

Client Alert: January 12, 2017

Duff & Phelps' U.S. Normalized Risk-Free Rate Decreased from 4.0% to 3.5% Effective November 15, 2016

Executive Summary

The Equity Risk Premium (ERP) changes over time. Fluctuations in global economic and financial conditions warrant periodic reassessments of the selected ERP and accompanying risk-free rate.

Based on current market conditions, Duff & Phelps is reaffirming its U.S. Equity Risk Premium recommendation of 5.5% to be used in conjunction with a normalized risk-free rate. However, based on declining real interest rates and long-term growth estimates for the U.S. economy, **we are lowering the U.S. normalized risk-free rate from 4.0% to 3.5%**, when developing discount rates as of November 15, 2016 and thereafter, until further guidance is issued. In summary:

- Equity Risk Premium: Reaffirmed at 5.5%
- Risk-Free Rate: Decreased from 4.0% to 3.5% (normalized)
- Base U.S. Cost of Equity Capital: 9.0% (5.5% + 3.5%)

Background

The Equity Risk Premium (ERP) is a key input used to calculate the cost of capital within the context of the Capital Asset Pricing Model (CAPM) and other models for developing discount rates to be used in discounting expected net cash flows. Duff & Phelps regularly reviews fluctuations in global economic and financial market conditions that warrant a periodic reassessment of the ERP.¹

Based on current market conditions, we are reaffirming the recommended U.S. ERP of 5.5%, which was previously established as of January 31, 2016 and thereafter. We will maintain our recommendation to use a 5.5% U.S. ERP when developing discount rates until there is evidence indicating equity risk in financial markets has materially changed. We are closely monitoring the aftermath of the U.S. presidential election held on November 8, 2016 and its impact on cost of capital assumptions.

The current ERP recommendation was developed in conjunction with a "normalized" 20-year yield on U.S. government bonds as a proxy for the risk-free rate (R_f). Based on recent academic literature and market evidence of a secular decrease in real interest rates (a.k.a. the "rental" rate) and lower long-term real GDP growth estimates for the U.S. economy, **we lowered our concluded normalized risk-free rate from 4.0% to 3.5%** for valuation dates as of November 15, 2016 and thereafter.

Methods of Estimating a Normalized Risk-Free Rate

Estimating a normalized risk-free rate can be accomplished in a number of ways, including (i) simple averaging, and (ii) various “build-up” methods.²

The first method of estimating a normalized risk-free rate entails calculating averages of yields to maturity on long-term government securities over various periods. This method’s implied assumption is that government bond yields revert to the mean. For example, as of October 31, 2016, the trailing 10-year average for the yield on 20-year U.S. Treasury bonds was 3.5%. In contrast, the corresponding spot yield on October 31, 2016 was 2.3%.

Taking the average over the last 10 years is a simple way of “normalizing” the risk-free rate. An issue with using historical averages, though, is selecting an appropriate comparison period that can be used as a reasonable proxy for the future.

The second method of estimating a normalized risk-free rate entails using a simple build-up method, where the components of the risk-free rate are estimated and then added together. Conceptually, the risk-free rate can be (loosely) illustrated as the return on the following two components:³

$$\text{Risk-Free Rate} = \text{Real Rate} + \text{Expected Inflation}$$

In Exhibit 1, we summarize long-term real rate estimates and inflation expectations for the United States at the end of October 2016, based on data assembled from a variety of sources. We also display the spot 20-year U.S. Treasury yield and its long-term (10-year) trailing average as of October 31, 2016.

Exhibit 1: Long-Term Spot and Normalized Risk-Free Rates for the United States October 2016 (approximately)^{4, 5}

Estimated Long-term Real Risk-Free Rate	0.0% to 2.0%
Expected Long-term Inflation	1.7% to 2.4%
Range of Normalized Risk-Free Rates	1.7% to 4.4%
Midpoint	3.1%
20-Year U.S. Government Securities	
-Spot Rate	2.3%
-Long-Term (10-year) Trailing Average Yield	3.5%
Concluded Normalized Risk-Free Rate	3.5%

The long-term real rate estimate of 0.0% to 2.0% represents a lower range relative to prior Duff & Phelps analyses. Recently, research in this area has been very active. Academic researchers and economic analysts have proposed a number of explanations for the secular (i.e., not cyclical or temporary) decline in global real interest rates, which they argue precedes the onset of the 2008 global financial crisis. The following are some of the most-often-cited factors:⁶

Academics and economic analysts have documented a declining trend in global *real* interest rates

- Lower global long-run output and productivity growth
- Shifting demographics (aging population leading to slower labor force expansion)
- Global “savings glut”
- Safe asset shortage (increased demand for safe-haven assets, accompanied by a declining supply)

With regards to long-term inflation expectations, the same declining trend has been taking hold in the United States and across several other developed markets over the last few years. Inflation has been persistently below the 2.0% target set by major central banks, such as the Federal Reserve Bank (Fed), the European Central Bank, the Bank of England, and the Bank of Japan. The sharp decline in oil prices from mid-2014 until early 2016 has put additional pressure on an already very low inflation environment.

However, the results of the U.S. presidential election seem to have spurred higher inflation expectations for global investors. Long-term government bond yields rose sharply in (for example) the United States, United Kingdom, and Germany in the short period between the election day and the date of writing this alert. This is the opposite of what happened following the June 23, 2016 vote by the U.K. electorate to leave the European Union (known in the financial press as “Brexit”). We will continue to monitor the aftermath of the U.S. presidential election and its potential impact on inflation expectations and consequent effects on the normalized long-term risk-free rate.

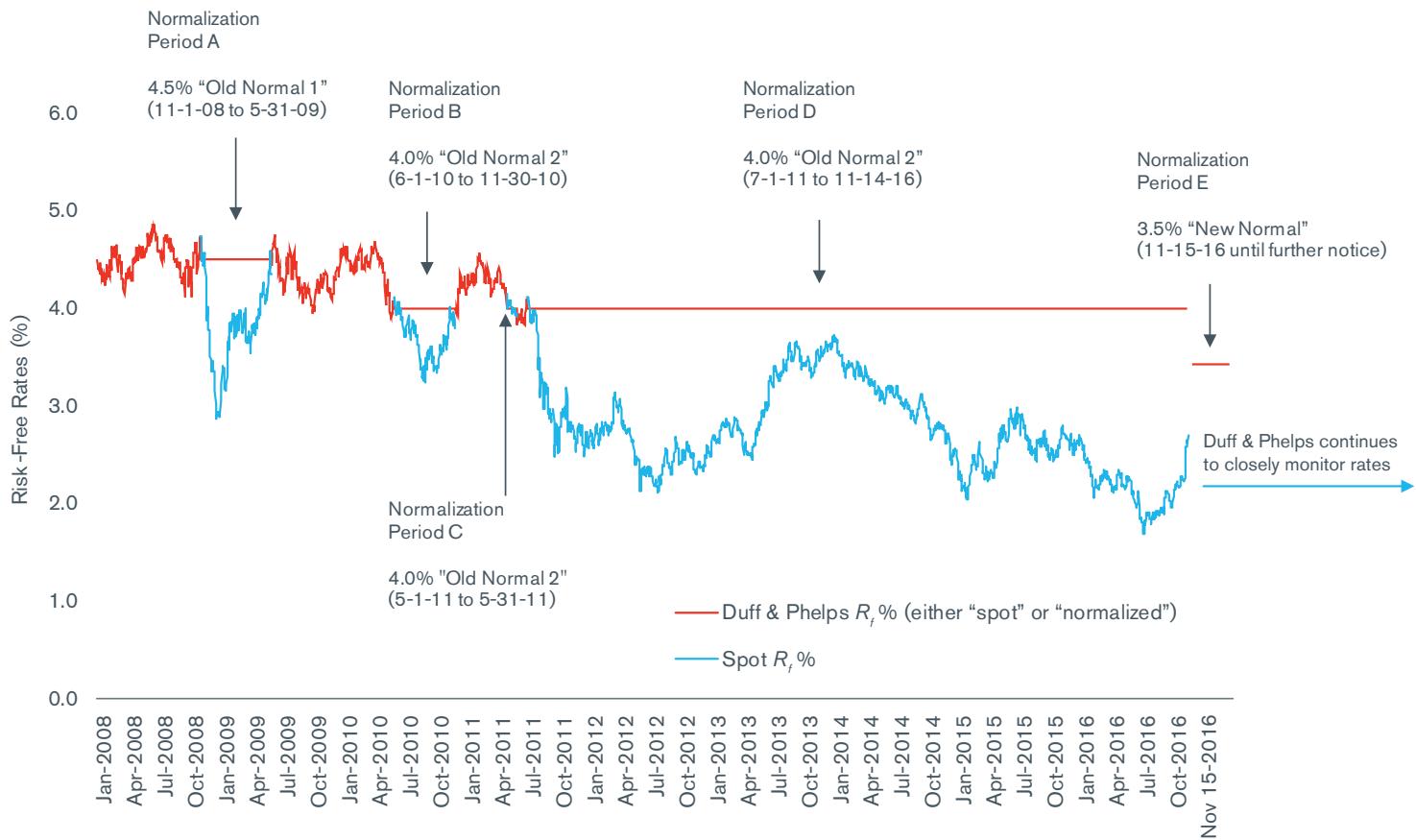
Can the Normalized Risk-Free Rate Decline While the Spot Yield is Increasing?

A long-term “normalized” risk-free rate attempts to capture the sustainable average return of long-term bonds issued by a government considered “safe” or free of default risk (e.g., U.S. Treasuries).^{7,8} However, the use of a normalized risk-free rate during certain periods does *not* preclude “spot” rates from fluctuating during these periods.

Exhibit 2 is a graphical illustration of both the daily “spot” long-term U.S. risk-free rate (using 20-year U.S. Treasury yields), and the Duff & Phelps recommended “normalized” long-term U.S. risk-free rate from January 1, 2008 through November 15, 2016. The red line in Exhibit 2 is the Duff & Phelps suggested risk-free rate, which has been the “spot” rate during certain periods (the red, spiky areas in the graph) and has been a “normalized” rate during certain periods (the areas in the graph that are red, straight, horizontal lines). The blue lines in Exhibit 2 represent the “spot” rate (during times that Duff & Phelps suggested using a normalized rate).

Exhibit 2: (i) Duff & Phelps Recommended U.S. Long-term Risk-Free Rate (both “spot” and “normalized”), and (ii) Spot 20-Year U.S. Treasury Yield During Normalization Periods⁹

January 1, 2008–November 15, 2016



During periods that Duff & Phelps suggested using a normalized rate (the areas in the graph that are red, straight, horizontal lines), the spot rate (the blue lines) still fluctuated, at times significantly.¹⁰ Spot rates will almost undoubtedly fluctuate during the current period as well, just as they have fluctuated in all previous periods of normalization. This fluctuation in itself does not alter our recommendation based on economic fundamentals.

Duff & Phelps will continue to monitor risk-free rates and other cost of capital inputs very closely. If and when (i) long-term spot yields increase to a level that approaches the Duff & Phelps recommended U.S. normalized risk-free rate (e.g., differences are lower than 50 b.p.), and (ii) there is evidence that this increase in spot yields is not transitory, we will then consider recommending a return to using the spot rate as the basis for the risk-free rate to be used in conjunction with our recommended U.S. ERP.

Duff & Phelps' U.S. Equity Risk Premium Recommendation and "Base" Cost of Equity

Duff & Phelps last changed its U.S. ERP recommendation on January 31, 2016. On that date, our ERP recommendation was increased to 5.5% (from 5.0%) in response to evidence that suggested a heightened level of risk in financial markets and deteriorating economic conditions.

Duff & Phelps monitors various economic and financial market indicators, as well as two quantitative models as corroboration to arrive at its U.S. ERP recommendation. While the current evidence seems to be pointing to a decline in equity risk in financial markets relative to January 31, 2016, from a qualitative perspective we deem it prudent to let some time elapse, in order to better assess the impact of the U.S. presidential election's results on the forward-looking ERP. We took a similar "wait-and-see" approach when evaluating the impact of Brexit on cost of capital assumptions.

Accordingly, Duff & Phelps is reaffirming the recommended U.S. ERP of 5.5%, to be used in conjunction with a normalized risk-free rate of 3.5%, when developing discount rates as of November 15, 2016 and thereafter. The combination of the new normalized risk-free rate (3.5%) and the reaffirmed U.S. recommended ERP (5.5%) results in an implied U.S. "base" cost of equity capital estimate of 9.0% (3.5% + 5.5%). Were we to use the spot yield-to-maturity on 20-year U.S. Treasuries of 2.6% as of November 15, 2016, one would have to increase the ERP assumption accordingly. One can determine the ERP against the spot 20-year yield as of November 15, 2016, inferred by Duff & Phelps' recommended U.S. ERP (used in conjunction with the normalized risk-free rate), by using the following formula:

U.S. ERP Against Spot 20-Year Yield (Inferred) =

$$\begin{aligned} &= \text{D&P Recommended U.S. ERP} + \text{Normalized Risk-Free Rate} - \text{Spot 20-Year U.S. Treasury Yield} \\ &= 5.5\% + 3.5\% - 2.6\% = 6.4\% \end{aligned}$$

Endnotes

¹ For a discussion of some of the studies and factors we evaluate, refer to Chapter 3 of the Duff & Phelps 2016 *Valuation Handbook – Guide to Cost of Capital* or to Duff & Phelps' Client Alert entitled "Duff & Phelps Increases U.S. Equity Risk Premium Recommendation to 5.5%, Effective January 31, 2016". To obtain a free copy of this Client Alert, visit www.duffandphelps.com/costofcapital.

² For a more detailed discussion on reasons for normalization and methods that can be used to normalize risk-free rates, refer to Chapter 3 of the Duff & Phelps 2016 *Valuation Handbook – Guide to Cost of Capital*.

³ This is a simplified version of the "Fisher equation", named after Irving Fisher. Fisher's "The Theory of Interest" was first published by Macmillan (New York), in 1930.

⁴ Sources of real rates: Haubrich, Joseph, George Pennacchi, and Peter Ritchken, "Inflation Expectations, Real Rates, and Risk Premia: Evidence from Inflation Swaps," *Review of Financial Studies* Vol. 25 (5) (2012): 1588-1629; Andrew Ang and Geert Bekaert "The Term Structure of Real Rates and Expected Inflation," *The Journal of Finance*, Vol. LXIII (2) (April 2008); Olesya V Grishchenko and Jing-zhi Huang "Inflation Risk Premium: Evidence From the TIPS Market," *The Journal of Fixed Income*, Vol. 22 (4) (2013); Pescatori, Andrea and Jarkko Turunen, "Lower for Longer: Neutral Rates in the United States", IMF Working Paper No. 15/135 (June 2015); Kiley, Michael T., "What Can the Data Tell Us About the Equilibrium Real Interest Rate?", *Finance and Economics Discussion Series* 2015-077. Washington: Board of Governors of the Federal Reserve System. (August 2015); Lubik, Thomas A. and Christian Matthes "Calculating the Natural Rate of Interest: A Comparison of Two Alternative Approaches", Richmond Fed Economic Brief (October 2015); Reza, Abeer and Subrata Sarker, "Is Slower Growth The New Normal In Advanced Economies?", Bank Of Canada Review (Autumn 2015); Hamilton, James, Ethan Harris, Jan Hatzius, and Kenneth West, "The Equilibrium Real Funds Rate: Past, Present and Future", working paper (May 2016); Holston, Kathryn, Thomas Laubach, and John C. Williams, "Measuring the Natural Rate of Interest: International Trends and Determinants", Federal Reserve Bank of San Francisco Working Paper 2016-11 (August 2016); Lansing, Kevin J., "Projecting the Long-Run Natural Rate of Interest", FRBSF Economic Letter 2016-25 (August 2016).

⁵ Sources of long-term inflation expectations: The Livingston Survey, dated June 8, 2016; Survey of Professional Forecasters, Third Quarter 2016; (August 12, 2016) Cleveland Federal Reserve's Inflation Expectations, released October 18, 2016; *Blue Chip Financial Forecasts* dated June 1, 2016 and November 1, 2016; *Blue Chip Economic Indicators*, dated October 10, 2016; Philadelphia Federal Reserve, Aruba Term Structure of Inflation, October 2016; the University of Michigan Inflation Expectations, October 2016.

⁶ For a more detailed discussion of some of these and other factors, see, for example, Rachel, Lukasz and Thomas D Smith "Secular drivers of the global real interest rate", Bank of England Staff Working Paper No. 571, December 2015. Also, consider reviewing Chapter 3 of the Duff & Phelps 2016 *Valuation Handbook – Guide to Cost of Capital* (Hoboken, NJ: John Wiley & Sons, 2016).

⁷ Beginning with the global financial crisis of 2008 (the "Financial Crisis"), analysts have had to reexamine whether the "spot" rate is still a reliable building block upon which to base their cost of equity capital estimates. The Financial Crisis challenged long-accepted practices and highlighted potential problems of simply continuing to use the spot yield-to-maturity on a safe government security as the risk-free rate, together with historical equity risk premiums, without any further adjustments.

⁸ The general framework for the normalization argument could be described as follows: (i) that the extremely-low rates we have experienced in recent years would not exist without the market intervention by "non-market" participants (i.e., central banks) pushing rates down "artificially", (ii) that these abnormally-low rates are not sustainable in the long-term, and (iii) that rates tend to revert to a mean that reflects the long-term relationship between nominal and real interest rates.

⁹ Source of government bond yields used herein is the Board of Governors of the Federal Reserve System website at: <https://www.federalreserve.gov/datadownload/Choose.aspx?rel=H15>.

¹⁰ For a complete table with Duff & Phelps recommended ERP and corresponding recommended risk-free rate since January 2008 through the present, visit: www.duffandphelps.com/costofcapital.

Authors

Roger J. Grabowski, FASA

Managing Director

roger.grabowski@duffandphelps.com

Carla S. Nunes, CFA

Managing Director

carla.nunes@duffandphelps.com

James P. Harrington

Director

james.harrington@duffandphelps.com

Contributors

Kevin Madden

Analyst

kevin.madden@duffandphelps.com

Aaron Russo

Analyst

aaron.russo@duffandphelps.com

For more information please visit:

www.duffandphelps.com/costofcapital

About Duff & Phelps

Duff & Phelps is the premier global valuation and corporate finance advisor with expertise in complex valuation, disputes and investigations, M&A, real estate, restructuring, and compliance and regulatory consulting. The firm's more than 2,000 employees serve a diverse range of clients from offices around the world. For more information, visit www.duffandphelps.com.

M&A advisory, capital raising and secondary market advisory services in the United States are provided by Duff & Phelps Securities, LLC. Member FINRA/SIPC. Pagemill Partners is a Division of Duff & Phelps Securities, LLC. M&A advisory and capital raising advisory services are provided in a number of European countries through Duff & Phelps Securities Ltd, UK, which includes branches in Ireland and Germany. Duff & Phelps Securities Ltd, UK, is regulated by the Financial Conduct Authority.