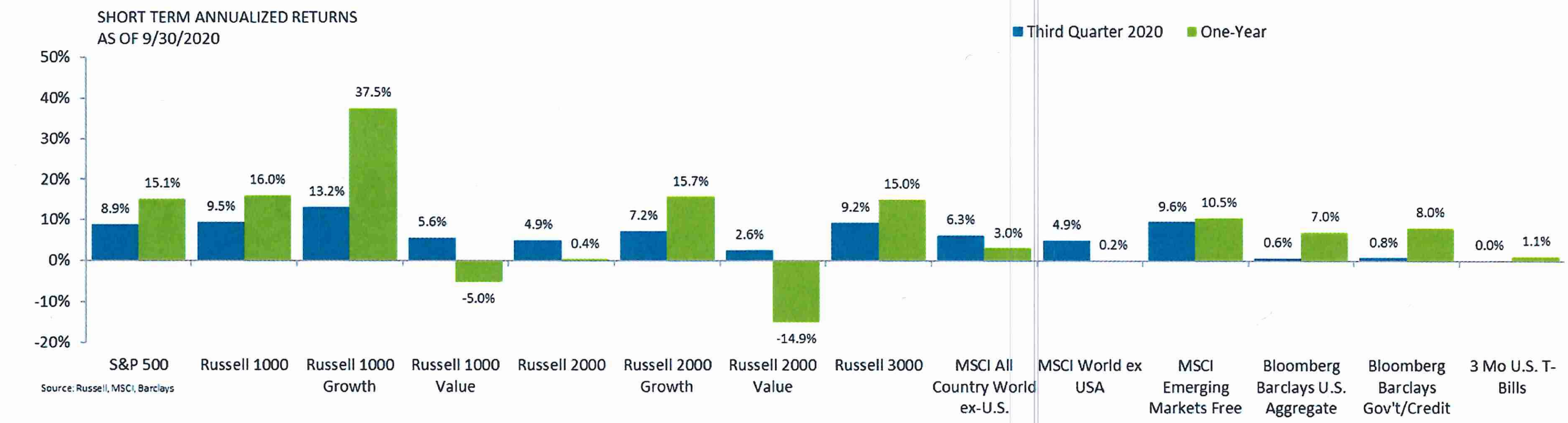
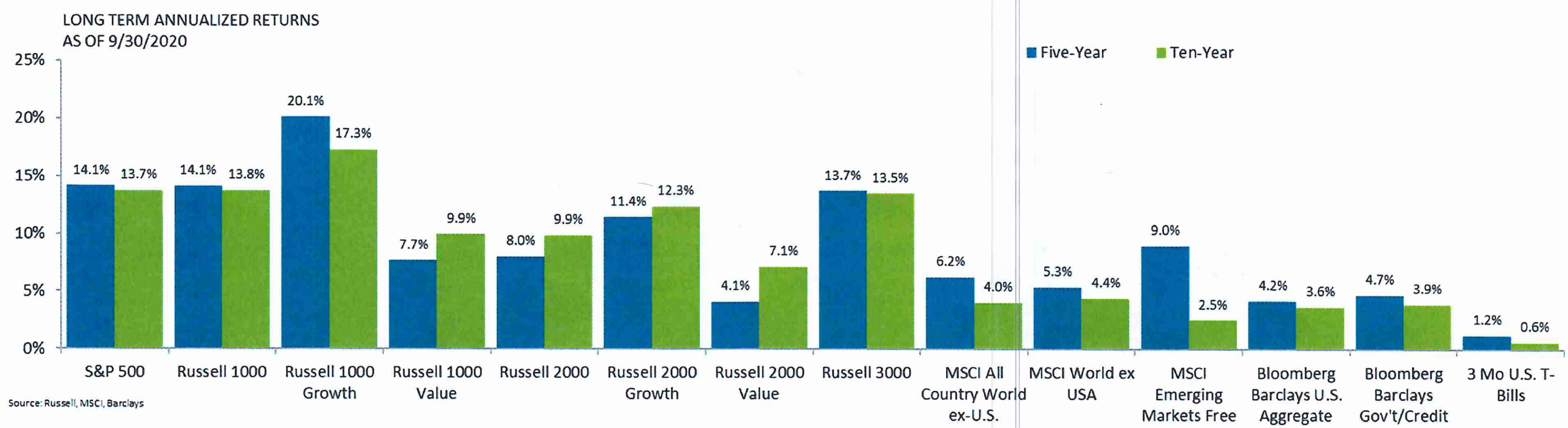
Market Highlights





Market Highlights

Returns of the Major Capital Markets

Periods Ending 9/30/2020

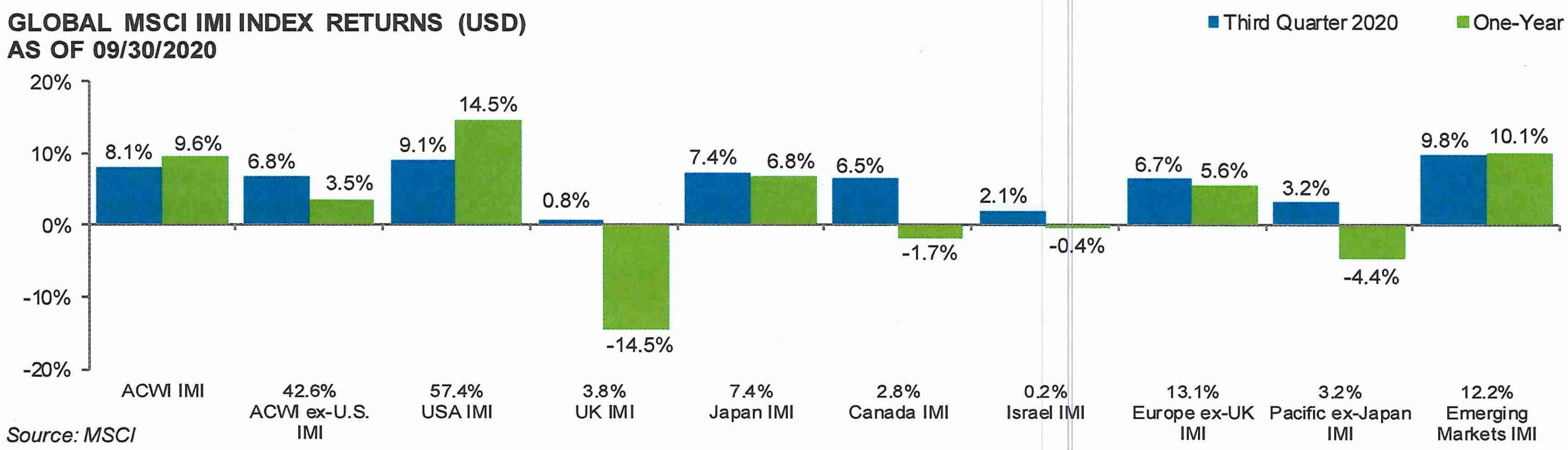
	Third Quarter	1-Year	3-Year[1]	5-Year[1]	10-Year[1]
Domestic Equity					
S&P 500	8.9%	15.1%	12.3%	14.1%	13.7%
Russell 1000	9.5%	16.0%	12.4%	14.1%	13.8%
Russell 1000 Growth	13.2%	37.5%	21.7%	20.1%	17.3%
Russell 1000 Value	5.6%	-5.0%	2.6%	7.7%	9.9%
Russell 2000	4.9%	0.4%	1.8%	8.0%	9.9%
Russell 2000 Growth	7.2%	15.7%	8.2%	11.4%	12.3%
Russell 2000 Value	2.6%	-14.9%	-5.1%	4.1%	7.1%
Russell 3000	9.2%	15.0%	11.6%	13.7%	13.5%
International Equity					
MSCI All Country World ex-U.S.	6.3%	3.0%	1.2%	6.2%	4.0%
MSCI World ex USA	4.9%	0.2%	0.6%	5.3%	4.4%
MSCI Emerging Markets Free	9.6%	10.5%	2.4%	9.0%	2.5%
Fixed Income					
Bloomberg Barclays U.S. Aggregate	0.6%	7.0%	5.2%	4.2%	3.6%
Bloomberg Barclays Gov't/Credit	0.8%	8.0%	5.9%	4.7%	3.9%
3 Mo U.S. T-Bills	0.0%	1.1%	1.7%	1.2%	0.6%
Inflation					
CPI-U	1.2%	1.4%	1.8%	1.8%	1.8%

MSCI Indices show net returns.

All other indices show total returns.

[1] Periods are annualized.

Global Equity Markets

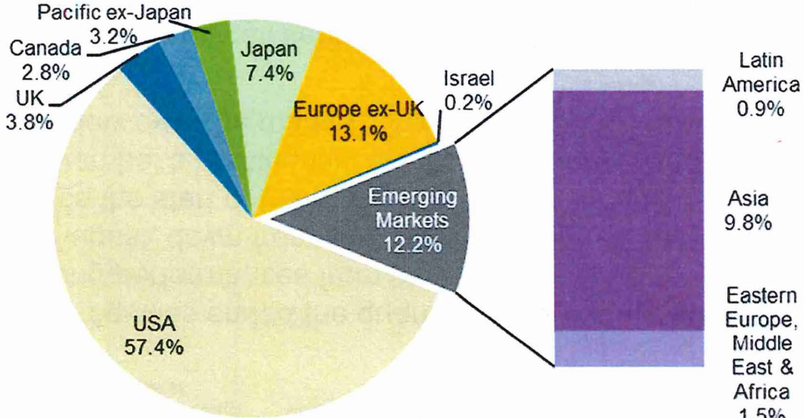


Source: MSCI

- Global equities continued their rebound over the third quarter as they broke through their pre-pandemic all time highs in early September. This performance was supported by optimism over progress in Covid-19 vaccine trials and supportive monetary and fiscal policies. However, rising fears of a second wave coronavirus outbreak and failure to agree further fiscal stimulus reversed some of the equity market's gains, bringing the MSCI AC World Investable Market Index's local currency return over the quarter to 6.9%. Depreciation of the U.S. dollar further pushed up the returns to 8.1% in USD terms.
- Emerging Markets equities were the best performers with a return of 9.8% over the quarter, supported by strong returns from the Consumer Discretionary and Information Technology sectors. Chinese equities continued their strong performance, boosted by the government's successful containment of Covid-19, despite increasing U.S.-China tensions.
- UK equities were the worst performer, returning 0.8% over the quarter. The UK's economy contracted by 19.8% over the second quarter, the worst Q2 contraction of any major developed economy. Heightened Brexit uncertainty also weighed on UK equities, as trade negotiations continue ahead of the end of the transition period in December.

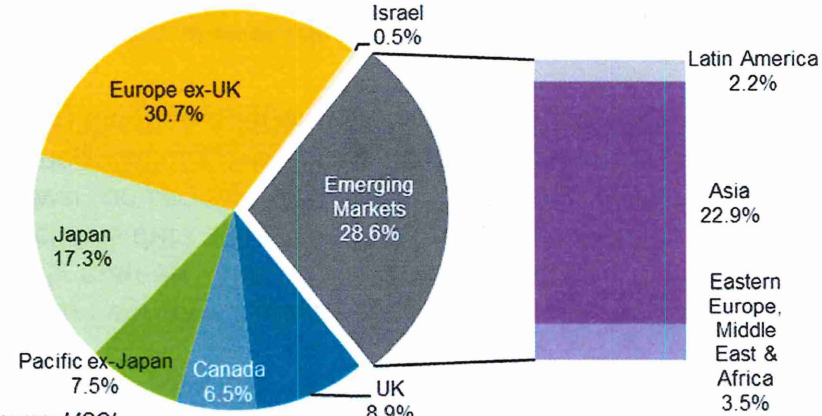
Global Equity Markets

MSCI ALL COUNTRY WORLD IMI INDEX GEOGRAPHIC ALLOCATION AS OF 09/30/2020



Source: MSCI

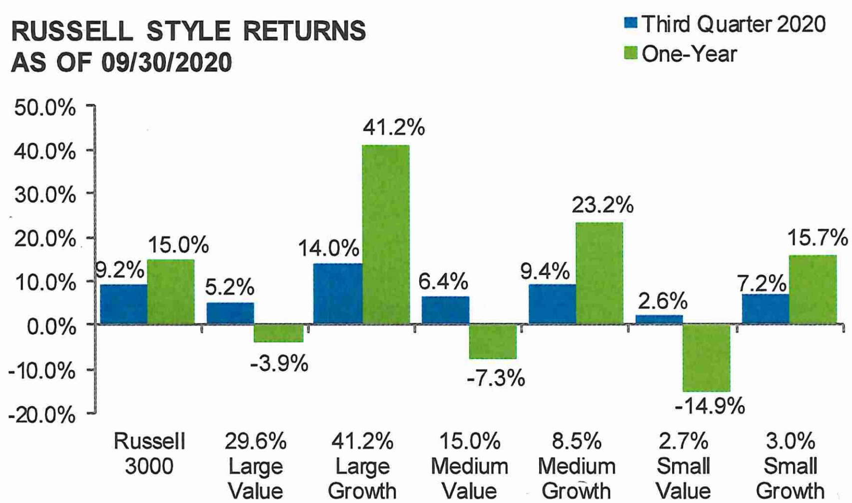
MSCI ALL COUNTRY WORLD EX-U.S. IMI INDEX GEOGRAPHIC ALLOCATION AS OF 09/30/2020



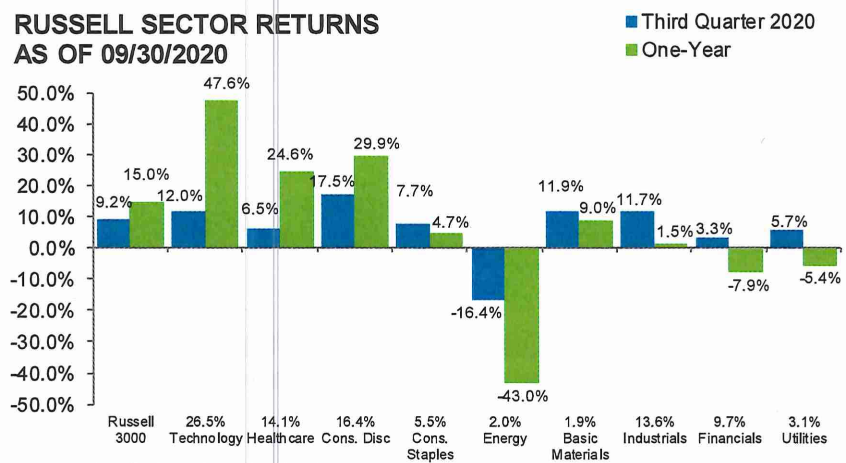
Source: MSCI

- The two exhibits on this slide illustrate the percentage that each country/region represents of the global and international equity markets as measured by the MSCI All Country World IMI Index and the MSCI All Country World ex-U.S. IMI Index, respectively.

U.S. Equity Markets



Source: Russell Indexes

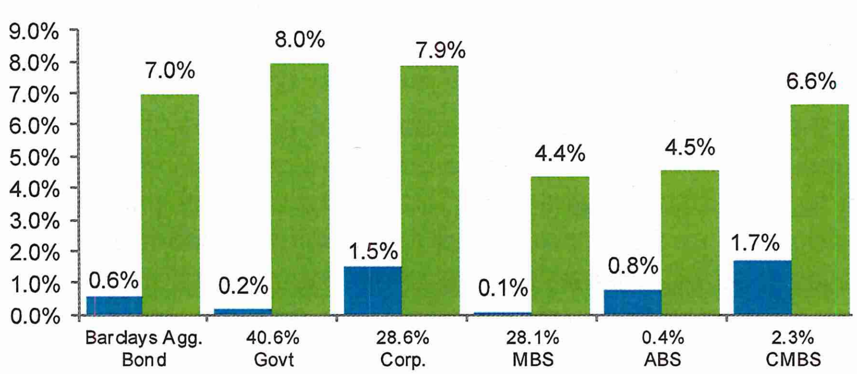


Source: Russell Indexes. Russell introduced Telecommunications and Real Estate as new sectors on 09/30/2020. Returns for the new sectors have been excluded due to the lack of historical data.

- U.S. equities ended the quarter above the pre-pandemic high set in February 2020, as rebounding economic data and strong performances from big tech stocks continued to push equity markets. The U.S. unemployment rate fell to 8.4% in August, down from April's all-time high of 14.7%, with jobless claims data suggesting that over half of the jobs lost since the start of the pandemic have now been recovered. However, an acrimonious election campaign ahead of November's presidential election and deadlocked congressional negotiations over a new fiscal stimulus package cast a shadow over the market. The Russell 3000 Index rose 9.2% during the third quarter and 15.0% over the one-year period.
- Except Energy, all sectors generated positive returns over the quarter. Consumer Discretionary was the best performing sector with a return of 17.5% while the Energy sector fell by 16.4%.
- Small cap stocks underperformed both large and medium cap stocks over the quarter, whilst Value stocks continued to underperform their Growth counterparts in Q3 2020.

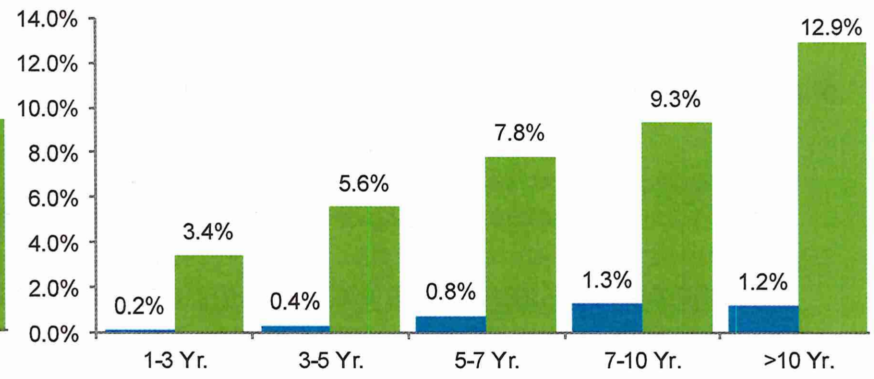
U.S. Fixed Income Markets

BLOOMBERG BARCLAYS AGGREGATE RETURNS BY SECTOR AS OF 09/30/2020



Source: FactSet

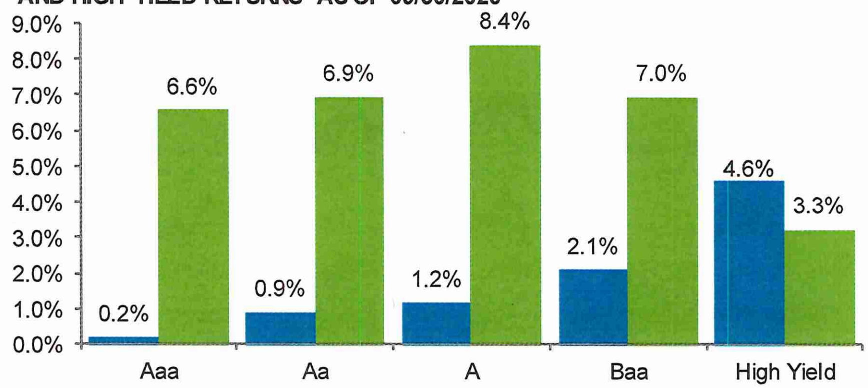
BLOOMBERG BARCLAYS AGGREGATE RETURNS BY MATURITY AS OF 09/30/2020



Source: FactSet

- The Bloomberg Barclays U.S. Aggregate Bond Index rose by 0.6%.
- CMBS bonds were the best performer with a return of 1.7%, followed by corporate bonds which rose by 1.5%.
- Bonds with 7–10-year maturities performed the best with a return of 1.3%.
- The Federal Reserve (Fed) continued to buy corporate bonds through its $750 billion corporate lending facility, ensuring that demand remains high
- High yield bonds rose by 4.6%. Within investment grade bonds, Baa bonds outperformed with a return of 2.1%.

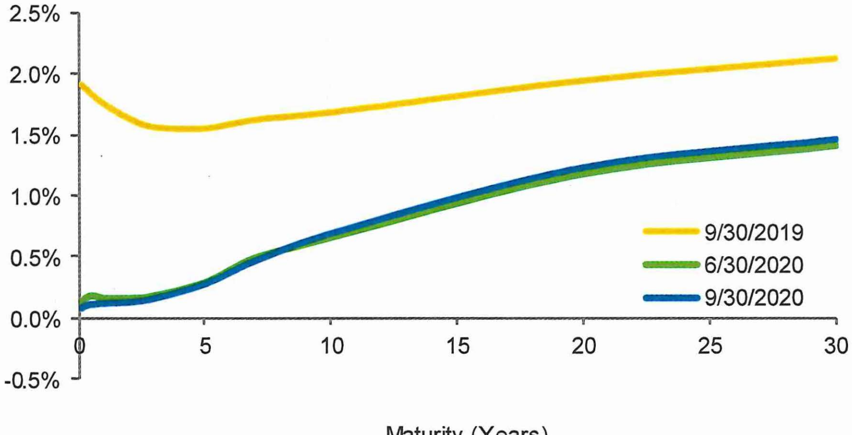
BLOOMBERG BARCLAYS AGGREGATE RETURNS BY QUALITY AND HIGH YIELD RETURNS AS OF 09/30/2020



Source: FactSet

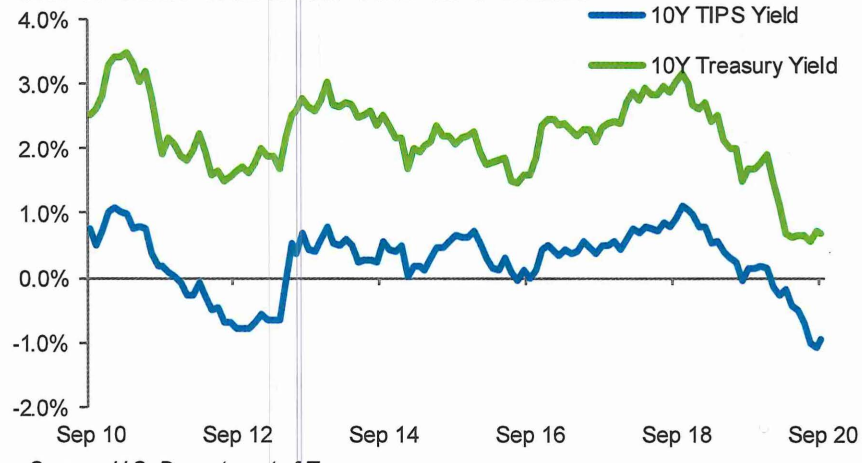
U.S. Fixed Income Markets

U.S. TREASURY YIELD CURVE



Source: U.S. Department of Treasury

U.S. 10-YEAR TREASURY AND TIPS YIELDS

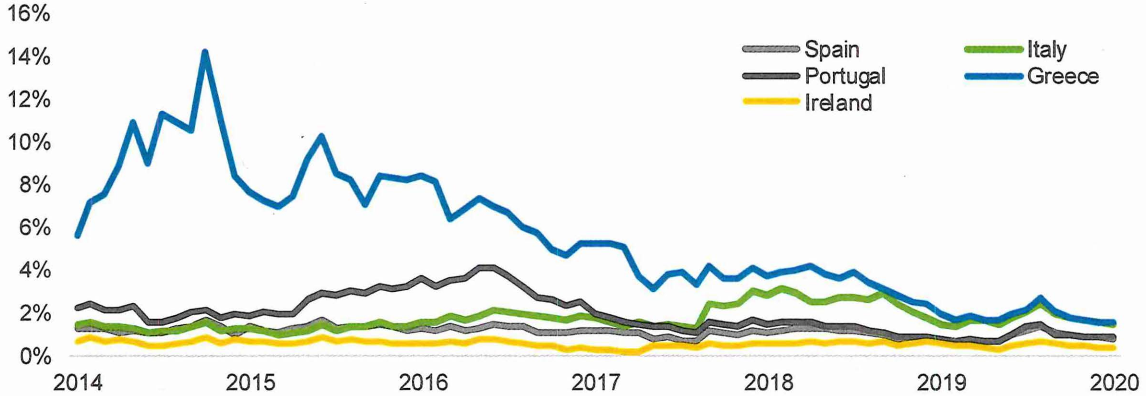


Source: U.S. Department of Treasury

- The U.S. nominal yield curve slightly steepened over the quarter, but overall yields were broadly unchanged. The Fed projected that it would keep interest rates near zero until at least 2023. During the quarter, the Fed also announced a major policy shift by adopting an "average inflation targeting" approach. Under this new approach the Fed will seek an average of 2.0% inflation over time by allowing inflation to run above the target to make up for periods where inflation ran below the target. Since inflation has recently run below the target, a period of higher inflation could be tolerated under the approach without the Fed having to tighten monetary policy.
- The 10-year U.S. treasury yield ended the quarter 3bps higher at 0.69% and the 30-year yield increased by 5bps to 1.46%.
- The 10-year TIPS yield fell by 26bps over the quarter to -0.94%. Breakeven inflation rose across the curve, with the short end rising by a greater extent. The Fed's new "average inflation targeting" approach, the continued relaxation of lockdown measures and the anticipation of further fiscal stimulus raised inflationary expectations over the quarter.

European Fixed Income Markets

EUROZONE PERIPHERAL BOND SPREADS (10-YEAR SPREADS OVER GERMAN BUNDS)



Source: FactSet

- European government bond spreads over 10-year German bunds continued to narrow across the Euro Area. European Union leaders struck a deal on a €750bn coronavirus recovery package, which the European Commission will fund by borrowing in the capital markets for the first time. Elsewhere, the Eurozone witnessed a second consecutive month of deflation, putting pressure on the European Central Bank to allow inflation to overshoot its target in the future.
- German bund yields fell by 5bps to -0.53% over the quarter. In Q2 2020 the Eurozone economy suffered the sharpest drop in growth since its inception, with GDP contracting by 12.1% on a quarter-on-quarter basis. Spain, which is one of the worst hit countries by the Covid-19 pandemic, was the worst performing major Eurozone economy over the quarter as it contracted by 18.5%.
- Italian government bond yields fell the most at 37bps to 0.87%, whereas, Spanish and Portuguese government bond yields fell by 22bps and 21bps to 0.25% and 0.26% respectively.

Credit Spreads

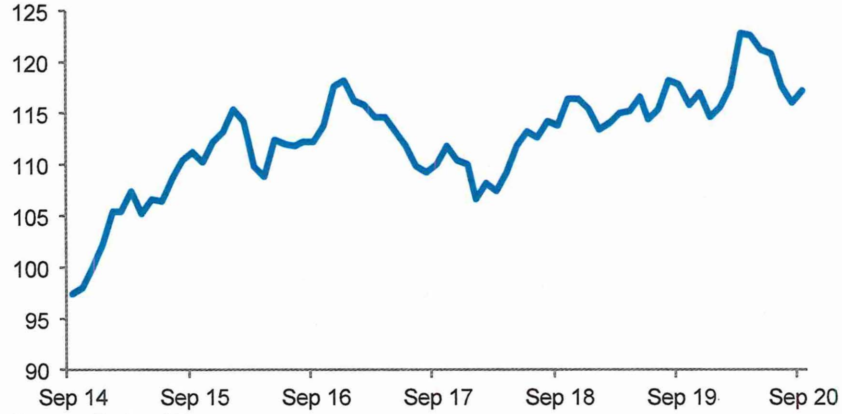
Spread (bps)	9/30/2020	6/30/2020	9/30/2019	Quarterly Change (bps)	1-Year Change (bps)
U.S. Aggregate	60	68	46	-8	14
Gov't	0	1	0	-1	0
Credit	128	142	109	-14	19
Gov't/Credit	58	65	46	-7	12
MBS	61	70	46	-9	15
CMBS	106	132	70	-26	36
ABS	41	68	37	-27	4
Corporate	136	150	115	-14	21
High Yield	517	626	373	-109	144
Global Emerging Markets	334	393	312	-59	22

Source: Barclays Live

- Credit markets generally performed well as spreads continued to fall, especially in the riskier credit areas. However, similar to equity markets, growing concerns over rising COVID cases and uncertainty with regards to the next round of fiscal stimulus caused spreads to widen in September. Overall, credit spreads over U.S. treasuries narrowed over the quarter.
- Riskier areas of credit, such as U.S. high yield bonds and emerging market debt performed well. High yield credit spreads narrowed significantly in Q3 2020, decreasing by 109bps, whilst Global Emerging Markets spreads narrowed by 59bps over the quarter.

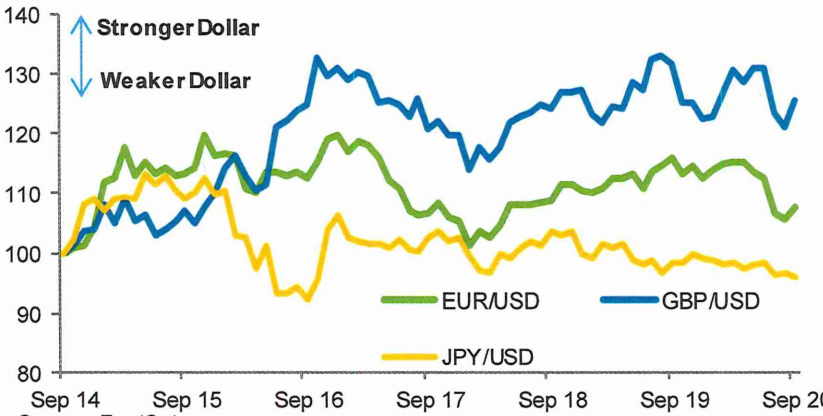
Currency

TRADE WEIGHTED U.S. DOLLAR INDEX (1973 = 100)



Source: Federal Reserve

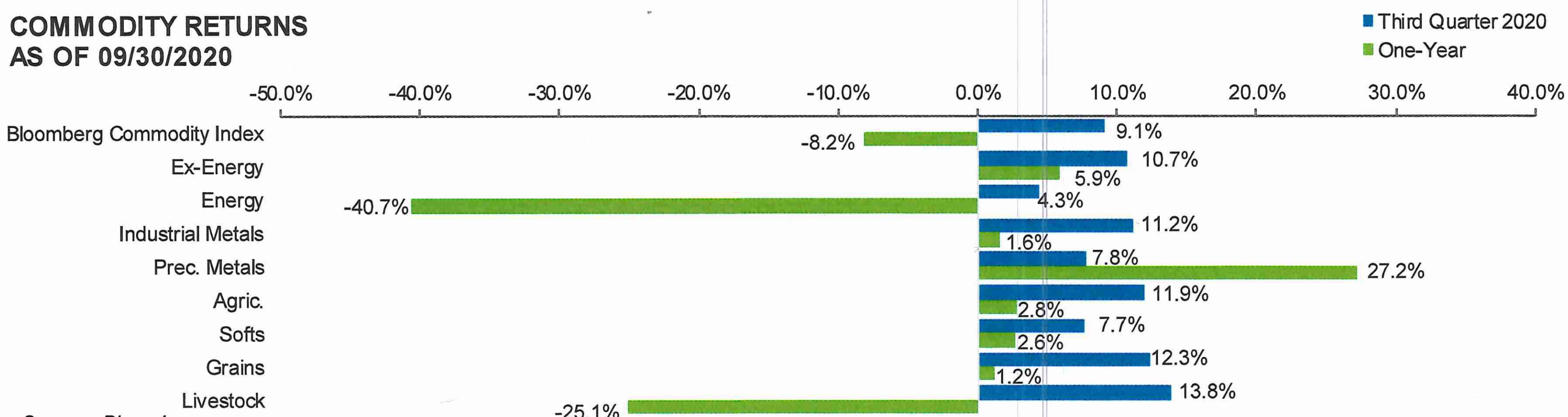
U.S. DOLLAR RELATIVE TO EUR, GBP AND JPY REBASED TO 100 AT 09/30/2014



Source: FactSet

- The U.S. dollar weakened against major currencies over the quarter as it fell by 2.9% on a trade-weighted basis. The resurgence of Covid-19 cases in the US and heightened political uncertainty ahead of November's presidential election was a drag on the dollar, whilst expectations of looser monetary policy and a higher inflation outlook provided further headwinds.
- Sterling rose by 1.8% on a trade-weighted basis over the quarter. Hopes that a UK-EU trade deal will be reached by the end of the year boosted sterling over July and August, but sterling came under renewed pressure in September as UK-EU clashes over the Internal Markets Bill raised fears of a chaotic departure. Over the quarter sterling appreciated by 4.4% against the U.S. dollar.
- The U.S. dollar depreciated by 4.2% and 2.2% against the euro and yen respectively.

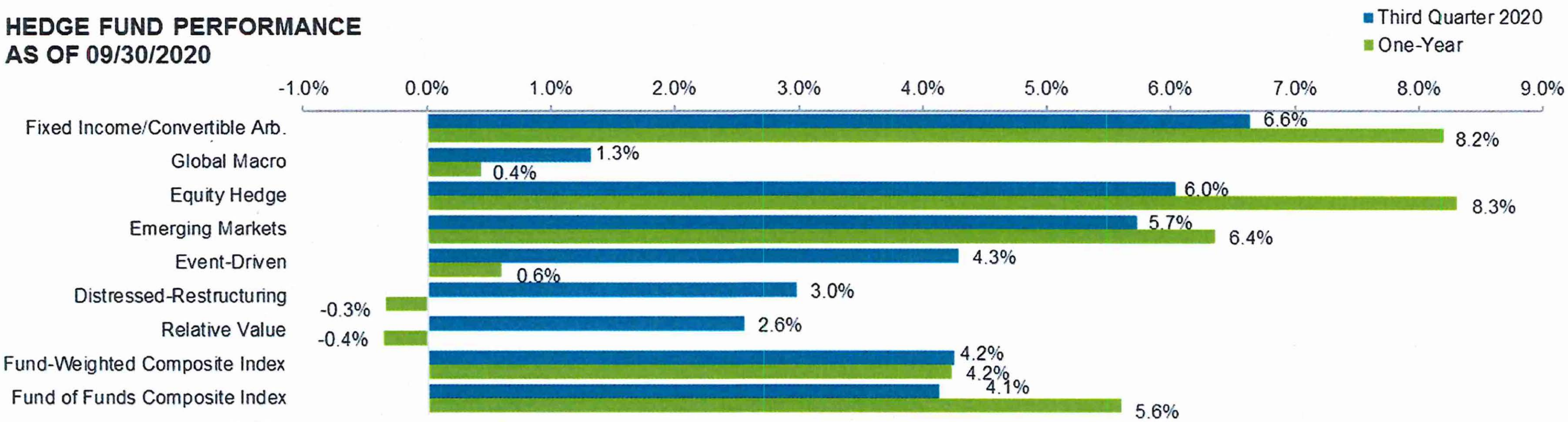
Commodities



Source: Bloomberg
Note: Softs and Grains are part of the wider Agriculture sector

- Commodities started the quarter off strong before falling back in tandem with equity markets in September. Despite the poor performance in September, the Bloomberg Commodity Index returned 9.1%.
- The Energy sector rose by 4.3% over the quarter. Oil had another turbulent quarter with prices seeming to stabilize in July and August as OPEC+ agreed to scale back its production cuts from 9.7 million barrels per day to 7.7 million barrels per day until the end of the year. However, WTI crude prices fell by 5.6% in September as OPEC reduced its demand expectations for the rest of 2020 to 90.2 million barrels per day as global coronavirus cases continued to grow.
- The price of Brent crude oil fell by 0.5% to $40.9/bbl. whilst WTI crude oil spot prices rose by 2.4% to $40.2/bbl. On a one-year basis, the Energy sector is down by 40.7%.
- Livestock was the best performing sector, rising by 13.8% in Q3 2020.

Hedge Fund Markets Overview



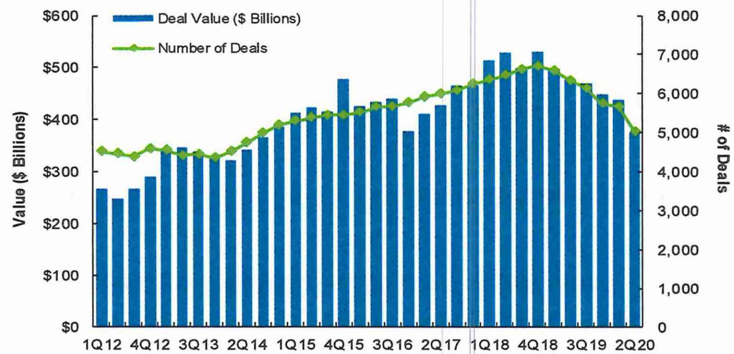
Note: Latest 5 months of HFR data are estimated by HFR and may change in the future.
Source: HFR

- Hedge fund performance was positive across all strategies in the third quarter.
- Over the quarter, Fixed Income/Convertible Arbitrage and Equity Hedge strategies were the best performers, returning 6.6% and 6.0% respectively.
- HFRI Fund-Weighted Composite Index and the HFRI Fund of Funds Composite Index produced returns of 4.2% and 4.1% respectively.

Private Equity Market Overview—Second Quarter 2020

LTM Global Private Equity-Backed Buyout Deal Volume

Source: Preqin



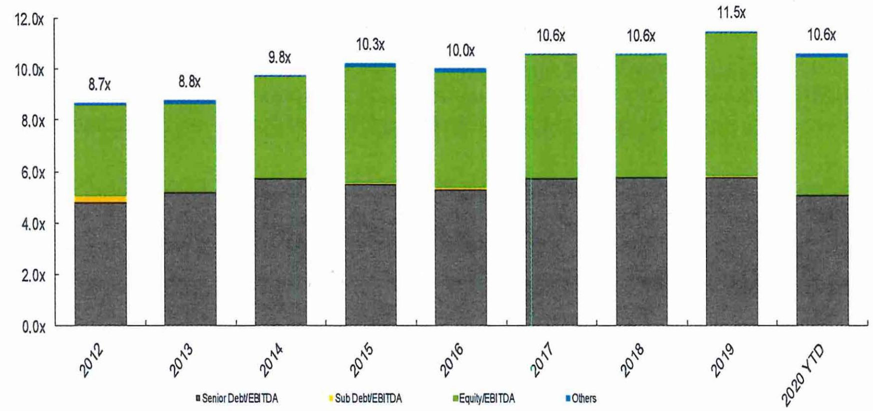
- **Fundraising:** In 2Q 2020, $162.3 billion was raised by 349 funds, which was a decrease of 17.7% on a capital basis and 15.9% by number of funds over the prior quarter. Dry powder stood at nearly $2.2 trillion at the end of the quarter, a modest increase compared to the previous quarter.[1]
- **Buyout:** Global private equity-backed buyout deals totaled $61.9 billion in 2Q 2020, which was down 40.1% on a capital basis and down 30.0% by number of deals from 1Q 2020.[1] In 2Q 2020, the average purchase price multiple for all U.S. LBOs was 9.2x EBITDA, a decrease of 2.0x over 1Q 2020 and lower than the five-year average (10.6x).[2] Large cap purchase price multiples stood at 9.2x in 2Q 2020, down compared to 1Q 2020's level of 10.9x.[2] The weighted average purchase price multiple across all European transaction sizes averaged 12.6x EBITDA for 2Q 2020, up from the 12.2x multiple seen at the end of 1Q 2020. Purchase prices for transactions of greater than €1.0 billion increased to 12.7x at the end of 2Q 2020, a jump from the 12.1x seen at the previous quarter end. Globally, exit value totaled $36.4 billion from 296 deals during the second quarter, meaningfully down from the $70.0 billion in exits from 453 deals during 1Q 2020.[1]
- **Venture:** During the second quarter, 1,374 venture-backed transactions totaling $26.9 billion were completed in the U.S., which was a decrease on a capital basis over the prior quarter's total of $27.0 billion across 1,336 deals. This was 16.3% higher than the five-year quarterly average of $23.1 billion.[3] Total U.S. venture-backed exit activity totaled approximately $21,2 billion across 147 completed transactions in 2Q 2020, down on a capital basis from the $24.1 billion across 229 exits in 1Q 2020. Through 2Q 2020, U.S. exit activity represented only 17.3% of 2019's total.[4]
- **Mezzanine:** Six funds closed on $2.6 billion during the second quarter. This was up from the prior quarter's total of $2.3 billion raised by six funds and represented 53.0% of the five-year quarterly average of $4.9 billion. Estimated dry powder was $48.6 billion at the end of 2Q 2020, up from the $48.5 billion seen at the end of 1Q 2020.[1]

Sources: [1] Preqin [2] Standard & Poor's [3] PwC/CB Insights MoneyTree Report [4] PitchBook/NVCA Venture Monitor [5] Fitch Ratings [6] Thomson Reuters [7] UBS

Notes: FY=Fiscal year ended 12/31; YTD=Year to date; LTM=Last 12 months (aka trailing 12 months); PPM=Purchase Price Multiples: Total Purchase Price ÷ EBITDA.

Private Equity Market Overview—Second Quarter 2020 (Continued)

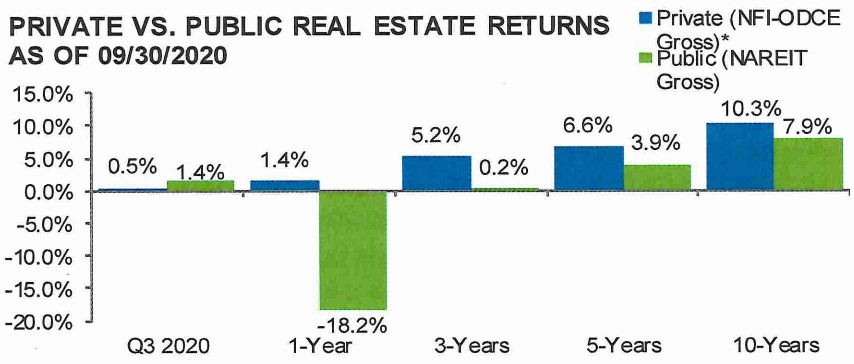
U.S. LBO Purchase Price Multiples—
All Transactions Sizes
Source: S&P



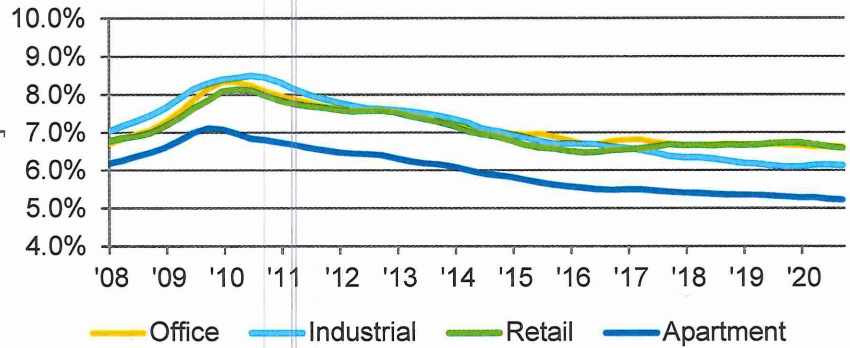
- **Distressed Debt:** The LTM U.S. high-yield default rate was 5.1% at June 2020 and was expected to increase during the following month.[5] During the quarter, $22.5 billion was raised by 18 funds, substantially higher than the $4.5 billion raised by 10 funds in 1Q 2020 and the five-year quarterly average of $11.4 billion.[1] Dry powder was estimated at $127.3 billion at the end of 2Q 2020, which was up from the $117.2 billion seen at the end of 4Q 2019. This remained above the five-year annual average level of $109.3 billion.[1]
- **Secondaries:** 11 funds raised $22.7 billion during the quarter, up from the $21.3 billion raised by 16 funds in 1Q 2020. The quarter surpassed the record-breaking amount raised in 1Q 2020, which was the most raised since Q1 2017.[1] At the end of 2Q 2020, there were an estimated 82 secondary and direct secondary funds in market targeting roughly $71.7 billion.[1] The average discount rate for all private equity sectors finished the quarter at 20.8%, lower than the 18.1% discount at the end of 1Q 2020.[6]
- **Infrastructure:** $13.9 billion of capital was raised by 28 funds in 2Q 2020 compared to $38.7 billion of capital raised by 23 partnerships in 1Q 2020. At the end of the quarter, dry powder stood at an estimated $219.7 billion, down slightly from 1Q 2020's total of $220.7 billion. Infrastructure managers completed 313 deals with an estimated aggregate deal value of $47.0 billion in 2Q 2020 compared to 644 deals totaling $81.8 billion a quarter ago.[1]
- **Natural Resources:** During 2Q 2020, two funds closed on $0.3 billion compared to six funds totaling $4.6 billion in 1Q 2020. Energy and utilities industry managers completed approximately 67 deals totaling an estimated $8.1 billion through 2Q 2020, which represented 47.8% of energy and utilities deal value during all of 2019.[1]

Sources: [1] Preqin [2] Standard & Poor's [3] PwC/CB Insights MoneyTree Report [4] PitchBook/NVCA Venture Monitor [5] Fitch Ratings [6] Thomson Reuters [7] UBS
Notes: FY=Fiscal year ended 12/31; YTD=Year to date; LTM=Last 12 months (aka trailing 12 months); PPM=Purchase Price Multiples: Total Purchase Price ÷ EBITDA.

U.S. Commercial Real Estate Markets



*Third quarter returns are preliminary
Sources: NCREIF, FactSet



- U.S. Core Real Estate returned 0.48%* over the third quarter, equating to a 1.4% total gross return year-over-year, including a 4.0% income return. Shelter in place orders and social distancing practices have most severely impacted the retail and hotel property sectors. Property valuations have begun to price in the loss of cash flow as a result of COVID-19. Transaction volume has contracted -57% YoY through Q3 2020, and price discovery continues to be limited.
- Global property markets, as measured by the FTSE EPRA/NAREIT Developed Real Estate Index, returned 2.3% (USD) in aggregate during the third quarter and experienced a cumulative decline of -19.1% YTD. REIT market performance was driven by Asia Pacific (2.0% USD), North America (0.9% USD) and Europe (3.1% USD). The U.S. REIT markets (FTSE NAREIT Equity REITs Index) returned 1.4% in the third quarter. The U.S. 10-year treasury bond yields rose by 3bps to 0.69% during the quarter.
- The coronavirus fueled market volatility in the stock and bond markets has created a situation of uncertainty for private real estate pricing. Public markets are searching for the right pricing level in light of the global pandemic, and how it will affect the regional and global economies. Implied volatility continues to signal elevated levels of uncertainty concerning public market implied valuations. Considering this situation, we are recommending that investments with pre-specified assets be postponed. Private market transactions based on appraisal valuations lag the most current information, and they do not fully reflect the current market conditions.
- We are proactively evolving our investment strategy. In the post-coronavirus world, supply chains may move back to North America which will require corresponding real estate infrastructure. Demand for last mile logistics, already a key investment theme, will accelerate. Live and work preference changes will create opportunities. Interest rates are likely to remain lower for even longer, making real estate a very compelling alternative to fixed income investments.
- Blind pool funds offer a potential to have capital available when the new opportunity set presents itself. Those strategies need careful review in light of the changing market dynamics. Strategies that worked previously in a growth-oriented market may not be appropriate for what may be more opportunistic style investing. Regions, countries and property types all need to be reevaluated.

*Indicates preliminary NFI-ODCE data gross of fees

Notes

1. Preqin
2. Standard & Poors
3. PitchBook/National Venture Capital Association Venture Monitor
4. First Trust Advisors
5. Evercore

Notes:
FY: Fiscal year ended 12/31
YTD: Year to date
YE: Year end
LTM: Last twelve months (aka trailing twelve months or TTM)
PPM: Purchase Price Multiples: Total Purchase Price / EBITDA
/bbl: Price per barrel
MMBtu: Price per million British thermal units

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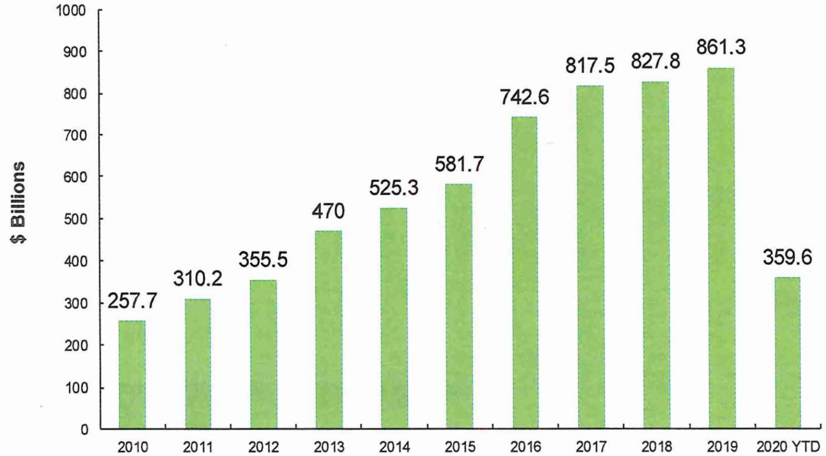
Appendix A:

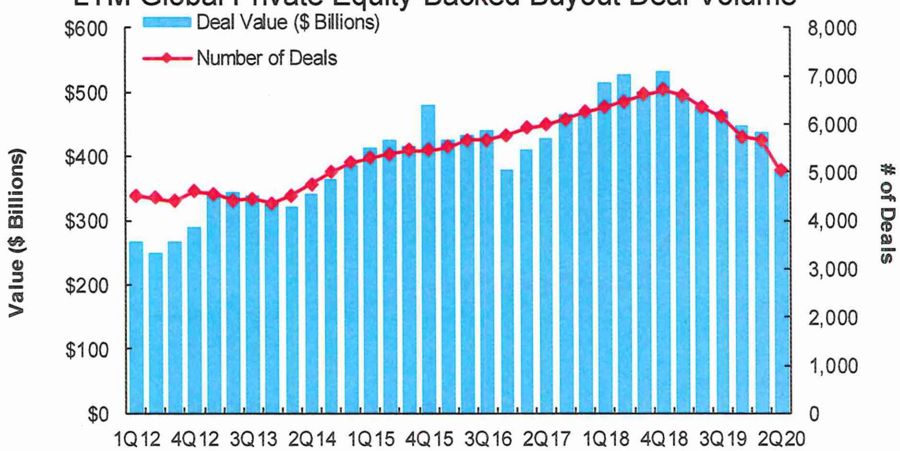
Global Private Equity Market Overview

2Q 2020

Private Equity Overview



Source: Preqin



Source: Preqin

Fundraising

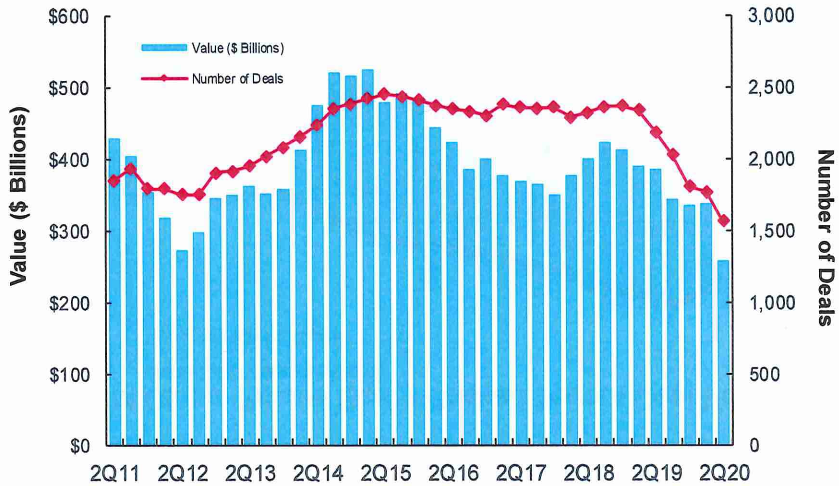
- In Q2 2020, $162.3 billion was raised by 349 funds, which was a decrease of 17.7% on a capital basis and 15.9% by number of funds from the prior quarter. Capital raised through Q2 2020 represented 41.8% of capital raised in all of 2019.[1]
  - Q2 2020 fundraising was 16.7% lower, on a capital basis, than the five-year quarterly average, but 45.1% lower by number of funds raised.
  - The majority of capital was raised by funds with target geographies in North America, comprising 58.2% of the quarter's total. This was down from 74.8% in Q1 2020. Capital targeted for Europe made up 29.3% of the total funds raised during the quarter, roughly double the 14.9% raised in Q1 2020. The remainder was attributable to managers targeting Asia and other parts of the world.
- Dry powder stood at nearly $2.2 trillion at the end of the quarter, a modest increase from the prior quarter and an increase of 28.1% compared to the five-year average.

Activity

- In Q2 2020, global buyout deals totaled 967 deals for an aggregate deal value of $61.9 billion, down meaningfully from the 1,381 transactions totaling $103.5 billion in Q1 2020.[1]
  - This was 45.9% lower than the five-year quarterly average deal volume of $114.5 billion.
  - Average deal size was $64.0 million in Q2 2020. This was down 14.5% compared to Q1 2020 and down 16.0% relative to the five-year quarterly average.
- European sponsored loan volume totaled €6.0 billion in Q2 2020, down by 71.0% compared to Q1 2020's total of €20.8 billion. Q2 2020's total was 42.4% less than the five-year quarterly average level of €10.5 billion.[3]
- In Q2 2020, the average purchase price multiple for all U.S. LBOs was 9.2x EBITDA, substantially down from Q1 2020 (11.2x) and down from the five-year average (10.6x). Large-cap purchase price multiples stood at 9.2x, down from the 10.9x observed at the end of Q1 2020.[3]
  - This was 1.4x and 0.5x turns (multiple of EBITDA) below the five and ten-year average levels, respectively.
- European multiples were up 0.4x quarter-over-quarter, averaging 12.6x EBITDA for all transaction sizes on a weighted basis, with large and medium transactions each running at 12.7x and 12.5x, respectively.[3]
- Debt remained broadly available in the U.S.
  - The average leverage for U.S. deals in Q2 2020 was 4.9x compared to the five and ten-year averages of 5.7x and 5.4x, respectively.[3]
  - The amount of debt issued supporting new transactions increased compared to the prior quarter, moving from 65.8% to 67.6%, and was higher than the five-year average of 64.7%.[3]
- In Europe, average senior debt/EBITDA in Q2 2020 was 5.8x, down slightly from the 5.9x observed in Q1 2020.

Buyouts / Corporate Finance

LTM PE Exit Volume and Value



Source: Preqin

M&A Deal Value by Deal Size

Source: Preqin

Fundraising

- $63.5 billion was closed on by 83 buyout and growth funds in Q2 2020, compared to $72.6 billion raised by 125 funds in Q1 2020. This was substantially lower than the $154.4 billion raised by 145 funds in Q4 2019.[1]
  - This was significantly below the five-year quarterly average of $94.5 billion and 179 funds.
  - Insight Partners XI was the largest fud raised during the quarter, closing on $9.5 billion of commitments.[1]
- Buyout and growth equity dry powder was estimated at $1.0 trillion, up 1.3% from Q1 2020 and substantially higher than the five-year average level of $780.3 billion.[1]
  - Mega, large, and mid cap buyout funds increased in dry powder compared to year-end 2019 by 2.5%, 8.8% and 15.5%, respectively. Mega cap buyout funds were sitting on $358.3 billion in dry powder at the end of the quarter. Small cap dry powder exhibited the only decrease during the quarter, decreasing to $85.8 billion or a decrease of 35.3% over Q4 2019.[1]
  - An estimated 60.3% of buyout dry powder was targeted for North America, while European dry powder comprised 24.6% and Asia/Rest of World accounted for the remainder.[1]

Activity

- Global private equity-backed buyout deals totaled $61.9 billion in Q2 2020, which was a decrease of 40.1% and 45.9% from Q1 2020 and the five-year quarterly average, respectively.[1]
  - Through Q2 2020, deal level accounted for 36.8% of 2019's total buyout activity and represented a decrease of 50.0% compared to Q2 2019's total.

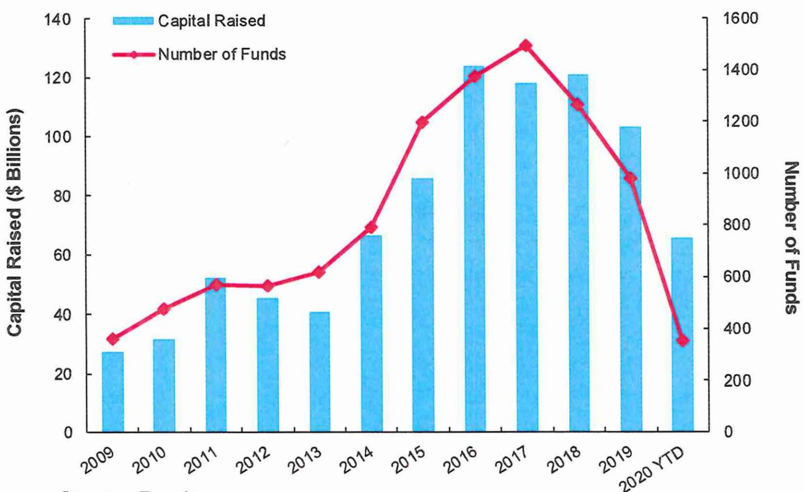
  Through Q2 2020, deals valued at $5.0 billion or greater accounted for an estimated 25.5% of total deal value compared to 20.9% in 2019 and 26.3% in 2018.[1] Deals valued between $1.0 billion to $4.99 billion represented 35.7% of total deal value through the second quarter.
  - By geography, North American deals accounted for the largest percentage of total deal value at an estimated 49.2% through Q2 2020, while Information Technology deals accounted for the largest percentage by industry at 32.7% of total deal value.
- U.S. Entry multiples for all transaction sizes in Q2 2020 stood at 9.2x EBITDA, down significantly from Q1 2020's level (11.2x).[3]
  - Large cap purchase price multiples stood at 9.2x, down compared to 10.9x in Q1 2020.[3]
  - The weighted average purchase price multiple across all European transaction sizes averaged 12.6x EBITDA in Q2 2020, up significantly from 12.2x in Q1 2020. Purchase prices for transactions of €1.0 billion or more increased from 12.1x to 12.7x quarter-over-quarter.
  - The portion of average purchase prices financed by equity for all deals was 46.7% in Q2 2020, down from 52.7% in Q1 2020. However this remained above the five and ten-year average levels of 45.7% and 43.6%, respectively.[3]
- Globally, exit value totaled $36.4 billion across 296 deals in Q2 2020 compared to $70.0 billion across 453 deals in the prior quarter.[1]

Opportunity

- Value-focused strategies
- Managers with expertise across business cycles

Venture Capital

Venture Capital Fundraising



Source: Preqin

U.S. Venture Capital Investments by Quarter ($B)

Source: PwC/CB Insights Report

Fundraising

- $26.4 billion of capital was raised by 167 funds in Q2 2020, down from the prior quarter's total of $39.4 billion raised by 186 managers. Although the average fund size dropped to $175.0 million, this was well above the five-year quarterly average of $115.0 million.[1]
  - Q2 2020 fundraising was down by 8.3% on a capital basis compared to the five-year quarterly average of $28.8 billion.
  - Lightspeed Venture Partners Select IV was the largest fund raised during the quarter, closing on $1.8 billion.
- The average fund size raised during the quarter was approximately $175.0 million. This represented a decrease compared to 1Q 2020's average of $240.0 million.
- At the end of Q2 2020, there were an estimated 2,237 funds in market targeting $193.4 billion.[1]
  - Softbank Vision Fund – Latin America was the largest venture fund in market, targeting an estimated $5.0 billion.
  - The majority of funds in market are seeking commitments of $200.0 million or less.
- Dry powder was estimated at $315.3 billion at the end of 2Q 2020, up from Q1 2020's total of $302.9 billion and 59.0% higher than the five-year average.[1]

Activity

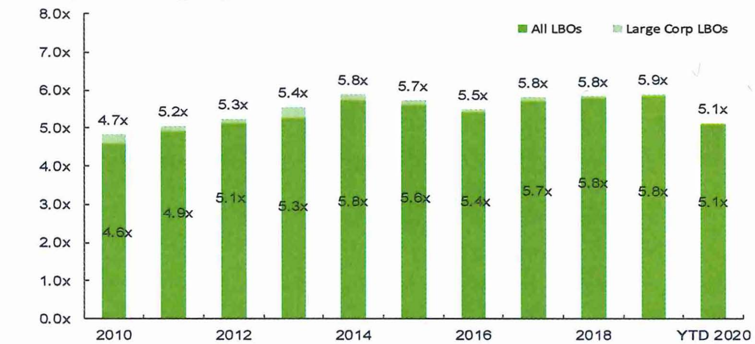
- During the quarter, 1,371 U.S. venture-backed transactions totaling $26.9 billion were completed, which was a decrease on a capital basis over the prior quarter's total of $27.0 billion across 1,336 deals. This was 16.3% higher than the five-year quarterly average of $23.1 billion.[7]
  - In Q2 2020, there were 49 U.S.-based deals involving unicorn companies, representing roughly $13.6 billion in deal value. This was up by number and value compared to Q1 2020, which saw 47 unicorn-related deals close at a deal value of $9.0 billion. Q4 2018 continues to be the quarter in which deal value by U.S. unicorns was the highest, with 49 deals raising $24.0 billion in value.[8]
- At the end of Q2 2020, median pre-money valuations increased across series except seed-stage rounds. Compared to Q1 2020, Series A transactions increased to a median pre-money valuation of $31.7 million from $29.9 million, Series B increased from $97.0 million to $105.0 million Series C increased from $166.1 million to $317.5 million, and Series D+ increased from $407.5 million to $475.0 million. Seed median pre-money valuation decreased from $9.0 million to $8.6 million during the quarter.[9]
- Total U.S. venture-backed exit activity totaled approximately $21.2 billion across 147 completed transactions in 2Q 2020, down from $24.1 billion across 229 exits in Q1 2020. Exit value through Q2 2020 represented only 17.3% of 2019's total exit value.[8]
  - The number of U.S. venture-backed initial public offerings increased over 1Q 2020, with 16 IPOs completed in 2Q 2020. Only 109 exits occurred by acquisition, the lowest by number in over 10 years, and accounted for only $7.5 billion in exit value. IPOs accounted for $12.3 billion in value compared to $5.8 billion in the prior quarter.[8]

Opportunity

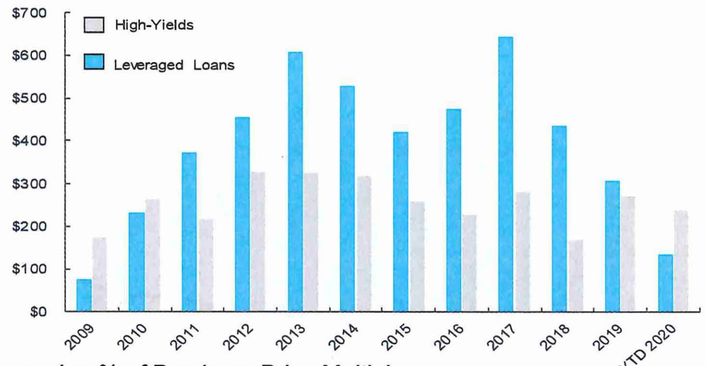
- Early stage continues to be attractive, although we continue to monitor valuations
- Smaller end of growth equity
- Technology sector

Leveraged Loans & Mezzanine

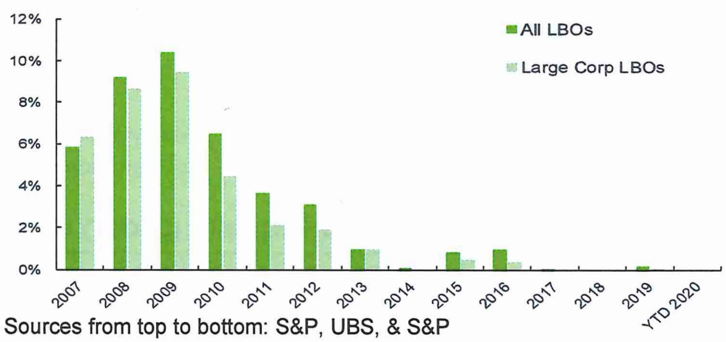
Average Leverage by Deal Size



Debt Issuance ($ Billions)



Mezzanine % of Purchase Price Multiple



Sources from top to bottom: S&P, UBS, & S&P

Leveraged Loans

Fundraising

- New CLO issuance totaled $34.1 billion in through Q2 2020 compared to $118.3 billion in full-year 2019.[2]
- High-yield debt issuance totaled $164.8 billion in 2Q 2020. 2020's YTD total is already 78.1% greater than 2019's total of $132.2 billion issued in the same period.[2]
- Through 2Q 2020, leveraged loan mutual fund net flows ended with a net outflow of $17.4 billion.[2]

Activity

- Leverage for all U.S. LBO transactions ended the quarter at 4.9x, down from Q1 2020's leverage of 5.3x. Leverage continues to be comprised almost entirely of senior debt. The average leverage level for large cap LBOs was 4.9x during the quarter, down from the 5.9x witnessed in 2019.[3]
- Q2 2020 institutional leveraged loan issuances totaled $44.0 billion compared to Q1 2020's total of $89.5 billion.[2]
- 67.6% of new leveraged loans were used to support M&A and growth activity in 2Q 2020, up from 65.8% in Q1 2020. This was above the five-year average of 64.7%.[3]
- European sponsored loan issuance decreased substantially to €6.0 during the second quarter compared to €20.8 during Q1 2020. This was a decrease of 60.9% compared to the five-year quarterly average level of €15.4 billion.[3]

Opportunity

- Funds with the ability to source deals directly and the capacity to scale for large transactions (both sponsored and non-sponsored)
- Funds with an extensive track record, experience through prior credit cycles, and staff with workout experience

Mezzanine

Fundraising

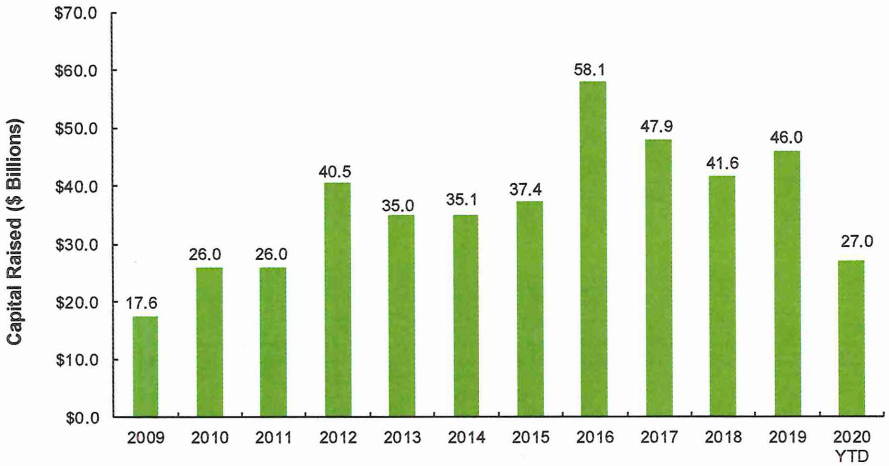
- Six funds closed on $2.6 billion during the quarter. This was an increase from the prior quarter's total of $2.3 billion raised by six funds and represented a decrease from the five-year quarterly average of $4.9 billion.[1]
- Estimated dry powder was $48.6 billion at the end of Q2 2020, which was up 11.5% from year-end 2019.[1]
- An estimated 85 funds are in market targeting $38.7 billion of commitments. HPS Mezzanine Partners 2019 is the largest fund in market targeting commitments of $8.0 billion.[1]

Opportunity

- Funds with the capacity to scale for large sponsored deals

Distressed Private Markets

Distressed Debt, Turnaround, & Special Situations Fundraising



Source: Preqin

High-Yield Bond Volume vs Default Rates

Source: UBS & Fitch Ratings

Fundraising

- During the quarter, $22.5 billion was raised by 18 funds, up 500% compared to the $4.5 billion raised by 10 funds in Q1 2020.[1]
  - Q1 2020's fundraising was 97.1% higher than the five-year quarterly average and represented only 48.9% of 2019's total.
  - Clearlake Capital Partners VI was the largest fund closed during the quarter, closing on $7.0 billion.
- Dry powder was estimated at $127.3 billion at the end of the quarter, up from year-end 2019's mark of $117.2 billion. This was also up compared to year-end 2018 ($118.3 billion) and remained above the five-year average level of $109.2 billion.[1]
- Roughly 139 funds were in the market at the end of 2Q 2020, seeking $92.3 billion in capital commitments.[1]
  - Distressed debt managers were targeting the most capital, seeking an aggregate $68.1 billion, followed by special situation managers ($21.6 billion).
  - Oaktree Opportunities Fund XI was the largest fund in market with a target fund size of $15.0 billion.

Activity

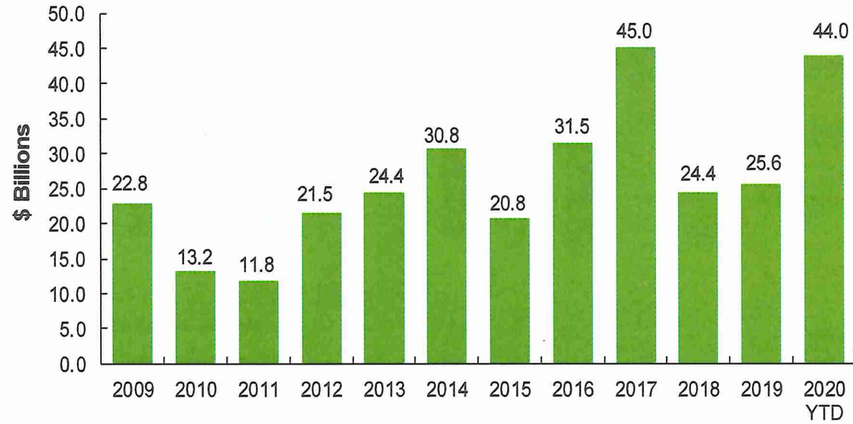
- The LTM U.S. high-yield default rate was 5.1% as of June 2020, which was up meaningfully from year-end 2019's rate of 3.0%.The default rate is expected to increase over the next several months of 2020.[6]
- The market dislocation caused by COVID-19 is expected to supply an abundance of distressed opportunities in the next several months.

Opportunity

- Funds capable of performing operational turnarounds
- Funds with the flexibility to invest globally
- Increased focus on distressed and turnaround opportunities during current downturn

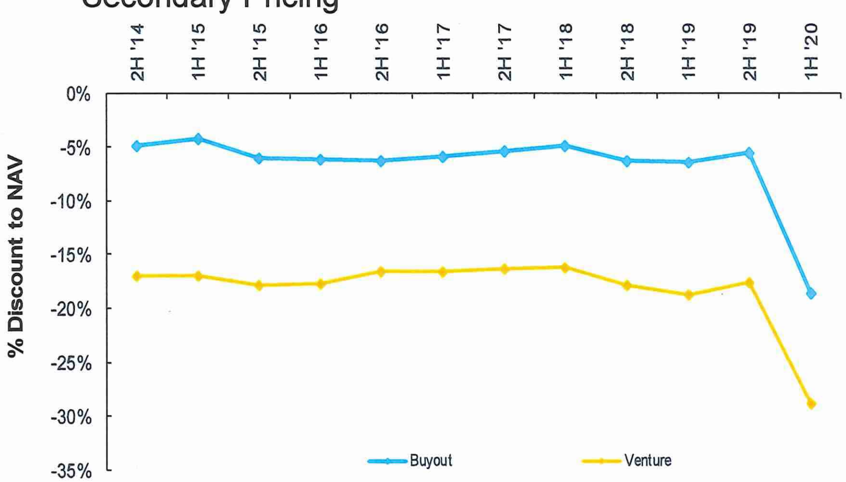
Secondaries

Secondary Fundraising



Source: Preqin

Secondary Pricing



Source: UBS

Fundraising

- 11 funds raised $22.7 billion during the quarter, up from the $21.3 billion by 16 funds in 1Q 2020.Capital raised through Q2 2020 represented 171.9% of 2019's total capital raised.[1]
  - Ardian's ASF VIII was the largest fund raised during the quarter, closing on $19.0 billion.
- Through 2Q 2020, there were an estimated 82 secondary funds in market, targeting approximately $71.7 billion. The majority of secondary funds are targeting North American investments.
  - Four funds are currently in market targeting greater than $5.0 billion in capital commitments. Together, these four funds account for $29.8 billion of the $71.7 billion of capital being raised.
  - Coller International Partners VIII is the largest fund being raised, seeking $9.0 billion in commitments.[1]

Activity

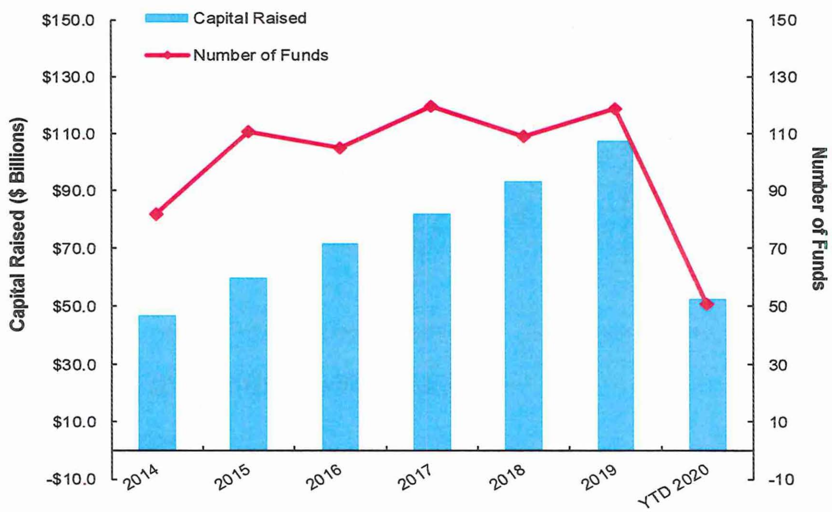
- Secondary market volume dropped significantly through Q2 2020 to $20.2 billion, a decrease of 56.1% compared to the same period in 2019. This also represented only 23.7% of 2019's total. [12]
- The market continues to have participation from a broad base of buyers and sellers with opportunistic selling activity from public and private pensions, financial institutions and insurance companies.
  - Middle market buyouts are expected to remain as the primary investment strategy in demand for buyers, with continued interest in growth and mega fund strategies. North America and Western Europe accounted for the vast majority of assets purchased through Q2 2020, representing 60.6% and 32.0%, respectively. [12]
- Due to the effects of Covid-19, the average discount rate for all private equity sectors finished Q2 2020 at 20.8%, down from 18.0% at the end of Q1 2020. The average buyout pricing discount ended at 18.6%, while venture ended at a discount of 28.8%. The average buyout pricing discount for Q2 was down from Q1 2020's 15.9% discount, while the venture discount was down from 25.7%.[2]
- Transaction fund leverage and deferred payment structures continue to be prevalent and are used as a means to improve pricing and deal returns in an increasingly competitive environment.[2]
- Pricing is expected to remain attractive for buyers given the effects of COVID on Q1 2020 and Q2 2020 NAVS. While steep discounts are expected to offer downside protection for buyers, discounts for assets of experienced GPs will be impacted less as buyers have greater confidence in their ability to work through the impacts of COVID.[2]
- GP-led transactions continue to assume a large share of transaction volume and activity, accounting for 27% of volume through Q2 2020.[12]

Opportunity

- Funds that are able to execute complex and structured transactions
- Niche strategies

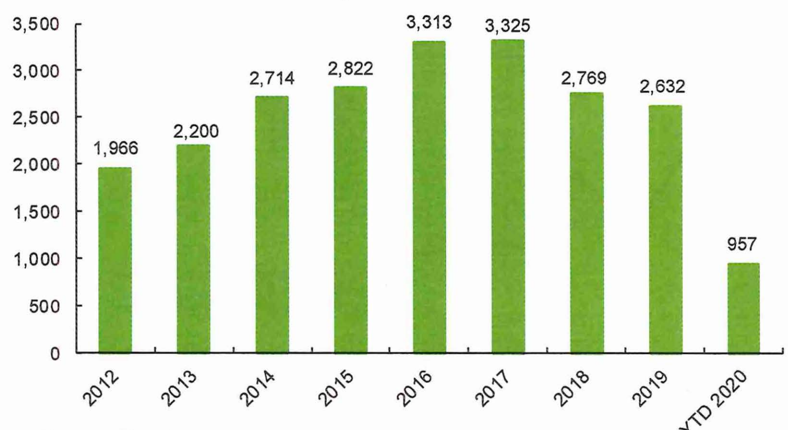
Infrastructure

Global Infrastructure Fundraising



Source: Preqin

Number of Deals Completed



Source: Preqin

Fundraising

- $13.9 billion of capital was raised by 28 funds in 2Q 2020 compared to $38.7 billion of capital raised by 23 partnerships in 1Q 2020.This represented 12.9% of capital raised in 2019.[1]
  - Blackrock Global Energy & Power Infrastructure Fund III was the largest fund raised during the quarter, closing on $5.1 billion.[1]
- As of the end of 2Q 2020, there were an estimated 238 funds in the market seeking roughly $184.4 billion.[1]
  - ISQ Global Infrastructure Fund III was the largest fund in market and was seeking commitments of $12.0 billion.
- At the end of the quarter, dry powder stood at $219.1 billion, slightly lower than the amounts seen at the end of Q1 2020 ($220.7 billion).[1]
- Concerns surrounding the relative availability and pricing of assets remain. Fundraising continues to be very competitive given the number of funds and aggregate target level of funds in market. Investor appetite for the asset class persists despite the record levels of dry powder and increased investment activity from strategic and corporate buyers as well as institutional investors.

Activity

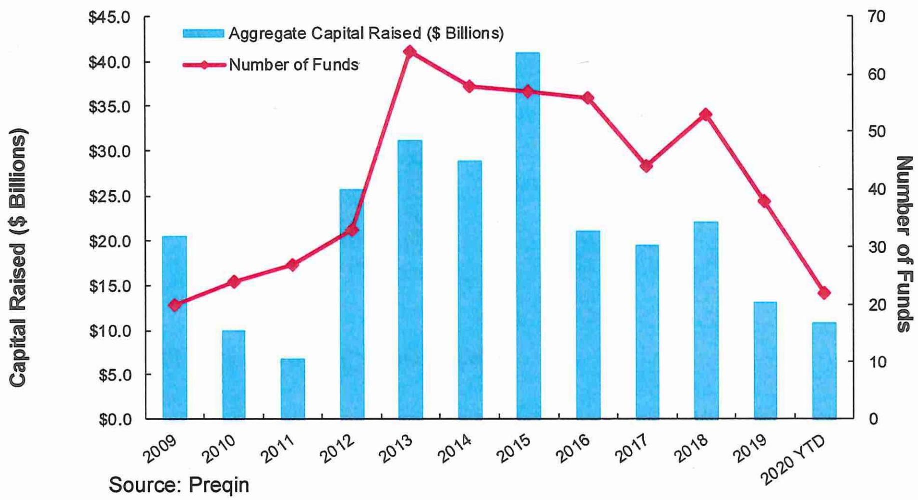
- Infrastructure managers completed 313 deals for an aggregate deal value of $47.0 billion in Q2 2020 compared to 644 deals totaling $80.8 billion in Q1 2020.[1]
  - By region, Europe saw the largest amount of deals completed, with 45.0% of deals being invested in the region, followed by North America at 24.2%. Asia amassed 10.7% of activity during the quarter.
  - Renewable energy was the dominant industry during the quarter with 59.3% of transactions, followed by the telecommunication sector, which accounted for 10.6% of deals. Utilities accounted for 7.3% of deals during the second quarter.[1]

Opportunity

- Avoid funds with pre-specified assets due to lag in and uncertainty around valuation impact
- Blind-pool funds may be better positioned to take advantage of the market dislocation across core and core+ infrastructure, however careful review of such strategies is required
- Greenfield social / PPP infrastructure will likely continue to be less competitive and offer a premium for managers willing to take on construction risk

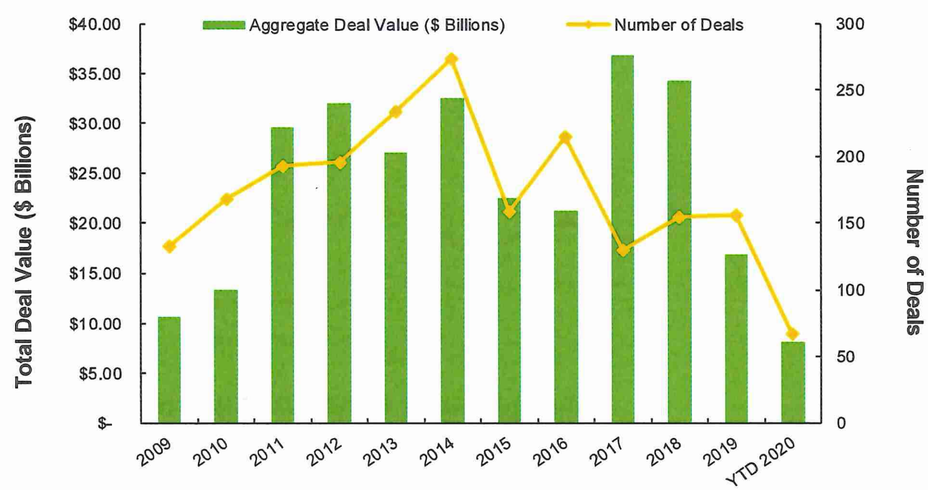
Natural Resources

Natural Resources Fundraising



Source: Preqin

Energy & Utilities Deal Activity



Source: Preqin

Fundraising

- During Q2 2020, two funds closed on $0.3 billion compared to six funds totaling $4.6 billion in Q1 2020.[1] The represented 2.3% of 2019's total.
  - Warwick Royalty & Mineral Fund II was the largest fund raised during the quarter, securing commitments of €274 million.
- At the end of the first quarter, there were roughly 107 funds in the market targeting an estimated $48.9 billion in capital.[1]
  - Quantum Energy Partners VIII was the largest fund raising capital with a target fund size of $5.5 billion.
- Dry powder stood at $55.7 billion at the end of 2Q 2020, which was 4.1% higher than 4Q 2019's level of $53.5 billion and down from the five-year average level by 12.7%.[1]

Activity

- Energy and utilities industry managers completed 28 deals totaling $2.8 billion in 1Q 2020, compared to $5.3 billion across 39 deals in Q1 2020.[1]
- Crude oil prices increased during the quarter.
  - WTI crude oil prices increased 31.2% during the quarter to $38.31 per bbl. However this was still a decrease of 36.0% compared to year-end 2019.[11]
  - Brent crude oil prices ended the quarter at $40.27/bbl, up 25.8% compared to the prior quarter, but down 40.2% from 4Q 2019.[11]
- Natural gas prices (Henry Hub) finished Q2 2020 at $1.63 per MMBtu, which was down 8.9% from 1Q 2020 and down 26.6% from 4Q 2019.[11]
- A total of 263 crude oil and natural gas rotary rigs were in operation in the U.S. at the end of the quarter. This was down by 60.3% from the prior quarter and down 72.7% year-over-year.[15]
  - Crude oil rigs represented 70.3% of the total rigs in operation. 68.1% of the 185 active oil rigs were in the Permian basin.
  - 43.4% and 36.8% of natural gas rigs at the end of Q2 2020 were operating in the Haynesville and Marcellus basins, respectively.
- The price of iron ore (Tianjin Port) ended the quarter at $103.30 per dry metric ton, up from $88.99 at the end of Q1 2020.[12]

Opportunity

- Acquire and exploit existing oil and gas strategies preferred over early stage exploration in core U.S. and Canadian basins
- Select midstream opportunities

Notes

1. Preqin
2. UBS
3. Standard & Poor's
4. Aon Hewitt Investment Consulting
5. Moody's
6. Fitch Ratings
7. PriceWaterhouseCoopers/National Venture Capital Association MoneyTree Report
8. PitchBook/National Venture Capital Association Venture Monitor
9. Cooley Venture Financing Report
10. U.S. Energy Information Administration
11. Bloomberg
12. Setter Capital Volume Report: Secondary Market FY 2019
13. KPMG and CB Insights
14. Baker Hughes

Notes:
FY: Fiscal year ended 12/31
YTD: Year to date
YE: Year end
LTM: Last twelve months (aka trailing twelve months or TTM)
PPM: Purchase Price Multiples: Total Purchase Price / EBITDA
/bbl: Price per barrel
MMBtu: Price per million British thermal units

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Appendix B:

Real Estate Market Update

2Q 2020

United States Real Estate Market Update (2Q20)

General

- On March 13, President Trump declared a national emergency. National, state, and local governments across the world implemented stay-at-home orders, which caused a near complete halt of the world economy. governments have dramatically expanded expenditures in order to protect people and businesses from large-scale disruption. In the 2nd quarter, equity markets bounced back from the March rout, and the S&P 500 produced a gross total return of 20.0%. The MSCI US REIT index rebounded and produced a return of 10.7% but remains down -20.0%.

- The U.S. entered a recession in February; GDP grew at an annualized rate of -32.9% in the 2nd quarter. Initial jobless claims reached 10 million in March alone, while the unemployment rate peaked in April at 14.7% but declined to 11.1% by quarter end. The Federal Reserve has acted aggressively via quantitative easing and rate cuts, thus far financial markets have stabilized. The CARES Act provided $1.5 trillion of stimulus to the economy. The International Monetary Fund has projected that the world economy will shrink by 4.9% in 2020.

Commercial Real Estate

- Shelter in place orders and social distancing have restricted the ability to complete due diligence and acquire assets. Transaction volume has declined by nearly 50% over the last 6 months. Transactions have primarily occurred in the apartment and industrial sectors.

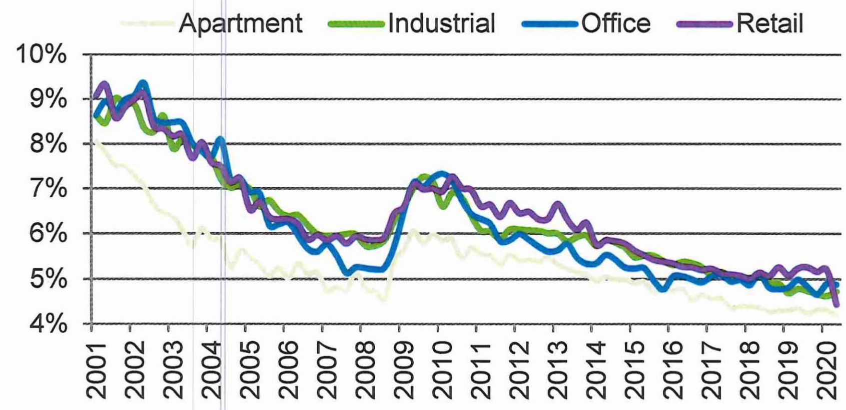
- Private real estate market carrying values contracted marginally over the quarter. Transaction cap rates (5.5%) expanded 12 bps during the quarter. Current valuation cap rates declined due to a reduction in cash flows, apartments (-12 bps), office (-2 bps), and retail (-77 bps). A lack of transactions has limited evidence to revalue real estate.

- NOI growth has substantially diverged between property sector due to the impacts of COVID-19. Retail NOI contracted substantially (-3273 bps) as rent collections declined and retailers were shutdown. The retail sector has seen rent collections of 30-50% vs. more than 85% in the other major sectors. Public market signals have been divergent by property type.

- In the second quarter of 2020, $44 bn of aggregate capital was raised by real estate funds. There continues to be substantial dry powder,~$322 billion, seeking exposure to private real estate.

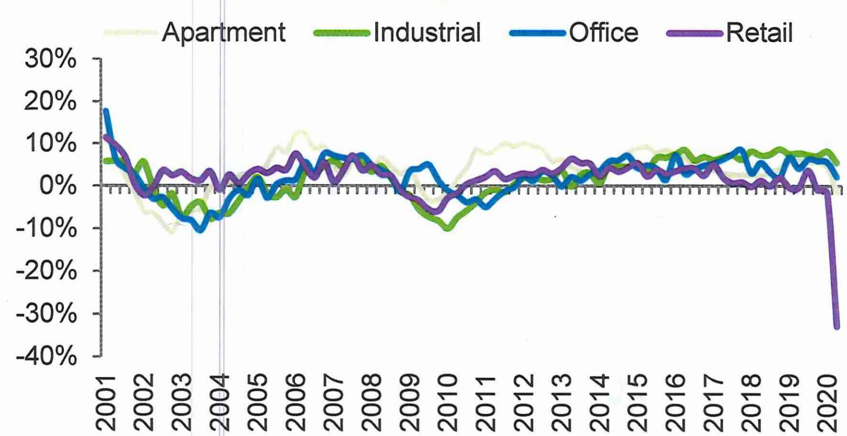
- 10-year treasury bond yields remained approximately flat 0.7% during the quarter.

Current Value Cap Rates by Property Type



Source: NCREIF

4 Qtr Rolling NOI Growth



Source: NCREIF

Sources: Bureau of Economic Analysis, U.S. Census Bureau, St. Louis Fed, NCREIF, Real Capital Analytics, Bloomberg LP., Preqin

United States Property Matrix (2Q20)

TOWNSEND GROUP an Aon company

INDUSTRIAL

- In 2Q20, industrial properties were the highest returning sector at 1.0% and outperformed the NPI by 200 bps.
- Transaction volumes fell to $12.3 billion in the second quarter of the year, a 40.0% year-over-year decrease. Individual asset sales were down 41.8% year-over-year, while portfolio purchases turned in a year-over-year volume decrease of 28.0%. The portfolio transaction volume continued to regress to the mean growth rate in 2Q20 following a second half of 2019 that was full of astronomical growth.
- The industrial sector turned in NOI growth of 5.6% over the past year, significantly decreasing from the prior periods TTM growth of 8.3% in 1Q20. Market rent growth is expected to decelerate compared to its recent pace, but still remains very strong.
- Vacancy increased by 26 bps year-over-year to 3.4%, still remaining close to all-time historic lows. E-commerce continues to drive demand.
- Industrial cap rates compressed approximately 6 bps from a year ago, to 4.74%. Industrial fundamentals still top all property sectors.

MULTIFAMILY

- The apartment sector delivered a -0.6% return during the quarter, outperforming the NPI by 35 bps.
- Transaction volume in the second quarter of 2020 fell to $15.0 billion, a decrease of 68.0% year-over-year. This volume continues to make multifamily the most actively traded sector for the twelfth straight quarter.
- Cap rates decreased to 4.20%, compressing 16 bps year-over-year. Multifamily cap rates have falling to their lowest in years.
- The multifamily sector has seen increasing vacancy rates due to the pandemic but has still held steady relatively speaking, vacancy has increased 175 bps from a year ago. The aging millennials have begun shifting their desires to suburban living but continued home price appreciation has deterred the full effect of this migratory trend.

OFFICE

- The office sector returned -0.5% in 2Q20, 50 bps above the NPI return over the period.
- Transaction volumes decreased by 70.0% year-over-year in Q2. Annual sales volumes equaled $11.6 billion for the quarter. Single asset transactions accounted for 87% of volume.
- Occupancy growth within the office sector has slowed, decreasing by 44 bps year-over-year. Office continues to be the highest vacancy property type at close to 10.2%.
- NOI growth of 2.3% in the last year is a negative for the sector as this is a decrease of 350 bps from 1Q20. Due to a number of work from home orders put in place at the end of the first quarter that have remined in place, NOI growth is expected to continue trending downward.
- Office cap rates compressed from a year ago to approximately 4.89% in the second quarter. Office-using job growth was hit significantly hard in the first quarter and continued into the second. Many work from home policies continued through the second quarter. Substantially slowing overall office growth.

RETAIL

- As of 2Q20, the retail sector delivered a quarterly return of -3.9%, performing 285 bps below the NPI.
- Transaction volumes totaled $5.0 billion in the second quarter, falling 71.0% year-over-year. Single asset transactions accounted for just over 91% of all sales volume.
- Cap rates have compressed approximately 80 bps within the sector over the last year, to 4.45%.
- NOI growth significantly decreased, -32.7% over the last year. This is a 31.2% decrease from last quarter. Retail is expected to continue to suffer from the shift towards e-commerce and the recent shelter in place orders.
- Retail vacancy rates increased 114 bps over the past year to 7.9%. Many big box stores have closed as the need for retail space shrinks, translating to a negative outlook for rent growth. Paired with the global economic crisis that has had a significant negative impact on this sector.

Sources: Real Capital Analytics, Green Street, NCREIF

Global Real Estate Market Update (2Q20)

- Global investment activity during the second quarter of 2020 was significantly down relative to the same period in 2019 and reached the worst quarterly level since 2Q 2009. Although transaction volumes fell during 2Q 2020, the New York, Los Angeles, San Francisco metro markets continued to witness the greatest transaction volume.
- Rising COVID cases across the world caused lockdowns across major economies resulting in a short but deep recession and affecting all sectors of the real estate industry. Uncertainty about the state of the economy threw some doubts on the future needs for certain property types.

Global Total Commercial Real Estate Volume - 2019 - 2020

$ US Billions	Q2 2020	Q2 2019	% Change Q2 20 - Q2 19	H1 2020	H1 2019	% Change H1 20-H1 19
Americas	40	124	-68%	162	224	-28%
EMEA	55	80	-31%	132	146	-10%
Asia Pacific	211	271	-22%	331	460	-28%
Total	306	474	-36%	624	830	-25%

Source: Real Capital Analytics, Inc., Q2' 20

- Investment activity in the Americas witnessed a sharp decline and fell by 68% year-over-year. COVID cases continued to increase in the US, putting plans of fully reopening the economy on hold. In the US, transaction volume decreased by 70% compared to the same quarter last year.
- In the Asia Pacific region, volumes declined but transaction activity was mixed across the region. China witnessed a strong investment quarter recovering from a severe plunge over the previous period. Japan continued to be the regions' largest investment market. Conversely, transactions fell in both Australia and Singapore.
- Although investment activity dropped in the EMEA region, Europe appeared to be more in control of the outbreak. Germany witnessed a 15% growth in the quarter as several apartment megadeals closed. In addition, Denmark saw a substantial increase of 74% in sales compared to the same quarter last year. On the other hand, both France and Netherlands recorded declines in transactions.
- All sectors were impacted by the spread of the pandemic but the hotel and retail sectors were affected the most
- In the office sector, global leasing activity declined by 59% year-over-year and vacancy rates begun to increase in all regions. The declines represent an uncertainty about future office space needs. The US witnessed a 65% decline in leasing activity. Across the main European markets, demand for office space is excepted to fall by 40%. In the APAC region, net absorption is anticipated to decrease by 40% to 50%.
- The retail sector continued to suffer globally as the shutdowns and social distancing measures of the COVID-19 outbreak posed challengers for operators. Vacancy rates increased as rents and NOI continued to compress. Retailers that were able to adapt their strategy to the digital world witnessed a recovery in sales.
- Despite the multifamily market recording a significant decrease in investments globally, the sector remains the most liquid in commercial real estate highlighting its attractiveness. In the U.S., rents fell by approximately 1% and demands fell. However, in Europe effective rent rates were stable. On the other hand, the APAC region recorded a stronger sales performance as cities like Beijing and Shanghai attracted home buyers.
- While the industrial market was affected by short-term headwinds from the recession as global vacancy recorded a slight uptick of 8.2%, the sector remains resilient Despite the slowdown in the construction of industrial properties at the beginning of the year, new development resumed during the second quarter.

Sources: Jones Lang LaSalle Research, Real Capital Analytics, Inc., CBRE

Global Outlook - GDP (Real) Growth % pa, 2020-2022

		2020	2021	2022
Global		**-3.9**	**5.1**	**3.5**
Asia Pacific		**-0.7**	**4.8**	**4.6**
	Australia	-3.9	3.0	3.2
	China	2.0	8.0	5.5
	India	-5.5	7.2	
	Japan	-5.3	2.5	1.3
North America		**-5.4**	**3.8**	**2.8**
	US	-5.0	3.7	2.8
MENA*		**-4.1**	**3.1**	**3.3**
European Union		**-8.0**	**5.6**	**2.6**
	France	-10.0	7.0	2.7
	Germany	-6.0	5.0	2.4
	UK	-9.9	6.4	2.8

*Middle East North Africa
Source: Bloomberg

Capital Markets Outlook & Risk Metrics

As of September 30, 2020

Capital Markets Outlook

Takeaways

- September diverged from the prior five months as equity markets across the globe produced moderately negative returns. Additionally, safe haven assets (e.g., US Treasury bonds) were roughly flat.
- Despite negative returns in September, risk-oriented markets have rebounded significantly since the March lows and Q3 was another strong period in aggregate. However, there has been a high degree of divergence among equity regions/styles/capitalizations, and this is exemplified at the extremes with US large cap growth stocks outperforming US small cap value stocks by over 45% thus far in 2020.
- As expected (considering recent Federal Reserve announcements), the entire US Treasury yield curve was effectively unchanged from the end of August to the end of September.
- Conversely, real yields in the US ticked up during September, with the most significant movements occurring at the short end of the curve. The entire real yield curve does, however, remain in negative territory.
- Recent economic data has shown a divergence among regions and metrics. Certain areas (e.g., US housing, China GDP, etc.) have been positive whereas other segments (e.g., US payrolls) are still indicative of broad challenges. Many global authorities appear to be in a period of observation as they attempt to gauge how the economy does, or does not, recover in the short term.

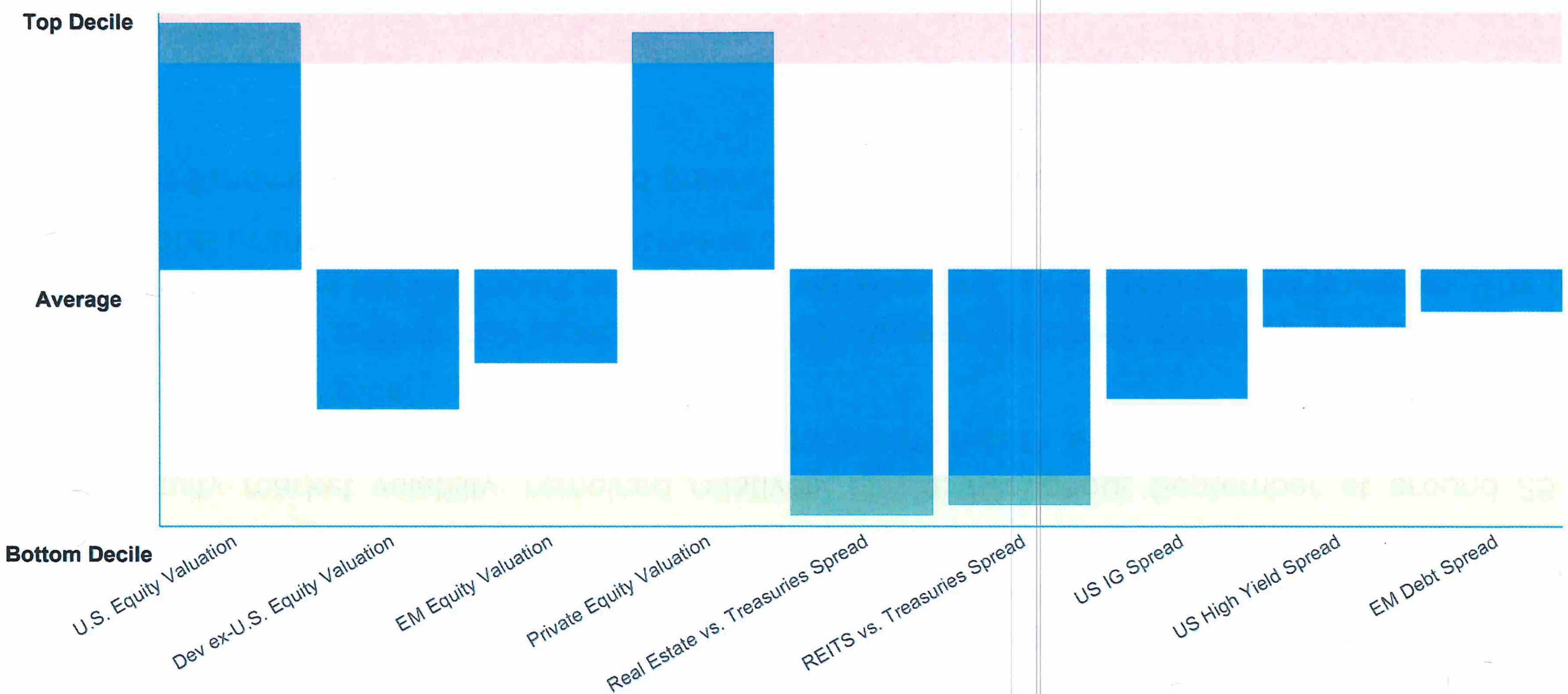
Capital Markets Outlook

Takeaways

- Local/regional US economies are in various stages of reopening, and the timeline for returning to normal levels of economic activity remains uncertain. Relatedly, the aggregate impacts to global GDP due to the COVID-19 pandemic are still unknown. Returning to pre-COVID levels of economic activity is not expected to occur until 2021 at the earliest.
- Implied equity market volatility[1] remained relatively stable throughout September at around 25-30. Conversely, our Systemic Risk measure increased during the month, while implied fixed income volatility[2] declined during September.
- While valuations for several risk-based asset classes appear neutral-to-attractive at first glance, it is important to note that the full impact on corporate earnings and solvencies remains unknown. The path that the global economy will take moving forward is uncertain.
- The Market Sentiment Indicator[3] remained green (i.e., positive) at month-end.

[1] As measured by VIX Index.
[2] As measured by MOVE Index.
[3] See Appendix for the rationale for selection and calculation methodology used for the risk metrics.

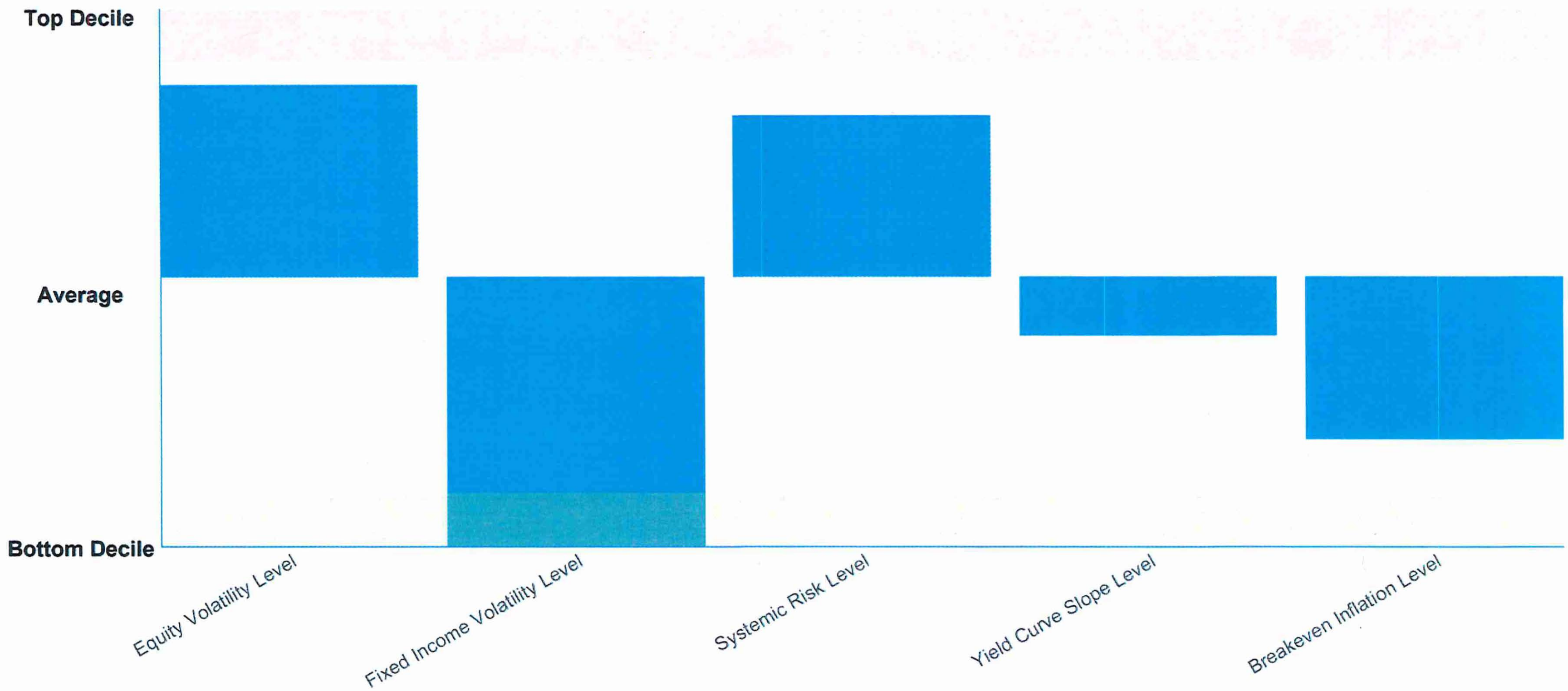
Risk Overview/Dashboard (1)
(As of September 30, 2020)[1]



- Dashboard (1) summarizes the current state of the different valuation metrics per asset class relative to their own history.

[1] With the exception of Private Equity Valuation, that is YTD as of December 31, 2019.

Risk Overview/Dashboard (2)
(As of September 30, 2020)

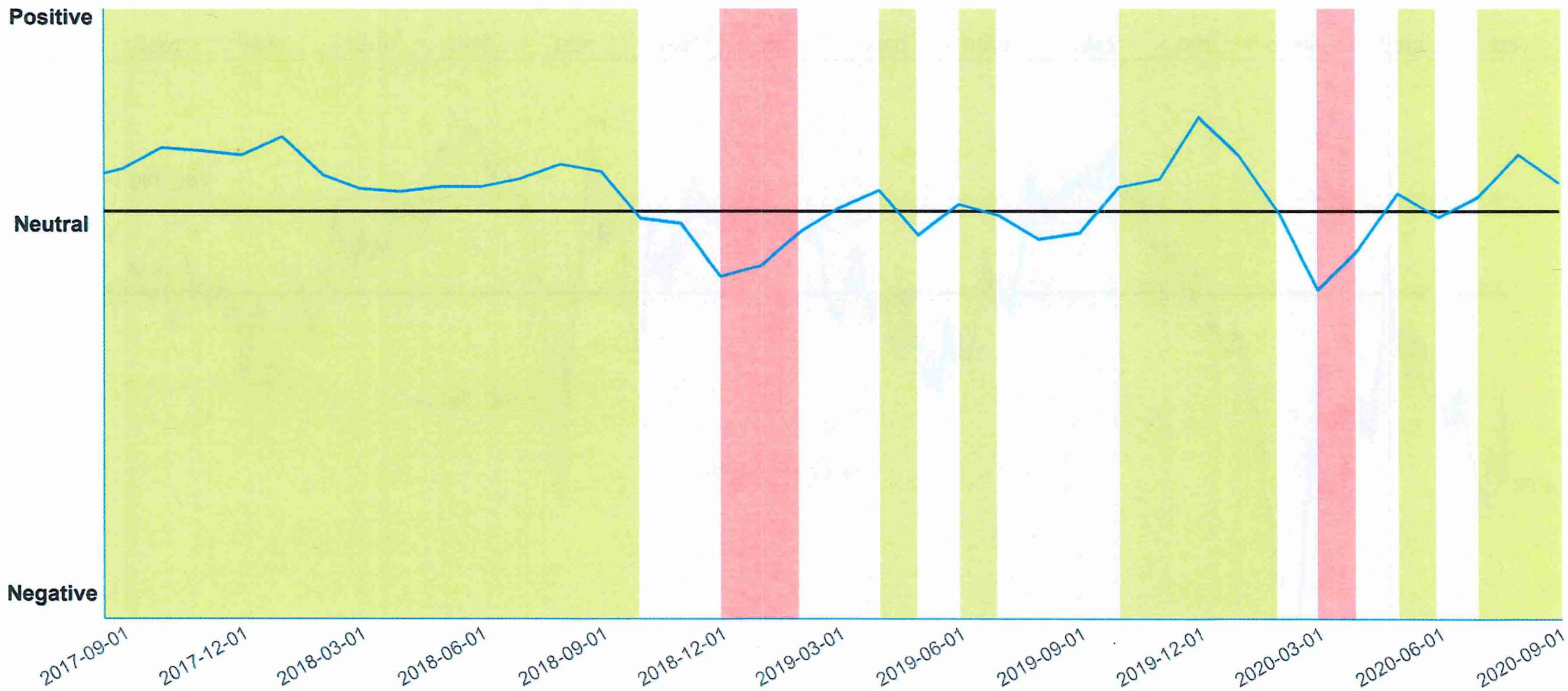


- Dashboard (2) shows how the current level of each indicator compares to its respective history.

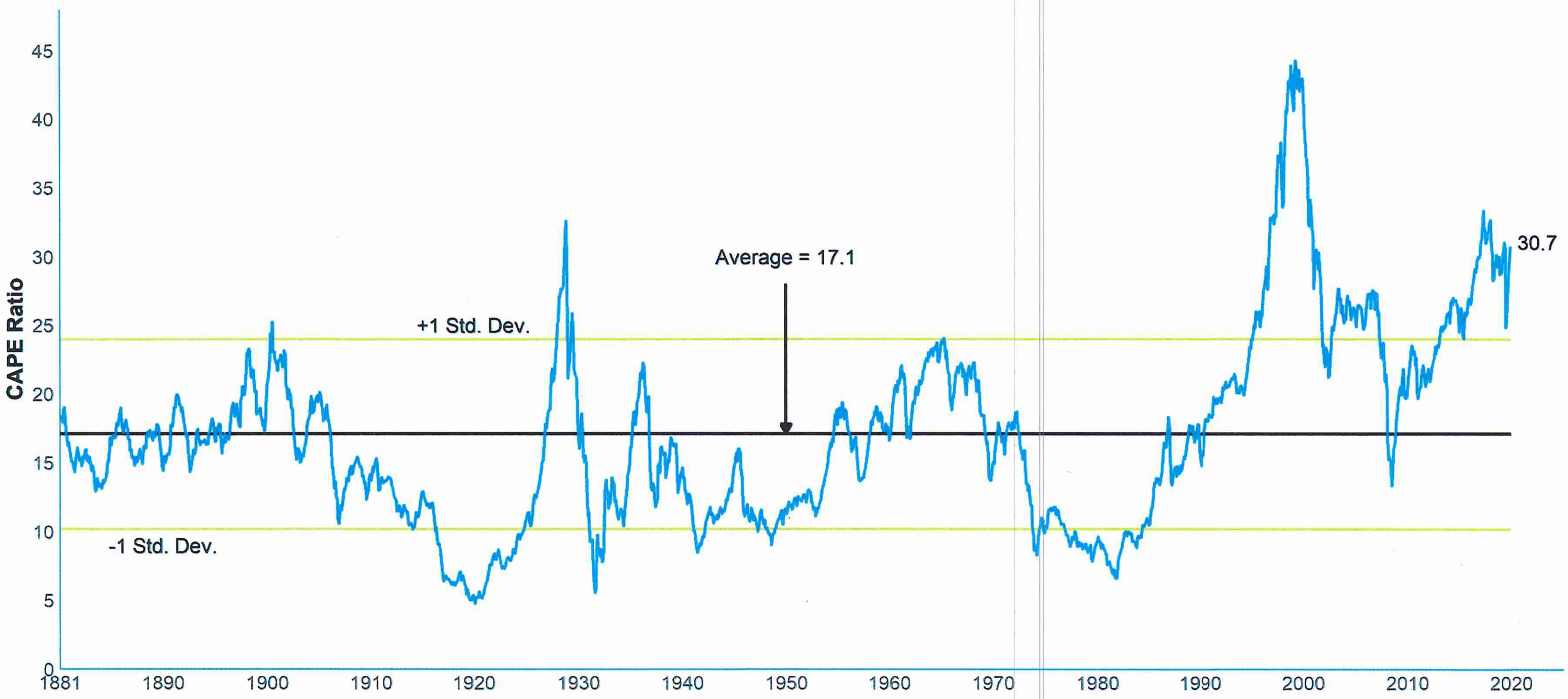
Market Sentiment Indicator (All History)
(As of September 30, 2020)

Market Sentiment Indicator (Last Three Years)

(As of September 30, 2020)



US Equity Cyclically Adjusted P/E[1]
(As of September 30, 2020)



- This chart details one valuation metric for US equities. A higher (lower) figure indicates more expensive (cheaper) valuation relative to history.

[1] US Equity Cyclically Adjusted P/E on S&P 500 Index. Source: Robert Shiller, Yale University, and Meketa Investment Group.

Small Cap P/E vs. Large Cap P/E[1]

(As of September 30, 2020)

- This chart compares the relative attractiveness of small cap US equities vs. large cap US equities on a valuation basis. A higher (lower) figure indicates that large cap (small cap) is more attractive.

[1] Small Cap P/E (Russell 2000 Index) vs. Large Cap P/E (Russell 1000 Index) - Source: Russell Investments. Earnings figures represent 12-month "as reported" earnings.

Growth P/E vs. Value P/E[1]

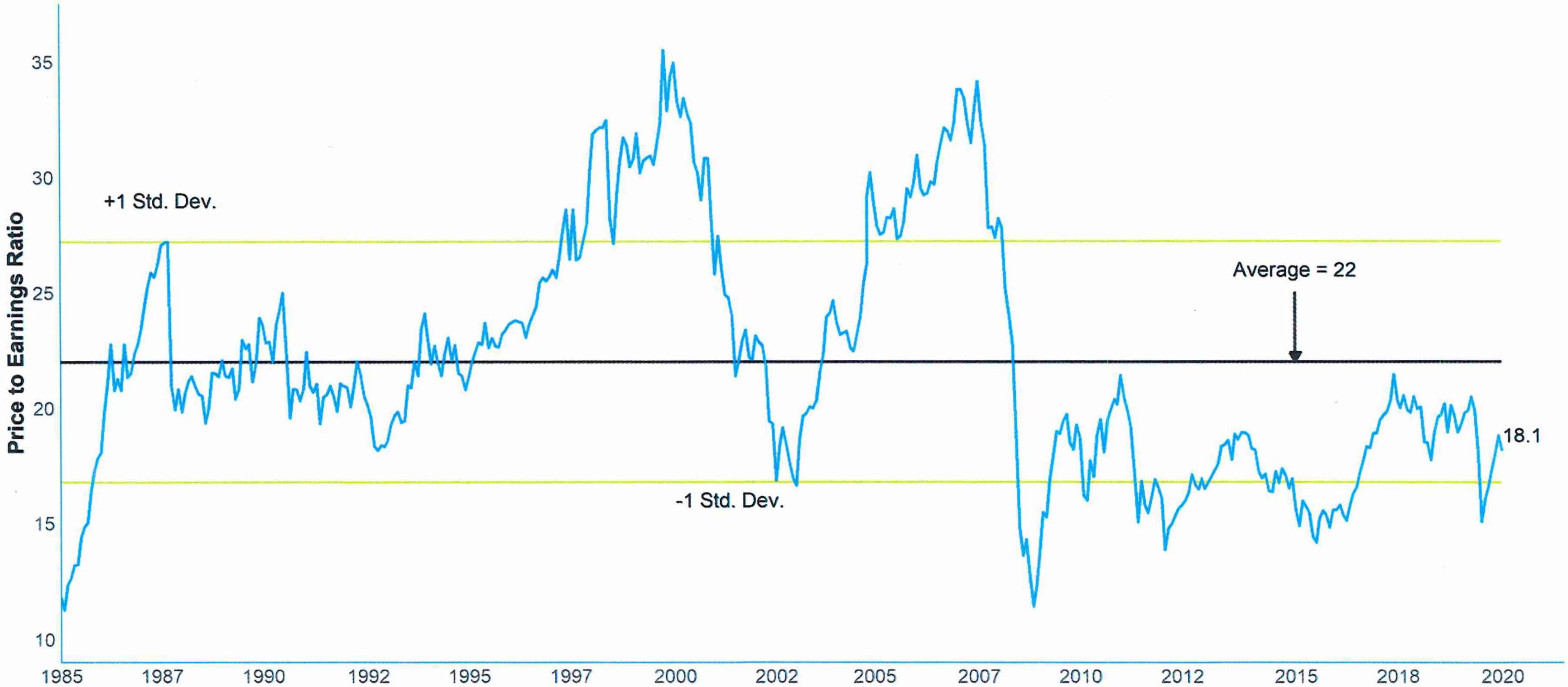
(As of September 30, 2020)

- This chart compares the relative attractiveness of US growth equities vs. US value equities on a valuation basis. A higher (lower) figure indicates that value (growth) is more attractive.

[1] Growth P/E (Russell 3000 Growth Index) vs. Value (Russell 3000 Value Index) P/E - Source: Bloomberg, MSCI, and Meketa Investment Group. Earnings figures represent 12-month "as reported" earnings.

Developed International Equity Cyclically Adjusted P/E[1]

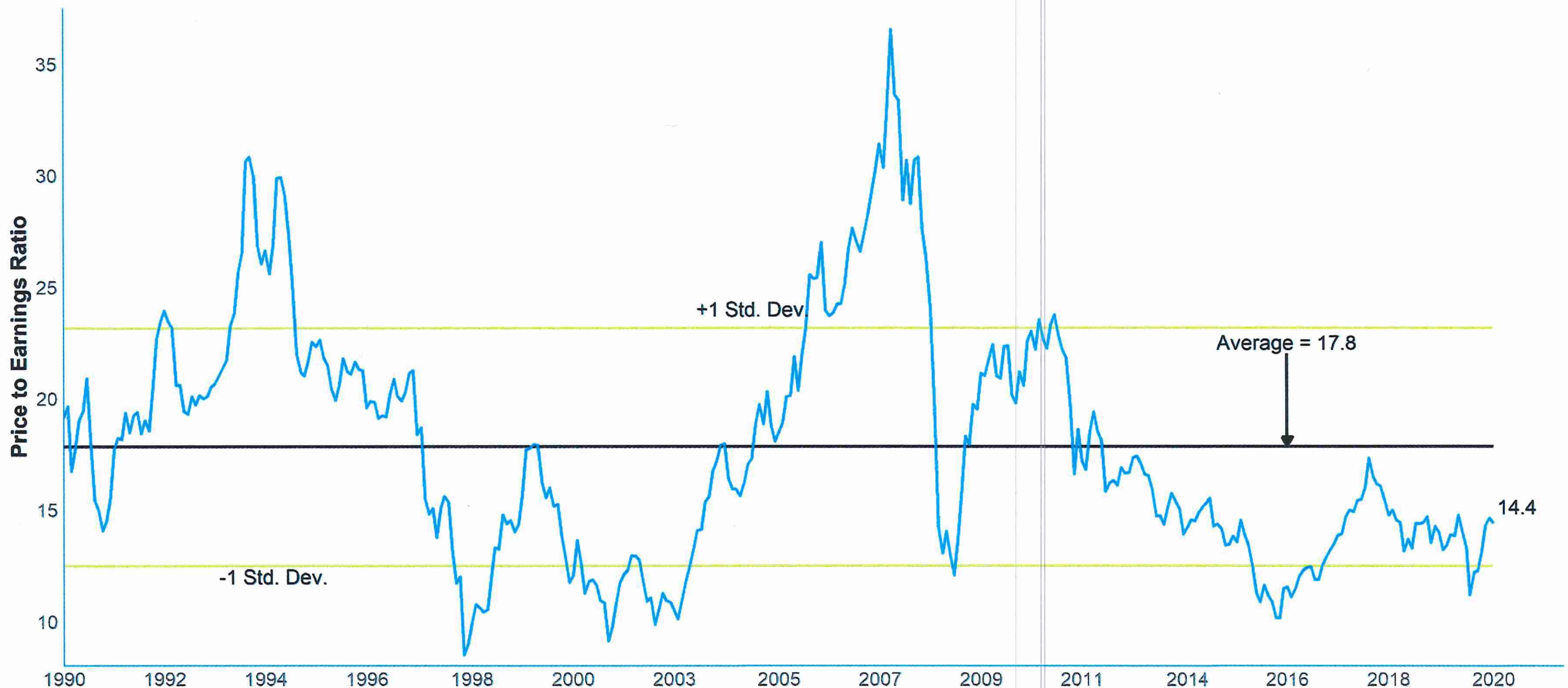
(As of September 30, 2020)



- This chart details one valuation metric for developed international equities. A higher (lower) figure indicates more expensive (cheaper) valuation relative to history.

[1] Developed International Equity (MSCI EAFE ex Japan Index) Cyclically Adjusted P/E – Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years.

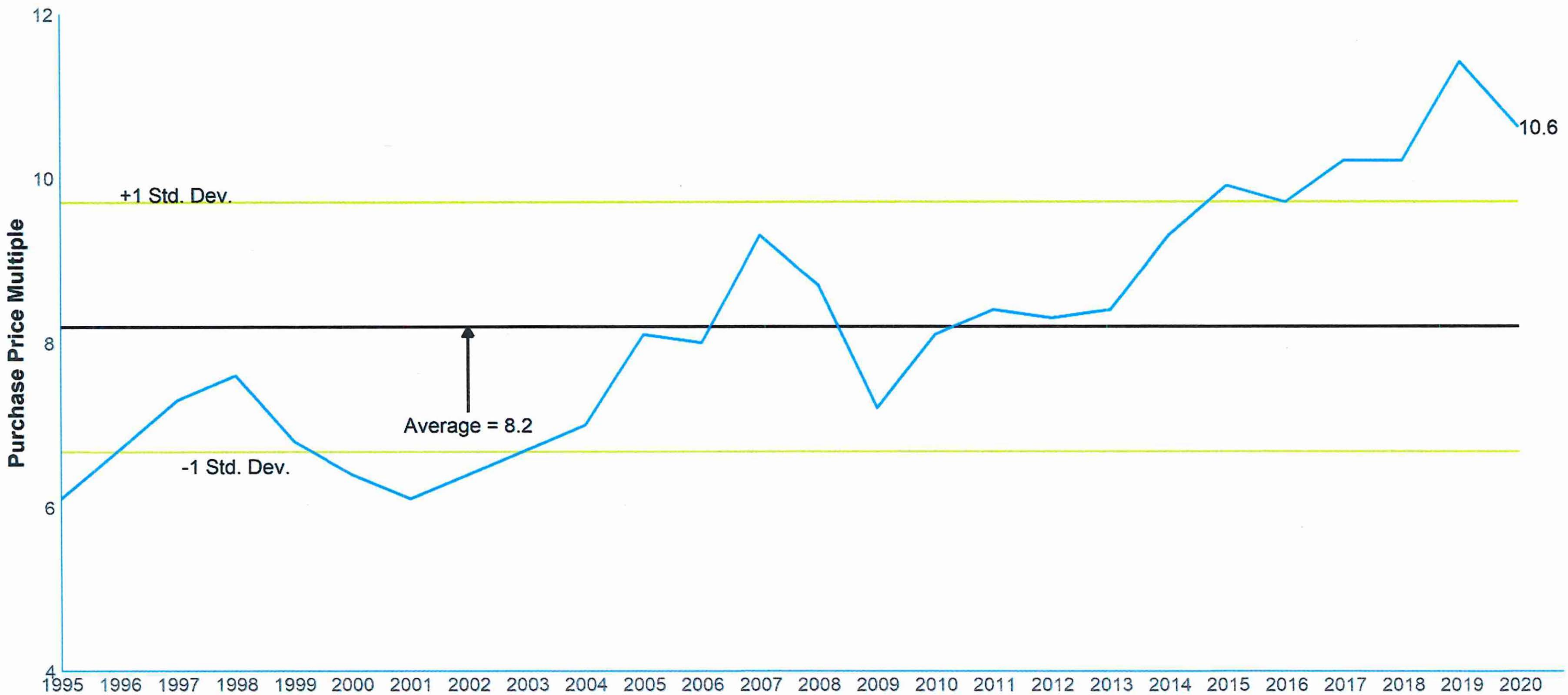
Emerging Market Equity Cyclically Adjusted P/E[1]
(As of September 30, 2020)



- This chart details one valuation metric for emerging markets equities. A higher (lower) figure indicates more expensive (cheaper) valuation relative to history.

[1] Emerging Market Equity (MSCI Emerging Markets Index) Cyclically Adjusted P/E – Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years.

Private Equity Multiples[1]
(As of February 29, 2020)[2]



- This chart details one valuation metric for the private equity market. A higher (lower) figure indicates more expensive (cheaper) valuation relative to history.

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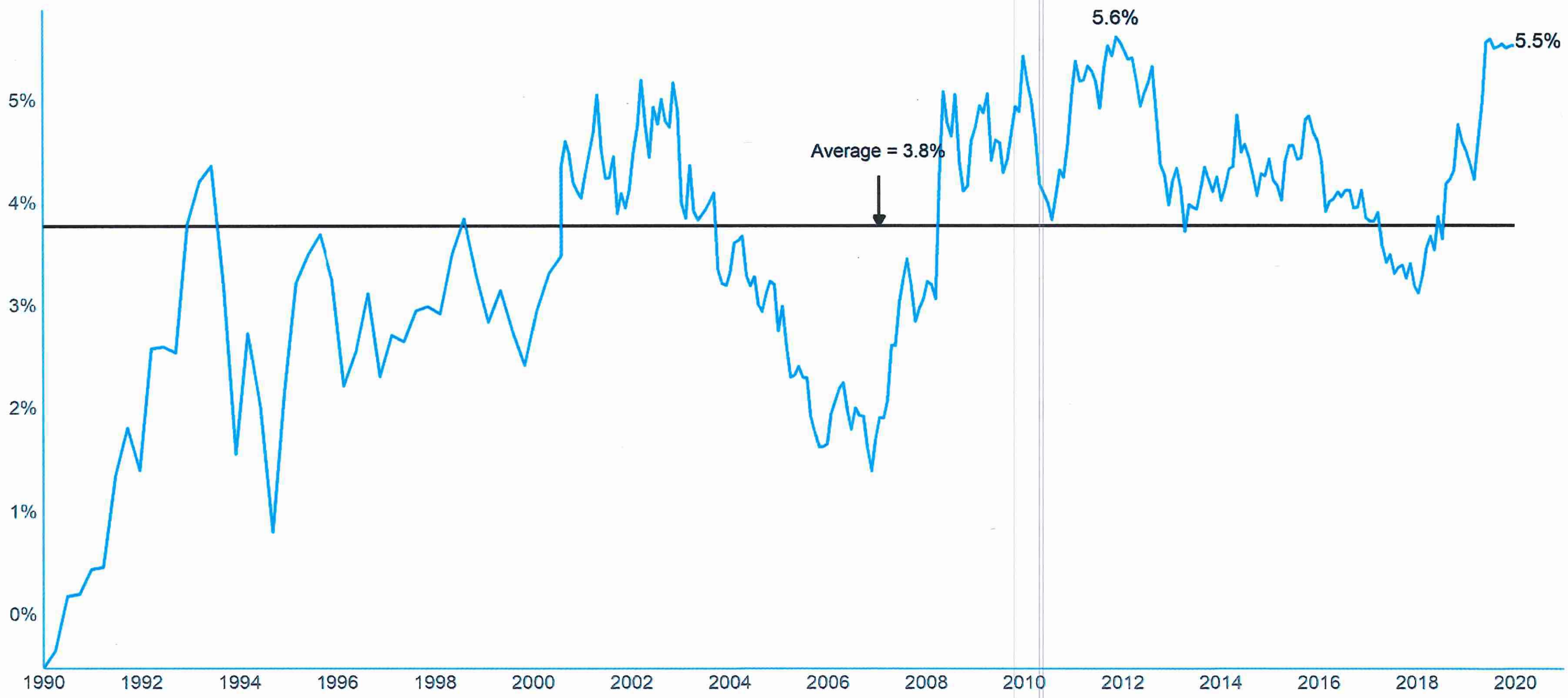
[1] Private Equity Multiples – Source: S&P LCD Average EBITDA Multiples Paid in All LBOs.
[2] Annual figures, except for 2020 (YTD).

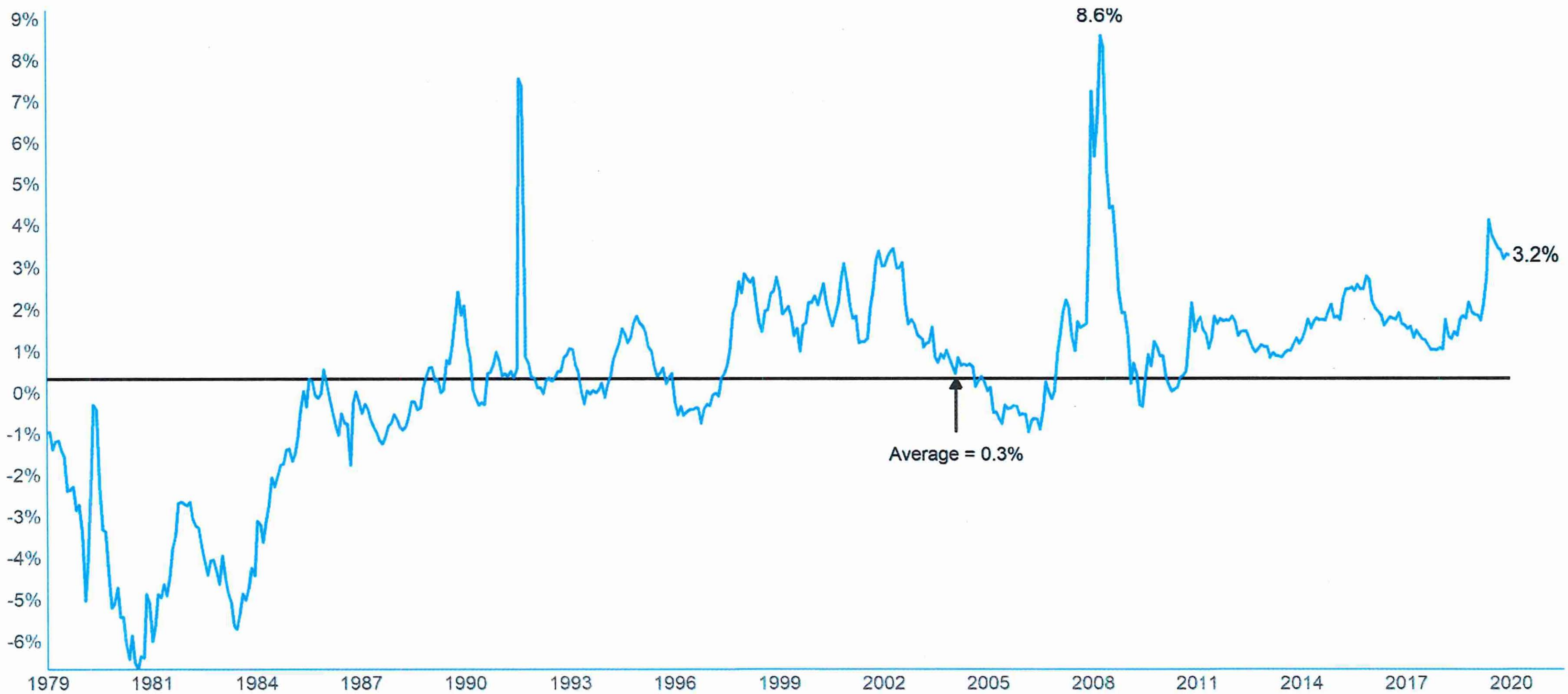
Core Real Estate Spread vs. Ten-Year Treasury[1]
(As of September 30, 2020)



- This chart details one valuation metric for the private core real estate market. A higher (lower) figure indicates cheaper (more expensive) valuation.

[1] Core Real Estate Spread vs. Ten-Year Treasury – Source: Real Capital Analytics, US Treasury, Bloomberg, and Meketa Investment Group. Core Real Estate is proxied by weighted sector transaction based indices from Real Capital Analytics and Meketa Investment Group.

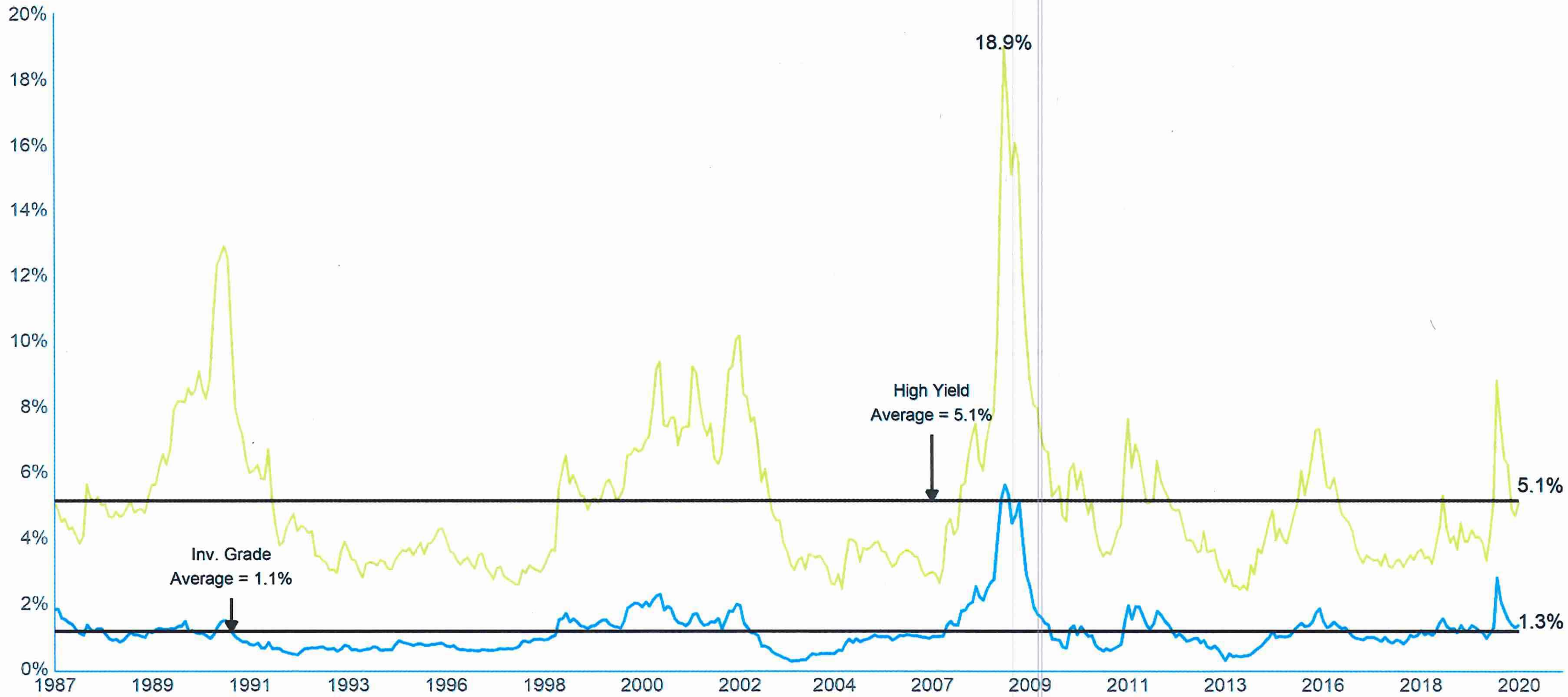
REITs Dividend Yield Spread vs. Ten-Year Treasury[1]
(As of September 30, 2020)



- This chart details one valuation metric for the public REITs market. A higher (lower) figure indicates cheaper (more expensive) valuation.

[1] REITs Dividend Yield Spread vs. Ten-Year Treasury – Source: NAREIT, US Treasury. REITs are proxied by the yield for the NAREIT Equity index.

Credit Spreads[1]
(As of September 30, 2020)



- This chart details one valuation metric for the US credit markets. A higher (lower) figure indicates cheaper (more expensive) valuation relative to history.

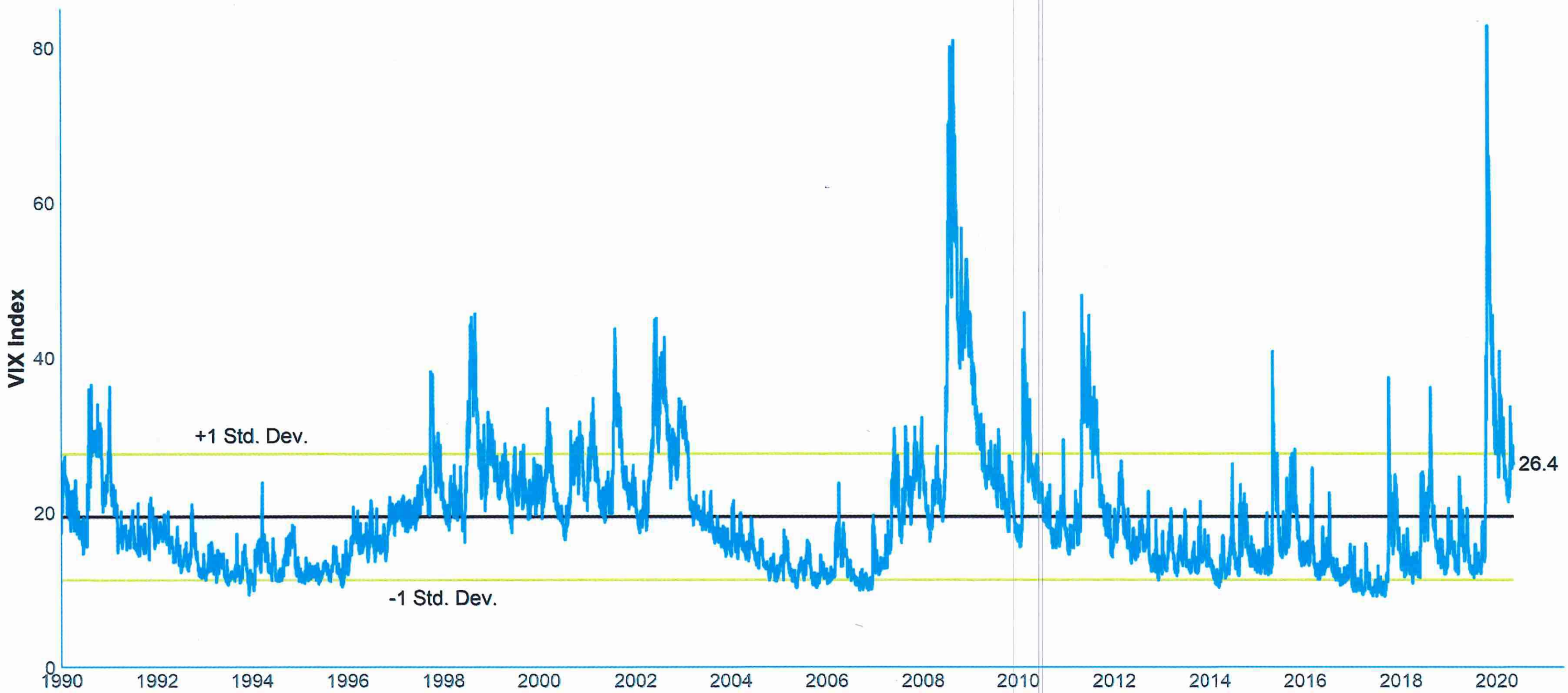
[1] Credit Spreads – Source: Barclays Capital. High Yield is proxied by the Barclays High Yield index and Investment Grade Corporates are proxied by the Barclays US Corporate Investment Grade index. Spread is calculated as the difference between the Yield to Worst of the respective index and the 10-Year US Treasury yield.

Emerging Market Debt Spreads[1]
(As of September 30, 2020)

- This chart details one valuation metric for the EM debt markets. A higher (lower) figure indicates cheaper (more expensive) valuation relative to history.

[1] EM Spreads – Source: Bloomberg. Option Adjusted Spread (OAS) for the Bloomberg Barclays EM USD Aggregate Index.

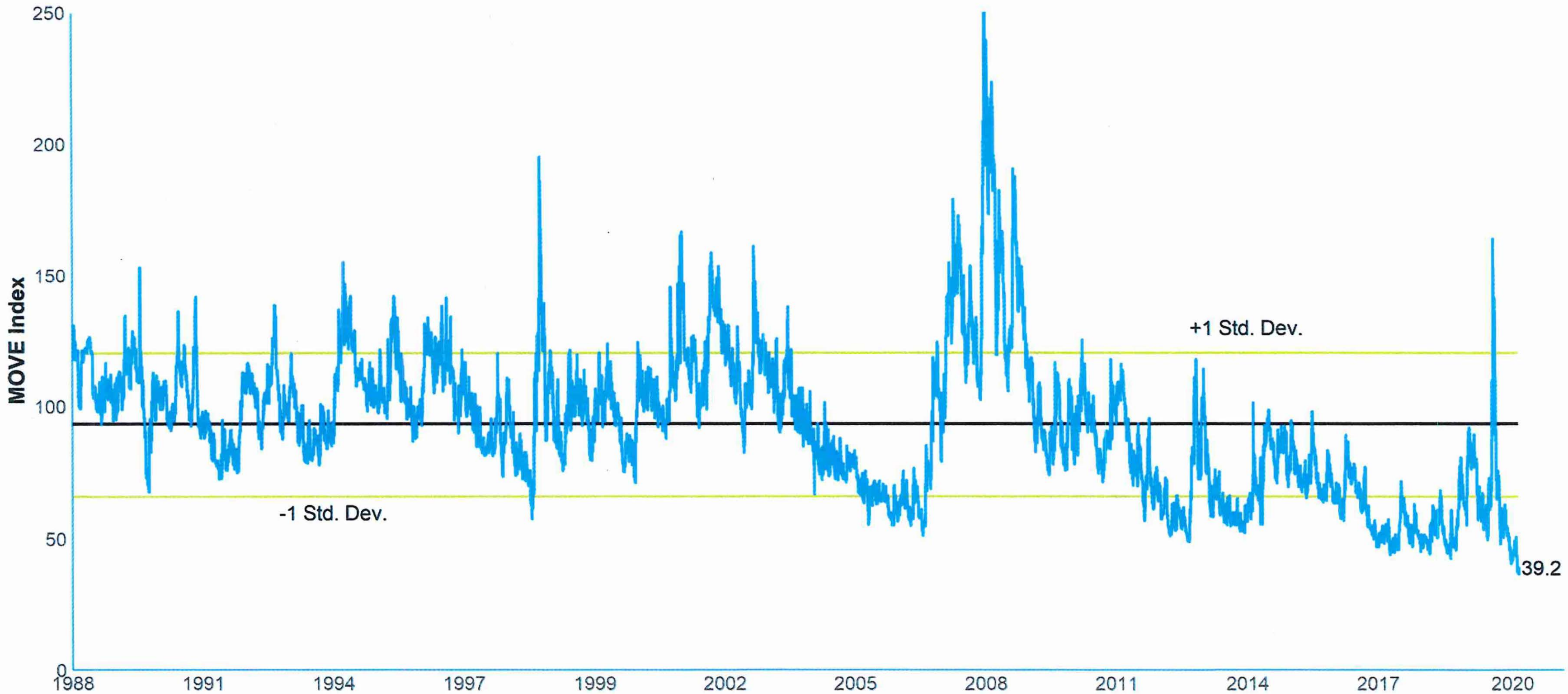
Equity Volatility[1]
(As of September 30, 2020)



- This chart details historical implied equity market volatility. This metric tends to increase during times of stress/fear and while declining during more benign periods.

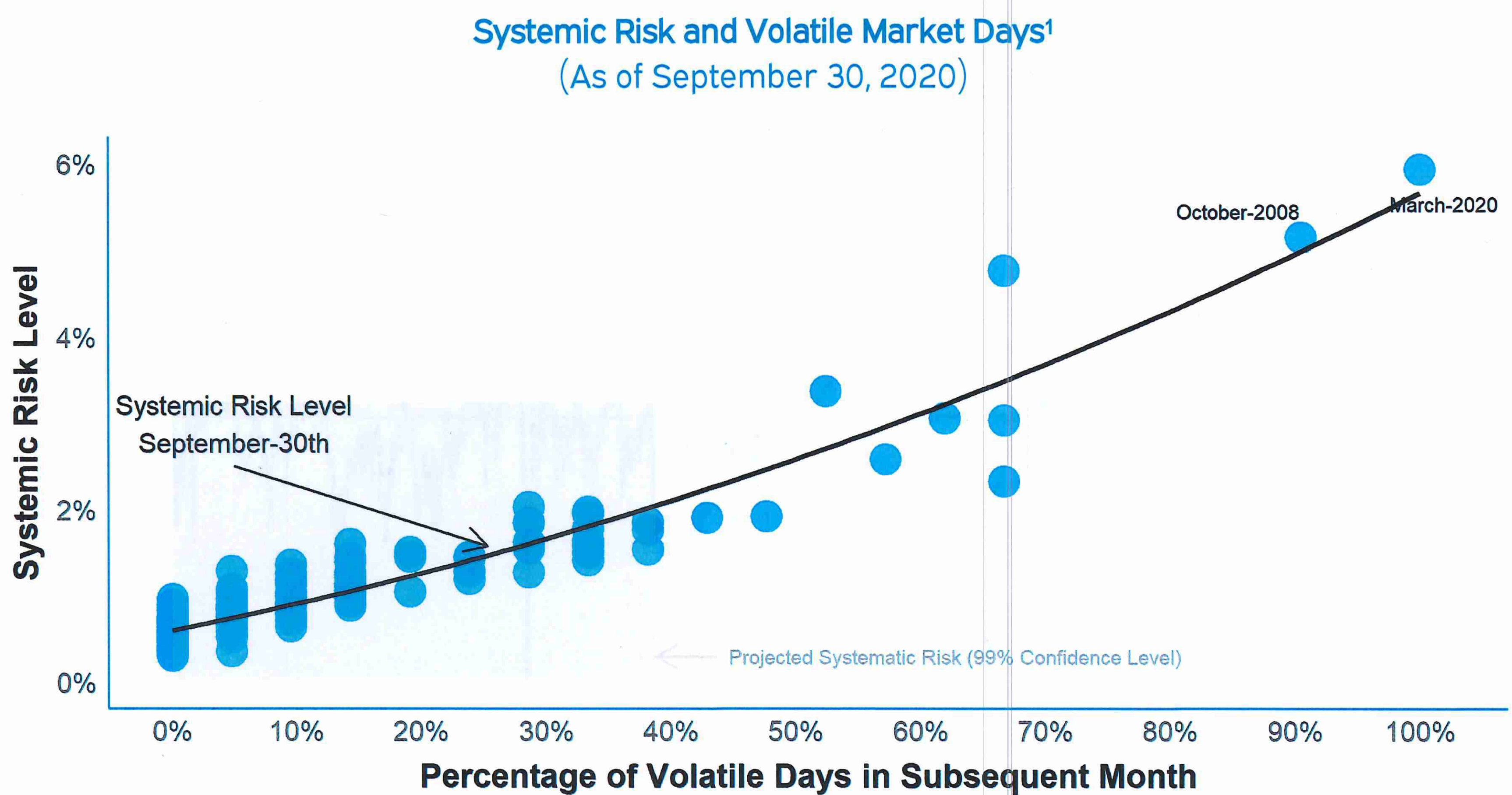
[1] Equity Volatility – Source: Bloomberg, and Meketa Investment Group. Equity Volatility proxied by VIX Index, a Measure of implied option volatility for US equity markets.

Fixed Income Volatility[1]
(As of September 30, 2020)



- This chart details historical implied fixed income market volatility. This metric tends to increase during times of stress/fear and while declining during more benign periods.

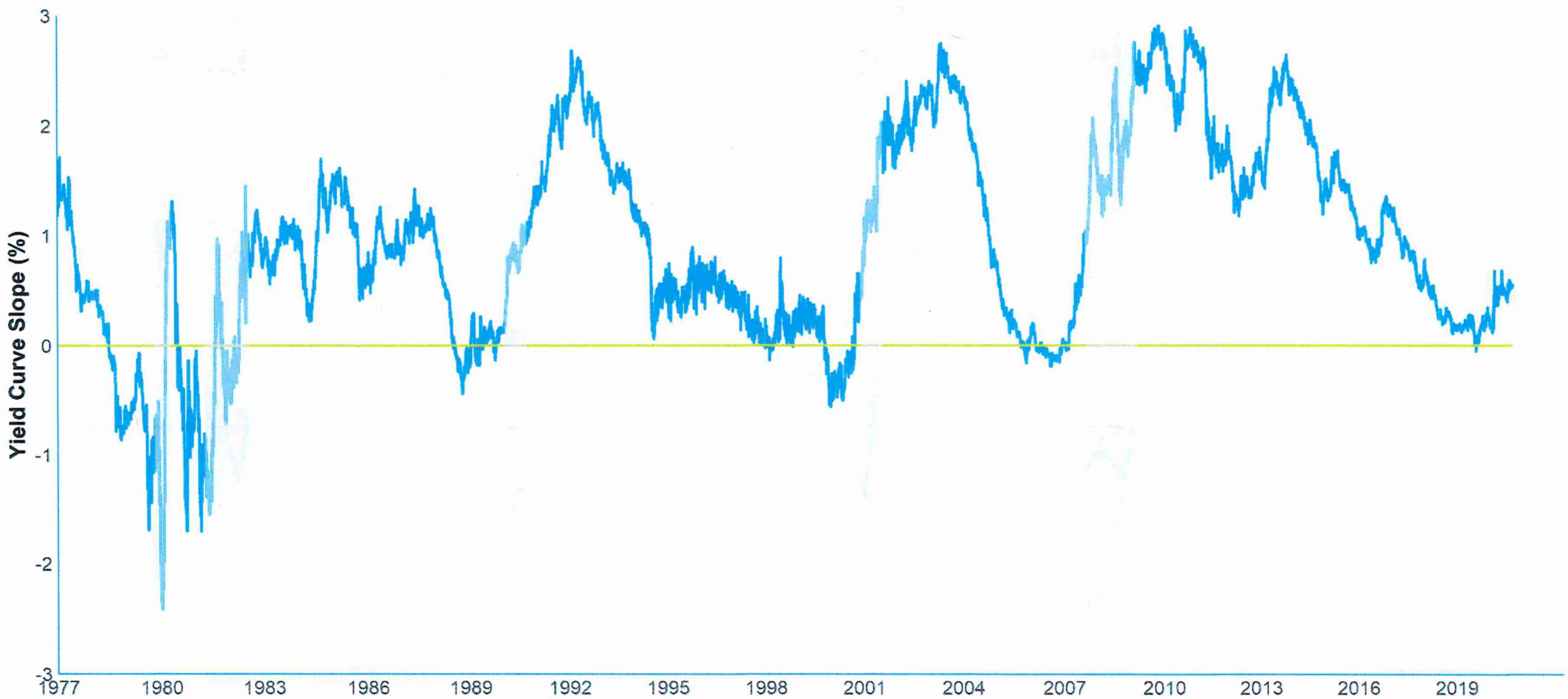
[1] Fixed Income Volatility – Source: Bloomberg, and Meketa Investment Group. Fixed Income Volatility proxied by MOVE Index, a Measure of implied option volatility for US Treasury markets.



- Systemic Risk is a measure of 'System-wide' risk, which indicates herding type behavior.

[1] Source: Meketa Investment Group. Volatile days are defined as the top 10 percent of realized turbulence, which is a multivariate distance between asset returns.

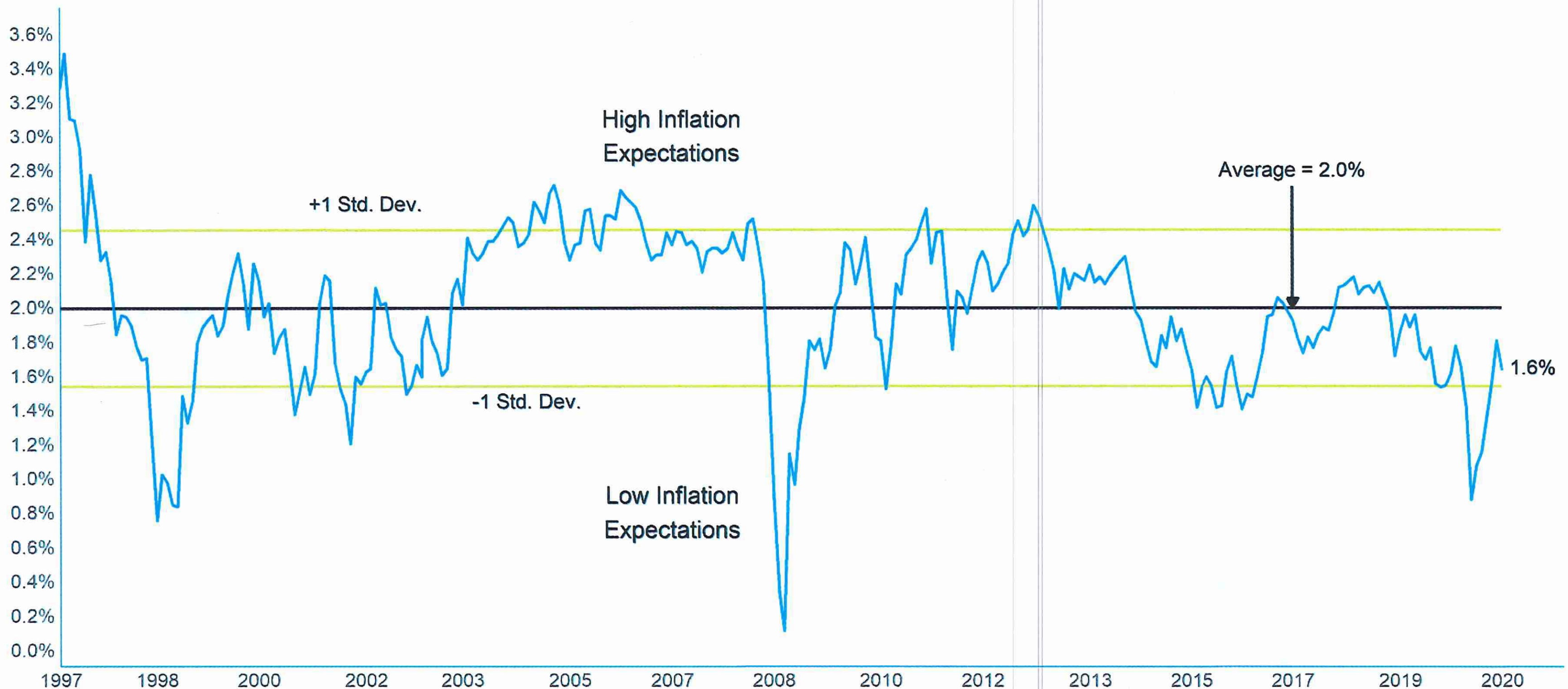
Yield Curve Slope (Ten Minus Two)[1]
(As of September 30, 2020)



- This chart details the historical difference in yields between ten-year and two-year US Treasury bonds/notes. A higher (lower) figure indicates a steeper (flatter) yield curve slope.

[1] Yield Curve Slope (Ten Minus Two) – Source: Bloomberg, and Meketa Investment Group. Yield curve slope is calculated as the difference between the 10-Year US Treasury Yield and 2-Year US Treasury Yield.

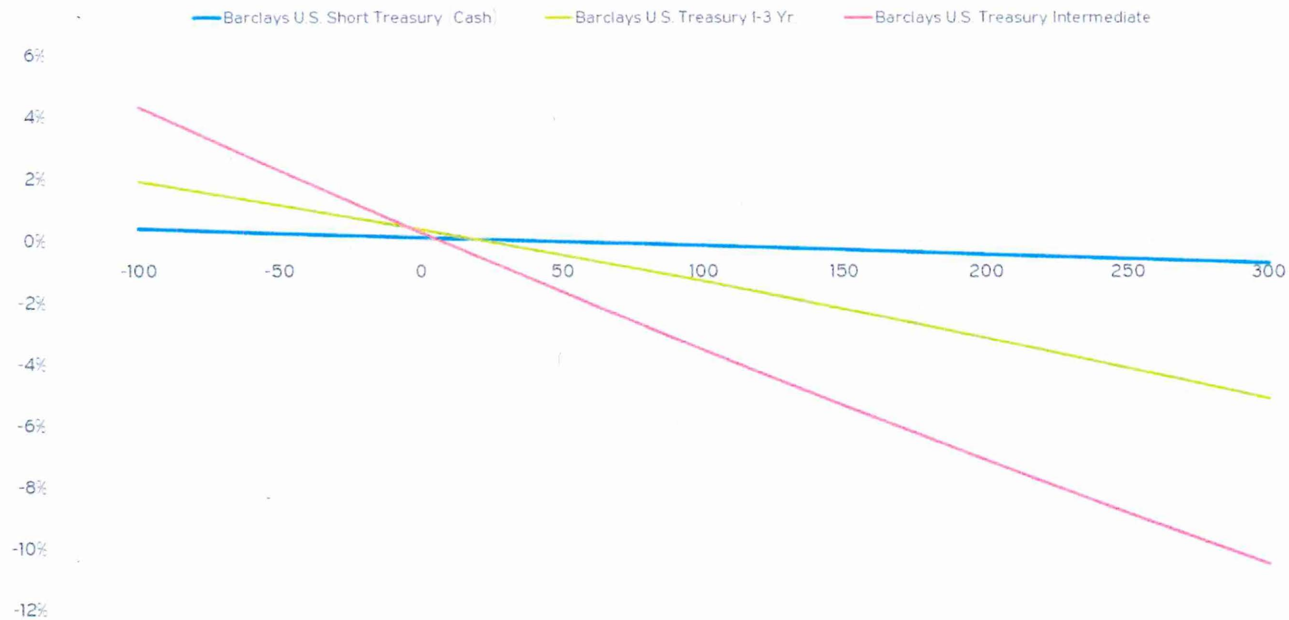
Ten-Year Breakeven Inflation[1]
(As of September 30, 2020)



- This chart details the difference between nominal and inflation-adjusted US Treasury bonds. A higher (lower) figure indicates higher (lower) inflation expectations.

[1] Ten-Year Breakeven Inflation – Source: US Treasury and Federal Reserve. Inflation is measured by the Consumer Price Index (CPI-U NSA).

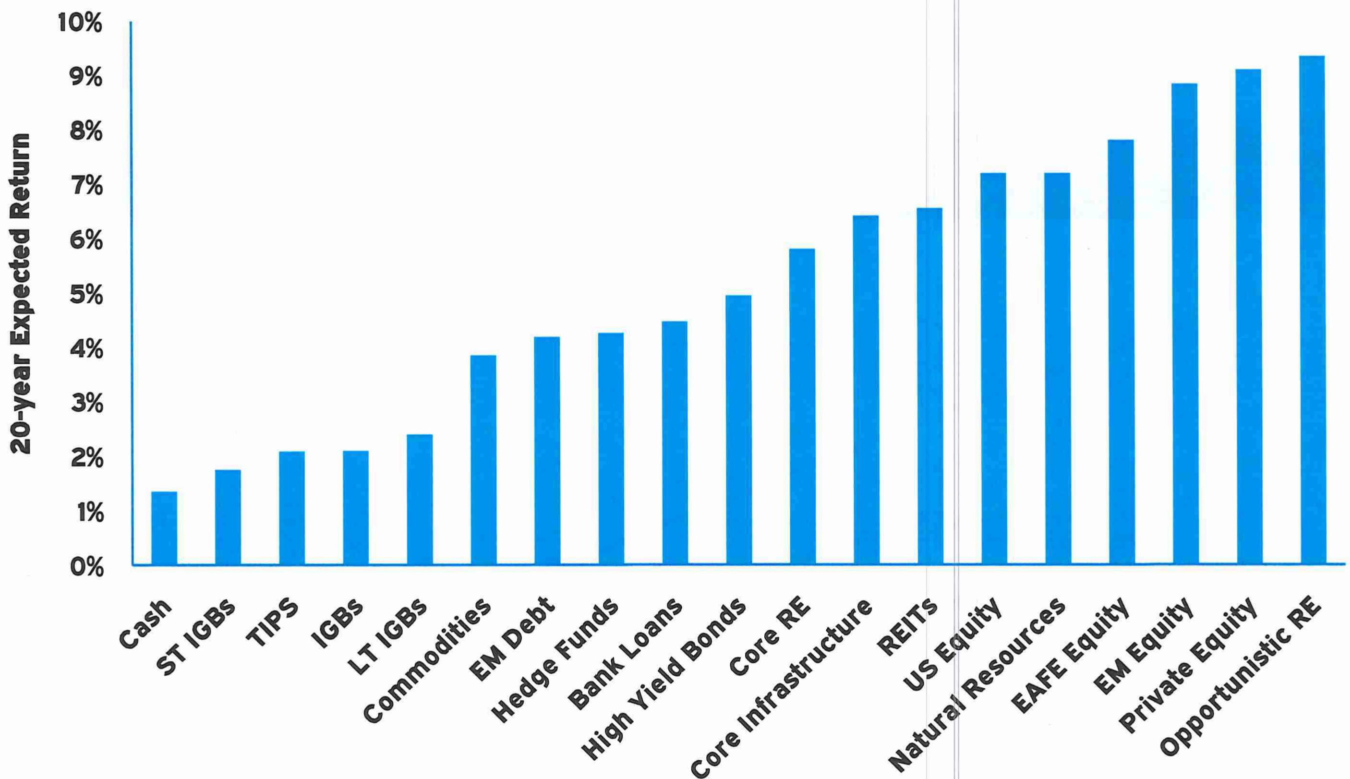
Total Return Given Changes in Interest Rates (bps)[1]
(As of September 30, 2020)



	Total Return for Given Changes in Interest Rates (bps)									Statistics	
	-100	-50	0	50	100	150	200	250	300	Duration	YTW
Barclays US Short Treasury (Cash)	0.4%	0.2%	0.1%	0.0%	-0.2%	-0.3%	-0.4%	-0.6%	-0.7%	0.27	0.09%
Barclays US Treasury 1-3 Yr.	1.9%	1.1%	0.4%	-0.5%	-1.3%	-2.2%	-3.2%	-4.1%	-5.1%	1.61	0.35%
Barclays US Treasury Intermediate	4.3%	2.2%	0.3%	-1.7%	-3.6%	-5.4%	-7.1%	-8.8%	-10.5%	3.92	0.25%
Barclays US Treasury Long	23.0%	11.6%	1.3%	-7.8%	-15.8%	-22.6%	-28.3%	-32.8%	-36.2%	19.42	1.32%

[1] Data represents the expected total return from a given change in interest rates (shown in basis points) over a 12-month period assuming a parallel shift in rates. Source: Bloomberg, and Meketa Investment Group.

Long-Term Outlook – 20-Year Annualized Expected Returns[1]



- This chart details Meketa's long-term forward-looking expectations for total returns across asset classes.

[1] Source: Meketa Investment Group's 2020 Annual Asset Study.

Appendix

Data Sources and Explanations[1]

- US Equity Cyclically Adjusted P/E on S&P 500 Index – Source: Robert Shiller and Yale University.
- Small Cap P/E (Russell 2000 Index) vs. Large Cap P/E (Russell 1000 Index) - Source: Russell Investments. Earnings figures represent 12-month "as reported" earnings.
- Growth P/E (Russell 3000 Growth Index) vs. Value (Russell 3000 Value Index) P/E - Source: Bloomberg, MSCI, and Meketa Investment Group. Earnings figures represent 12-month "as reported" earnings.
- Developed International Equity (MSCI EAFE ex Japan Index) Cyclically Adjusted P/E – Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years.
- Emerging Market Equity (MSCI Emerging Markets Index) Cyclically Adjusted P/E – Source: MSCI and Bloomberg. Earnings figures represent the average of monthly "as reported" earnings over the previous ten years.
- Private Equity Multiples – Source: S&P LCD Average EBITDA Multiples Paid in All LBOs.
- Core Real Estate Spread vs. Ten-Year Treasury – Source: Real Capital Analytics, US Treasury, Bloomberg, and Meketa Investment Group. Core Real Estate is proxied by weighted sector transaction based indices from Real Capital Analytics and Meketa Investment Group.

[1] All Data as of September 30, 2020 unless otherwise noted.

Appendix

Data Sources and Explanations[1]

- REITs Dividend Yield Spread vs. Ten-Year Treasury – Source: NAREIT, US Treasury. REITs are proxied by the yield for the NAREIT Equity index.
- Credit Spreads – Source: Barclays Capital. High Yield is proxied by the Barclays High Yield index and Investment Grade Corporates are proxied by the Barclays US Corporate Investment Grade index.
  - Spread is calculated as the difference between the Yield to Worst of the respective index and the 10-Year Treasury Yield.
- EM Debt Spreads – Source: Bloomberg, and Meketa Investment Group. Option Adjusted Spread (OAS) for the Bloomberg Barclays EM USD Aggregate Index.
- Equity Volatility – Source: Bloomberg, and Meketa Investment Group. Equity Volatility proxied by VIX Index, a Measure of implied option volatility for US equity markets.
- Fixed Income Volatility – Source: Bloomberg, and Meketa Investment Group. Equity Volatility proxied by MOVE Index, a Measure of implied option volatility for US Treasury markets.
- Systemic Risk and Volatile Market Days – Source: Meketa Investment Group. Volatile days are defined as the top 10 percent of realized turbulence, which is a multivariate distance between asset returns.
- Systemic Risk, which measures risk across markets, is important because the more contagion of risk that exists between assets, the more likely it is that markets will experience volatile periods.

[1] All Data as of September 30, 2020 unless otherwise noted.

Appendix

Data Sources and Explanations[1]

- Yield Curve Slope (Ten Minus Two) – Source: Bloomberg, and Meketa Investment Group. Yield curve slope is calculated as the difference between the 10-Year US Treasury Yield and 2-Year US Treasury Yield.
- Ten-Year Breakeven Inflation – Source: US Treasury and Federal Reserve. Inflation is measured by the Consumer Price Index (CPI-U NSA).

[1] All Data as of September 30, 2020 unless otherwise noted.

Meketa Market Sentiment Indicator

Explanation, Construction and Q&A

Meketa has created the MIG Market Sentiment Indicator (MIG-MSI) to complement our valuation-focused Risk Metrics. This measure of sentiment is meant to capture significant and persistent shifts in long-lived market trends of economic growth risk, either towards a risk-seeking trend or a risk-aversion trend.

This appendix explores:

- What is the Meketa Market Sentiment Indicator?
- How do I read the indicator graph?
- How is the Meketa Market Sentiment Indicator constructed?
- What do changes in the indicator mean?

Meketa has created a market sentiment indicator for monthly publication (the MIG-MSI – see below) to complement Meketa's Risk Metrics.

- Meketa's Risk Metrics, which rely significantly on standard market measures of relative valuation, often provide valid early signals of increasing long-term risk levels in the global investment markets. However, as is the case with numerous valuation measures, the Risk Metrics may convey such risk concerns long before a market corrections take place. The MIG-MSI helps to address this early-warning bias by measuring whether the markets are beginning to acknowledge key Risk Metrics trends, and / or indicating non-valuation based concerns. Once the MIG-MSI indicates that the market sentiment has shifted, it is our belief that investors should consider significant action, particularly if confirmed by the Risk Metrics. Importantly, Meketa believes the Risk Metrics and MIG-MSI should always be used in conjunction with one another and never in isolation. The questions and answers below highlight and discuss the basic underpinnings of the Meketa MIG-MSI:

What is the Meketa Market Sentiment Indicator (MIG-MSI)?

- The MIG-MSI is a measure meant to gauge the market's sentiment regarding economic growth risk. Growth risk cuts across most financial assets, and is the largest risk exposure that most portfolios bear. The MIG-MSI takes into account the momentum (trend over time, positive or negative) of the economic growth risk exposure of publicly traded stocks and bonds, as a signal of the future direction of growth risk returns; either positive (risk seeking market sentiment), or negative (risk averse market sentiment).

How do I read the Meketa Market Sentiment Indicator graph?

- Simply put, the MIG-MSI is a color-coded indicator that signals the market's sentiment regarding economic growth risk. It is read left to right chronologically. A green indicator on the MIG-MSI indicates that the market's sentiment towards growth risk is positive. A gray indicator indicates that the market's sentiment towards growth risk is neutral or inconclusive. A red indicator indicates that the market's sentiment towards growth risk is negative. The black line on the graph is the level of the MIG-MSI. The degree of the signal above or below the neutral reading is an indication the signal's current strength.
- Momentum as we are defining it is the use of the past behavior of a series as a predictor of its future behavior.

How is the Meketa Market Sentiment Indicator (MIG-MSI) Constructed?

- The MIG-MSI is constructed from two sub-elements representing investor sentiment in stocks and bonds:
  - Stock return momentum: Return momentum for the S&P 500 Equity Index (trailing 12-months)
  - Bond yield spread momentum: Momentum of bond yield spreads (excess of the measured bond yield over the identical duration US Treasury bond yield) for corporate bonds (trailing 12-months) for both investment grade bonds (75% weight) and high yield bonds (25% weight).
  - Both measures are converted to Z-scores and then combined to get an "apples to apples" comparison without the need of re-scaling.
- The black line reading on the graph is calculated as the average of the stock return momentum measure and the bonds spread momentum measure.[1] The color reading on the graph is determined as follows:
  - If both stock return momentum and bond spread momentum are positive = GREEN (positive)
  - If one of the momentum indicators is positive, and the other negative = GRAY (inconclusive)
  - If both stock return momentum and bond spread momentum are negative = RED (negative)

[1] Momentum as we are defining it is the use of the past behavior of a series as a predictor of its future behavior.
"Time Series Momentum" Moskowitz, Ooi, Pedersen, August 2010. *http://pages.stern.nyu.edu/~lpederse/papers/TimeSeriesMomentum.pdf*

What does the Meketa Market Sentiment Indicator (MIG-MSI) mean? Why might it be useful?

- There is strong evidence that time series momentum is significant and persistent. In particular, across an extensive array of asset classes, the sign of the trailing 12-month return (positive or negative) is indicative of future returns (positive or negative) over the next 12-month period. The MIG-MSI is constructed to measure this momentum in stocks and corporate bond spreads. A reading of green or red is agreement of both the equity and bond measures, indicating that it is likely that this trend (positive or negative) will continue over the next 12 months. When the measures disagree, the indicator turns gray. A gray reading does not necessarily mean a new trend is occurring, as the indicator may move back to green, or into the red from there. The level of the reading (black line) and the number of months at the red or green reading, gives the user additional information on which to form an opinion, and potentially take action.

Disclaimer Information