2019

TEN-YEAR CAPITAL MARKET ASSUMPTIONS

TABLE OF CONTENTS

2019 vs. 2018 ASSUMPTIONS

A comparison of PCA's 2019 10-year compound asset class total return assumptions versus those in 2018.

ASSET CLASSIFICATION	2018 COMPOUND EXPECTED RETURN	2019 COMPOUND EXPECTED RETURN	CHANGE from 2018 to 2019
Cash	2.25	2.50	+0.25
Treasury Inflation Protected Securities	2.75	3.25	+0.50
U.S. Treasuries Only Fixed Income	2.65	2.90	+0.25
U.S. Core Fixed Income	3.40	3.65	+0.25
U.S. Credit Fixed Income	3.75	4.25	+0.50
Core Real Estate (unlevered)	5.00	5.00	---
Domestic Equity	5.75	6.00	+0.25
International Equity	6.80	7.15	+0.35
Global Equity	6.70	6.95	+0.25
Private Equity	7.90	8.05	+0.15
Inflation	2.25	2.25	---

2019 SUMMARY & HIGHLIGHTS

1. Expected returns are fundamental-based and reflect a building block methodology:
   (Inflation) + (Real Risk-Free Rate of Cash) + (Premium over Real Risk-Free Rate)

2. The methodology/algorithm to convert arithmetic returns to geometric returns (or vice versa) will impact a portfolio's estimated expected return. PCA uses a horizon-dependent algorithm to convert between the two.

3. Data points related to current yields, forward curves, economic growth, default rates, and other quantitative-based measures form the basis of most class return expectations. Surveys and practitioner insight are marginally incorporated into certain projections (e.g., inflation).

4. We project a positive real return to cash for the first time since 2011.

5. Compared to PCA's 2018 assumptions, all asset classes except for Core Real Estate (unlevered) are projected to produce a higher compound return. This is primarily the result of higher short-term interest rates coupled with more attractive valuations (i.e., poor returns during 2018).

6. Based on these assumptions, an allocation of 60% Global Public Equity, 20% Core Bonds, 10% Levered Core Real Estate (22% LTV), and 10% Private Equity has an expected 10-year compound return of approximately 6.70%.

7. Private Equity and International Equity (combined developed and emerging markets) are the only stand-alone asset classes that are currently projected to produce a return above 7% over the next 10 years.

Summary of Investment Class Assumptions

	Expected Arithmetic Average Nominal Annual Return	Expected Geometric[1] Compound Nominal Annual Return	Expected Risk of Nominal Returns (Annl. SD)	Cash	TIPS	TSY	CoreFxd	Credit	RealEst	USEq	IntlEq	GlblEq	PrivEq
Cash	2.50	2.50	1.25										
Treasury Infl. Protected Securities	3.45	3.25	7.00	0.20									
U.S. Treasuries Only Fixed Income	3.10	2.90	6.50	0.30	0.55								
U.S. Core Fixed Income	3.80	3.65	5.50	0.25	0.60	0.75							
U.S. Credit Fixed Income	4.45	4.25	7.00	0.00	0.65	0.40	0.70						
Core Real Estate (unlevered)	5.45	5.00	10.00	0.30	0.05	0.00	0.00	0.00					
Domestic Equity	7.50	6.00	19.00	0.00	0.00	-0.25	0.00	0.35	0.40				
International Equity	9.00	7.15	21.50	0.00	0.00	-0.35	0.00	0.25	0.30	0.80			
Global Equity	8.50	6.95	19.50	0.00	0.00	-0.30	0.00	0.30	0.35	0.90	0.90		
Private Equity	10.90	8.05	27.00	0.00	0.00	-0.30	0.00	0.30	0.30	0.85	0.80	0.80	
Inflation	2.25	2.25	1.50	0.50	0.45	-0.20	-0.15	0.10	0.35	0.20	0.20	0.20	0.10

Key Takeaways and Significant Changes from PCA's 2018 Ten-Year Assumptions

- PCA's inflation expectation remains the same as last year at 2.25%. U.S. breakeven inflation, realized inflation, the Federal Reserve Bank of Cleveland's expectation, and other consensus estimates generally forecast inflation to be between 2.00% and 2.25%.
- PCA forecasts the first positive real return to cash (0.25% real) since 2011.
- PCA maintained volatility expectations constant across all asset classes. Volatility estimates for several asset classes were lowered in 2018 due to the expectation of relatively low trailing volatility persisting in the near-term followed by a reversion to more historical averages.
- Fixed Income return expectations increased across the board. Current yields are generally higher than last year and forward curves forecast a tepid pace to interest rate increases, which will ultimately benefit long-term investors in these segments.
- Equity return expectations universally increased, with Non-U.S. markets experiencing the largest change relative to 2018 expections. Poor recent returns (i.e., more attractive valuations) is the strongest source of the change.
- Private Equity and International Equity are the only stand-alone classes that are forecasted to achieve a compound return above 7% over the next 10 years.

Indices/Assets Used in Modeling Asset Class Assumptions

Asset Class	Index/Asset
Cash	3-month U.S. Treasury Bills
TIPS	Bloomberg Barclays U.S. TIPS Index, Simulated TIPS series per Bridgewater
U.S. Treasuries Only Fixed Income	Bloomberg Barclays U.S. Government Index
U.S. Core Fixed Income	Bloomberg Barclays U.S. Aggregate Index, Bloomberg Barclays U.S. Govt/Credit Index
U.S. Credit Fixed Income	Bloomberg Barclays U.S. IG and HY Credit Indices (roughly 80% / 20% market cap split)
Core Real Estate	NCREIF NPI Index, NCREIF ODCE Index
Domestic Equity	Russell 3000 Index, S&P 500 Index
International Equity	MSCI ACWI ex-U.S. Index, MSCI EAFE Index
Global Equity	MSCI ACWI Index
Private Equity	Cambridge Indices, VCJ Venture Capital Index

[1] Geometric returns are comparable to actuarial assumption rates for pension funds (i.e., compound/annualized returns).

Expected Inflation, Arithmetic Average Annual Risk Free Rates & Annual Risk Premiums for Various Classes – %

Category	Expectation – Annual %	Comments
Inflation	2.25	Long-term inflation expectations are the same as last year. The TIPS breakeven inflation rate, one important data point indicative of equilibrium pricing of inflation expectations, averaged roughly 2.00% throughout 2018 before compressing towards 1.60% at year-end. Realized inflation over the last few years has been around 2.00%, notably increasing from prior years. Market-based measures, Federal Reserve-generated models, and forecasts from a variety of market participants are generally forecasting inflation to be within the 2.00%-2.25% range over the next 10 years. A variety of economic factors such as GDP growth, unemployment, wages, interest rates, and commodity prices, among others, indicate that inflation is likely to tick up in the medium-term. The trajectory of all of these factors led PCA to forecast inflation at the higher-end of the consensus range.
Real Risk-Free Rates		
Short-Term (Cash)	0.25	The Federal Reserve continued to raise short-term lending rates throughout 2018 before signaling a (potential) near-term pause. The target range is now 2.25%-2.50%. As of 12/31/18, short-term U.S. Treasury Bills were at the higher-end of that range. Forward curves for U.S. Treasuries indicate slowly rising rates over the next 10 years, with the average 3-month U.S. Treasury Bill yielding approximately 2.75% over this period. Expectations are for short-term rates to remain above inflation (on average) unless a recession were to occur, resulting in a positive real rate over the investment horizon.
Longer-Term (10-Year Real TIPS Yield)	1.00	The expected long-term real risk-free rate is the current 10-year TIPS real yield. As of December 2018, the 10-year TIPS real yield was approximately 1.00%, materially increasing from ≈0.40%-0.50% of the prior two year-ends. Note, this is a rate, not an investment class. It is different from the TIPS asset class.
Risk Premiums Over Short-Term Risk-Free Rate		
U.S. Treasury Inflation Linked Securities (TIPS) U.S. Treasuries Only Fixed Income U.S. Core Fixed Income U.S. Credit Fixed Income	0.95 0.60 1.30 1.95	As of December 2018, the yield-to-worst (YTW) on the BB U.S. Treasury Index was 2.60%. The YTW on the BB U.S. Aggregate Index was 3.30%. The YTW on credit indices ranged from approximately 4.0% to 8.0% (depending on credit quality), but this represents a severe widening of spreads at year-end. Throughout 2018, the U.S. Treasury yield curve generally flattened as short-term rates rose by a significant amount, whereas intermediate and long-term default-free rates merely ticked up. The Fed raised rates four times in 2018, and credit spreads widened during the year. The broad markets (e.g., forward curves) are generally forecasting slowly rising rates over the next 10 years. Current expected returns assume near-term price declines with reinvestment at higher rates, relatively stable credit spreads, and default rates in-line with historical averages for credit-related securities.
Core Real Estate (unlevered)	2.95	Cap rates remained relatively stable throughout 2018. The estimate assumes slowly rising interest rates and a stable-to-rising cap rate level, reverting towards historical averages.
Domestic Equity International Equity Global Equity	5.00 6.50 6.00	2018 was a challenging year for equity markets across the globe, with most markets down (5.0%)-(14.0%). Forward-looking projections are a combination of more attractive valuations coupled with more divergent global growth expectations. Our assumptions take into account earnings/dividend yields, earnings/GDP growth/reversion, expected valuation changes, and governance hinderances (e.g., emerging markets). Current U.S. Equity valuations are well above historical averages, whereas Non-U.S. Equity valuations are in-line with their historical averages. We assume a modestly higher return for Non-U.S. Equity due to both valuation differences and compensation for bearing additional inherent risks.
Alternative Investments/Private Equity	8.40	Expected long-term illiquidity premium over Global Public Equity of 2.40% (arithmetic) and 1.10% (geometric).

Notes:

PCA developed its average annual return premiums and standard deviation estimates using a combination of approaches. First, for major asset classes with an appropriate amount of history, PCA studied historical time series over both one-year and five-year holding periods to uncover any specific trends in the time series data. For example, domestic stock return premiums exhibit cyclical behavior, with each full cycle lasting approximately 40-50 years. Statistical procedures were used to identify such trends and extrapolate these trends 10-15 years forward. Second, PCA examined fundamental variables underlying several major asset classes and computed expectations based on consensus views of these variables. PCA also reviewed outlook opinions from a handful of leading investment banks and investment advisory firms. PCA compiled these opinions to develop consensus expectations for the major asset classes. PCA then used these consensus expectations as reference checks against its own expectations. Finally, PCA professionals discussed and debated asset expectations internally until a consensus view developed.

In recognizing that asset class risks are not always stable, PCA also examined risk trends utilizing similar statistical procedures. PCA also calculated risks weighting more recent periods heavier than earlier periods. In certain instances, weighted standard deviations differed materially from basic standard deviations. In these cases, PCA utilized weighted standard deviations as a base line for analysis.

In recognizing that correlations are also not always stable, PCA analyzed the current behavior of the correlations among major pairs of asset classes. In analyzing the correlation trends among pairs of assets, we focused on correlation trends across non-overlapping five-year holding periods. Using statistical procedures highlighted above, we extrapolated the trends of these correlations into the future to gain a sense of their level and direction. Correlations across different time horizons (monthly, quarterly, annual, etc.) were analyzed to improve robustness. Similar to analyzing risks, we also applied a decay factor to return history and calculated weighted correlations where appropriate.

The investment class risk premia estimated for classes that consist of publicly traded securities are market "beta" returns and do not assume returns to active management, nor active management fees. The risk premia for investment classes that, by definition, are actively managed (e.g., private real estate, hedge fund of funds, private equity), have been developed "net" of customary investment management fees, which are intrinsic to the indices from which the premia were developed.

Given the complexities associated with developing capital market expectations, we advise users of the above information to rely on judgment as well as optimization approaches in setting strategic allocations to any set of investment classes. Please note that all information shown is based on qualitative and quantitative analyses. Exclusive reliance on the above is not advised. This information is not intended as a recommendation to invest in any particular asset class or as a promise of future performance. References to future returns for either asset allocation strategies or asset classes are not promises or even estimates of actual returns a client portfolio may achieve.

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