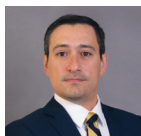




## Peeking inside the crystal ball

# Capital markets assumptions



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### Key takeaways

- At GWCM, our proprietary Capital Markets Assumptions (CMAs) reflect our forward-looking beliefs of risk and return potential for the asset classes in which we invest.
- Currently, they indicate a preference for value equity over growth equity, and small capitalizations over large — reflecting a return to normal valuation conditions after a historic period for large growth.
- Fixed-income expressions generally favor domestic credit in both investment grade and high yield.
- Global markets, particularly the emerging markets, are expected to outperform in both equity and fixed income following a period of sustained U.S. outperformance.

Do-it-yourself investors and advisors alike are increasingly seeking portfolio solutions that simplify their investment experience. Some portfolio solutions, such as the Great-West Portfolio Series, represent a simple, one-stop shop that can replace an entire traditional portfolio with one singular holding. These portfolios are then continuously monitored by professional investment management teams to ensure they are achieving their stated objectives, removing a time-consuming monitoring burden from the user.

But at the very core of their simplicity are some very complicated questions — How much equity exposure should the portfolio have? How much fixed income? What about international markets? The answer to all of those complicated questions is a seemingly unhelpful “it depends on what you think the market is going to do.” The assumptions that are made here, termed capital markets assumptions (CMAs) by the industry, together with other portfolio design elements like risk tolerance and time horizon, will ultimately dictate what the portfolios look like.

Capital market assumptions have two basic components: expected returns and a measure of risk. At Great-West Capital Management, LLC (GWCM) we use a building-block approach to create our CMAs. Below, we provide our take on this often unexplained and misunderstood process.

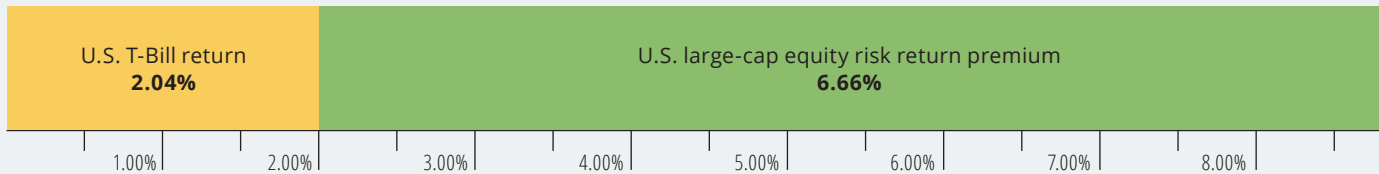
The term “building block” comes from the analogy that you as an investor should be compensated fairly for the risks you take, and that these risks stack on top of each other like building blocks. We can start with U.S. large-cap stocks as an example. To begin, we can deconstruct the elements of historical returns into two components: first, an estimate of what you might earn if your investment portfolio took on essentially no risk at all and, second, a “risk premium” that represents the amount you expect to be compensated for risks over and above that rate.



We use the 30-day T-bill for our estimate of the risk-free rate (RFR). Any incremental return above this rate is your compensation for assuming risk, or a “risk premium.” For U.S. large-cap stocks, this can

be approximated by taking the historical difference between U.S. large-cap stocks and the risk-free rate. A quick depiction may be helpful:

### Long-term return of U.S. large-cap stocks: 8.70%



**Figure 1: Decomposing the U.S. large-cap equity risk premium (ERP)**

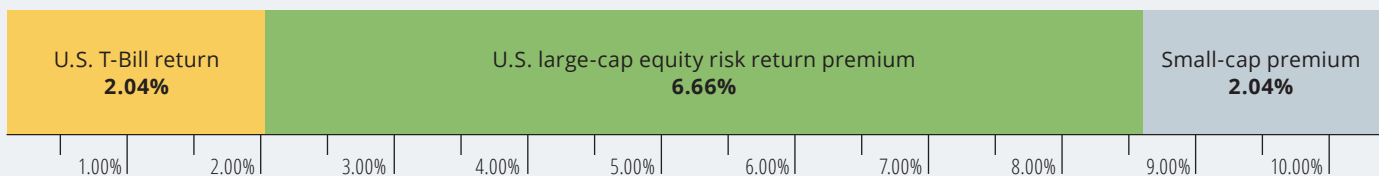
On average, U.S. large-cap equities have returned 8.70% per year. A portion of that return represents an equity risk premium, which is the compensation the investor receives for investing in a riskier, less liquid asset than holding cash. The U.S. T-Bill return (+2.04%) is as good an approximation of that as any. The remainder, +6.66%, is compensation for the additional risk you take by investing in stocks.

Source: Morningstar®

Calculating the risk premium for the large-cap universe is relatively straightforward, since it is among the least risky of equity asset classes and encompasses companies that have endured the test of time. But let’s tackle small caps next. Here, we may want to adjust

our expectations for an additional factor: size (the fact that small companies tend to be riskier than larger companies, which should in turn lead to additional return for those bearing that risk).

### Long-term return of U.S. small-cap stocks: 10.36%



**Figure 2: Building the small-cap equity CMA**

Small-cap equities are riskier than large caps, so investors naturally demand a higher return to hold them. But how much do they demand? Simple math: Recall that investors expect to earn 2.04% for a riskless investment. And, as we just saw, they demand another 6.66% to induce them to buy stocks. But small caps have returned 10.36% per year over the long term. The difference, 1.66%, must therefore be the amount required to compel investors to take the additional risks of holding small caps — and represents our “small-cap premium.”

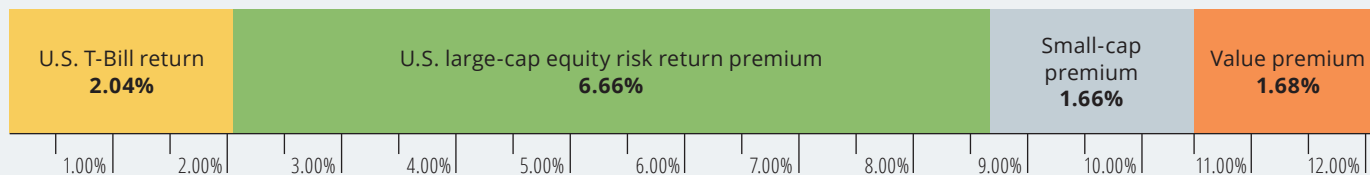
Source: Morningstar®



A final example: Value stocks are typically thought to be riskier than other stocks, a well-studied subject that — if correct — should cause the return for small-cap value stocks to be slightly higher than small caps in

general (and notably higher than small-cap growth). GWCM analysis demonstrates that to be the case as shown in figure 3 below, in which we calculate the value premium for U.S. small caps to be 1.68%.

**Long-term return of U.S. small-cap value stocks: 12.04%**



**Figure 3: Increasing complexity with investment-style adjustments**

Value stocks are typically thought to be more risky than growth stocks. In fact, we currently calculate the “value premium” at 1.68%. Because CMAs are built using a “building block” approach, these two premia — small cap and value — are summed together.

Source: Morningstar®

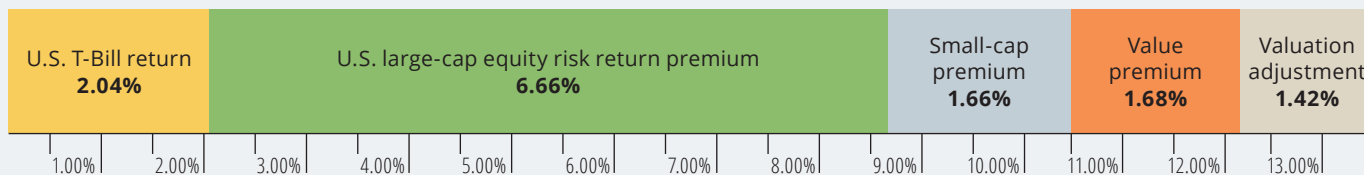
And lastly, while this is all well and good, it relies on historical data and is blind to current market conditions. We want to modernize the CMAs to reflect current conditions to make them more robust. To solve this problem, we opt for a valuation adjustment for each equity asset class, which incorporates P/E ratios relative to their historical bounds to simulate a horizon-based return to normalized conditions. The mechanism functions this way: When the P/E ratio of a given asset class is currently trading significantly below its historical valuation (that is, the asset class is “cheap” relative to its own history), we apply a valuation premium to our historically derived CMA to

reflect our view that valuations will eventually trend toward a more normal range. Likewise, when an asset class appears overvalued based on its current P/E, we apply a negative valuation premium (or, perhaps more appropriately, a “discount”).

By way of example, as of this writing, small-cap value stocks appear somewhat undervalued on a P/E basis relative to historic norms. To adjust for this — and to take advantage of an expected return to more normal conditions — we apply a valuation discount of +1.42% to our original CMA estimate to bring the total to 13.46%.



### Valuation-adjusted CMA, small-cap value: 13.46%



**Figure 4: Incorporating a valuation adjustment**

When an asset class is temporarily trading at an earnings multiple that is lower than normal, GWCM applies a valuation adjustment to its CMA. For example, as of this writing, small-cap value stocks are trading at valuations that are moderately lower than historical observations. We apply a valuation adjustment to arrive at a CMA of 13.46%, consisting of a risk-free rate of +2.04%, an equity risk premium of +6.66%, a size premium of +1.66%, a style/value premium of +1.68% and, finally, a valuation adjustment of +1.42%. Summing each of these components yields a total CMA for small-cap value stocks of 13.46%.

Source: Morningstar®

This process is then repeated for the 15+ asset classes we recognize, ranging from domestic to international markets, large- and small-cap spectrums, and value and growth styles. This adjustment allows for us to take the current pulse of the market across each asset class and make adjustments based on historical observations. Fixed-income market assumptions are created based upon a similar building blocks method,

but by measuring different premiums (default, horizon, etc).

Together, these CMAs represent GWCM’s base-case view of the investing world going forward. The CMAs are optimized in a way that maximizes risk-adjusted returns over absolute returns, and their views are propagated across the portfolios we manage.



## GWCM's 2019 capital market assumptions

EXPECTED EQUITY RETURNS		METHODOLOGY
Large Cap Growth	7.18%	RFR + ERP - Value Premium (Large) + Valuation premium (Large Growth)
Large Cap Core	8.07%	RFR + ERP + Valuation Premium (Large Core)
Large Cap Value	8.85%	RFR + ERP + Value Premium (Large) + Valuation Premium (Large Value)
Mid Cap Growth	7.63%	RFR + ERP + Size Premium (Mid) - Value Premium (Mid) + Valuation Premium (Mid Growth)
Mid Cap Core	9.30%	RFR + ERP + Size Premium (Mid) + Valuation Premium (Core)
Mid Cap Value	10.08%	RFR + ERP + Size Premium (Mid) + Value Premium (Mid) + Valuation Premium (Mid Value)
Small Cap Growth	7.13%	RFR + ERP + Size Premium (Small) - Value Premium (Small) + Valuation Premium (Small Growth)
Small Cap Core	10.32%	RFR + ERP + Size Premium (Small) + Valuation Premium (Small Core)
Small Cap Value	13.46%	RFR + ERP + Size Premium (Small) + Value Premium (Small) + Valuation Premium (Small Value)
MSCI EAFE Growth	8.19%	RFR + Int'l ERP + Valuation Premium (MSCI EAFE) - Value Premium (MSCI)
MSCI EAFE Core	10.80%	RFR + Int'l ERP + Valuation Premium (MSCI EAFE)
MSCI EAFE Value	13.18%	RFR + Int'l ERP + Valuation Premium (MSCI EAFE) + Value Premium (MSCI)
MSCI EM	13.97%	RFR + EM ERP + Valuation Premium (MSCI EM)
U.S. Real Estate	8.70%	RFR + ERP
Non-U.S. Real Estate	10.68%	RFR + Int'l ERP

EXPECTED FI RETURNS		METHODOLOGY
Barclays U.S. Agg Bond	3.60%	RFR + Horizon Premium (Int) + Corporate Default Premium
Barclays U.S. Govt/Credit 1-3 Yr	2.85%	RFR + Horizon Premium (Short)
Barclays U.S. Corporate High Yield	5.38%	RFR + Horizon Premium (Int) + HY Default Premium
FTSE WGBI NonUSD Hdg	3.54%	RFR + Horizon Premium (Int) + WGBI Default Premium
Barclays U.S. Treasury U.S. TIPS	3.13%	RFR + Horizon Premium (Int)
Citi T-Bill 3Mo	2.04%	RFR
JPM EMBI Global Diversified	7.39%	RFR + Horizon Premium (Int) + EMBI Default Premium



<b>GWCM CMA BUILDING BLOCKS</b>	<b>2018 GWCM CMAs</b>	<b>2019 GWCM CMAs</b>	<b>METHODOLOGY*</b>	<b>TIME- SERIES START</b>
Historical Risk Free Rate	3.35%	3.34%	IA SBBI US 30-Day Tbill TR USD	1926
Current Risk Free Rate	2.12%	2.04%	1-Month Treasury Bill Rate (as of 9/10/19)	
US Equity Risk Premium	6.81%	6.66%	IA SBBI US Lrg Stock - IA SBBI US 30-Day Tbill	1926
US Equity Return	8.93%	8.70%	U.S. ERP + Current RFR	
Dev. Int'l Equity Risk Premium	7.94%	8.64%	(EAFE Std Dev/IA SBBI US Lrg Stock Std. Dev)*U.S. ERP}	1975
Int'l Equity Return	10.06%	10.68%	Dev. Int'l Equity Risk Premium + Current RFR	
EM Equity Risk Premium	8.85%	12.73%	(EM Std Dev/Russell 1000 Std. Dev)* U.S. ERP}}	1999
EM Equity Return	10.97%	14.77%	Expected EM Equity Risk Premium + Current RFR	
Value Premium — US Large	0.46%	0.35%	Russell 1000 Value — Russell 1000 Growth / 2	1980
Value Premium — US Mid	0.54%	0.38%	Russell Mid Value — Russell Mid Growth / 2	1986
Value Premium — US Small	1.79%	1.68%	Russell 2000 Value — Russell 2000 Growth / 2	1980
Value Premium — Int'l	1.15%	1.22%	MSCI EAFE Value — MSCI EAFE Growth / 2	1975
Size Premium — Mid	1.09%	0.97%	Russell MidCap — Russell Large Cap	1986
Size Premium — Small	1.77%	1.66%	IA SBBI Small Stock Premium	1926
Default Premium — Corporate Bonds	0.52%	0.47%	IA SBBI LT Corp TR — IA SBBI LT Govt TR	1926
Default Premium — HYB	2.42%	2.24%	Barclays Corp HYB TR — IA SBBI US Govt Inter Term TR	1984
Default Premium — WGBI	0.49%	0.41%	FTSE WGBI TR — IA SBBI US Govt Inter Term TR	1986
Default Premium — EMBI	4.70%	4.26%	JPM EMBI Diversified TR — IA SBBI US Govt Inter Term TR	1994
Horizon Premium — Interm. Term	1.09%	1.09%	IA SBBI US IT Gov Yld — IA SBBI US 30-Day Tbill	1926
Horizon Premium — Short Term	0.65%	0.81%	Bbg US Gov 1-3Yr Yld — IA SBBI US 30-Day Tbill	1976
Real Return on Govt Debt	1.56%	1.55%	IA SBBI Interm Govt Yld — IA SBBI Inflation	1929



VALUATION PREMIUM	2018 GWCM CMAs	2019 GWCM CMAs	METHODOLOGY*
Valuation Premium — Large Growth	-1.64%	-1.17%	See footnotes on valuation premium methodology (1995)
Valuation Premium — Large Core	-0.87%	-0.63%	See footnotes on valuation premium methodology (1995)
Valuation Premium — Large Value	-0.32%	-0.19%	See footnotes on valuation premium methodology (1995)
Valuation Premium — Mid Growth	-1.77%	-1.66%	See footnotes on valuation premium methodology (2000)
Valuation Premium — Mid Core	-0.47%	-0.37%	See footnotes on valuation premium methodology (2000)
Valuation Premium — Mid Value	-0.12%	0.03%	See footnotes on valuation premium methodology (2000)
Valuation Premium — Small Growth	-3.02%	-1.55%	See footnotes on valuation premium methodology (1995)
Valuation Premium — Small Core	-1.02%	-0.04%	See footnotes on valuation premium methodology (1995)
Valuation Premium — Small Value	0.56%	1.42%	See footnotes on valuation premium methodology (1995)
Valuation Premium — MSCI EAFE Growth	-0.83%	-1.27%	See footnotes on valuation premium methodology (2005)
Valuation Premium — MSCI EAFE	0.00%	0.12%	See footnotes on valuation premium methodology (2005)
Valuation Premium — MSCI EAFE Value	0.76%	1.28%	See footnotes on valuation premium methodology (2005)
Valuation Premium — MSCI EM	-0.04%	-0.80%	See footnotes on valuation premium methodology (2005)

The above methodologies are calculated using geometric means on observed data sets unless otherwise noted. The dates in parentheses indicate the beginning of the time series of data used.

Deriving the valuation premium:

1. Gather all forward P/E data for each segment of stylebox/international indices.
2. Compare current forward P/E as of 9/30/18 against the median P/E across the observed dataset.
3. Use the premium/discount to adjust forward P/E of the S&P 500® Index relative to the S&P 500 average forward P/E.
4. Input adjusted P/E into regression model derived from 10-year forward-looking returns against TTM P/E to derive forecast for each style box.\*
5. Subtract forecasted style return from the S&P 500 forecasted return.
6. Add/Subtract valuation premium/discount.

\*Valuations for each style box were applied to S&P 500 data due to a longer P/E history existing for the index. Russell P/E data is only available beginning in 1995 for some indices.

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