DEVELOPING THE COST OF EQUITY CAPITAL: RISK-FREE RATE AND ERP DURING PERIODS OF "FLIGHT TO QUALITY"

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INTRODUCTION

The rate of interest on the risk-free security, the *risk-free rate*, is one of the building blocks valuation professionals use in developing the cost of equity capital. Selection of the risk-free rate allows one to "scale" the cost of equity capital for the expected inflationary environment. But during late 2008 and early 2009 and again during the summer of 2010 risk-free rates were abnormally low and inconsistent with their theoretical formulation due to a "flight to quality."

Another key building block is the *equity risk premium* (ERP). Choice of the appropriate ERP as of the valuation date is one of the most important decisions the analyst must make in developing a discount rate. Any estimate of the ERP must be made in relation to a risk-free security. That is, the expected return on a fully diversified portfolio of equity securities must be measured in its relationship to the rate of return expected on a risk-free security.

The selection of an appropriate risk-free security with which to base the ERP estimate is a function of the expected holding period for the investment to which the discount rate (rate of return) is to apply. For example, if you were estimating the equity return on a highly liquid investment and the expected holding period were potentially short-term, a U.S. government short-term security (e.g., a Treasury or T-bill) may be an appropriate instrument to use in benchmarking the ERP estimate.

Alternatively, if you were estimating the equity return on a long-term investment, such as the valuation of a business where the value can be equated to the present value of a series of future cash flows over many years, then the yield on a long-term U.S. government bond is commonly used in benchmarking the ERP estimate. As the thrust of this paper is the development of the cost of equity capital for valuing a business or other long-term investments, this is the approach we will discuss herein.

The Great Recession of 2008-2010 has necessitated we reconsider many methods of analysis we took for granted during periods of stability.[1] The choice of risk-free rate and estimate of ERP are just other examples of the difficulty in pricing risk during these uncertain economic times.

RISK-FREE RATE

A *risk-free rate* is the return available on a security that the market generally regards as free of the risk of default. Many of the widely used methods for estimating the cost of equity capital (e.g., the build-up method, the capital asset pricing model, and the Fama-French 3-factor model) are built upon the yield to maturity on U.S. government securities, as of the valuation date.

The risk-free rate reflects three components:

1. *Rental rate.* A real return for lending the funds over the investment period, thus forgoing consumption for which the funds otherwise could be used.
2. *Inflation.* The expected rate of inflation over the term of the risk-free investment.
3. *Maturity risk or investment rate risk.* The risk that the investment's principal market value will rise or fall during the period to maturity as a function of changes in the general level of interest rates.

All three of these economic factors are embedded in the yield to maturity for any given maturity length. However, it is not possible to observe the market consensus about how much of the yield for any given maturity is attributable to these factors (with the exception of expected inflation which can be estimated based on Treasury Inflation Protected Securities or TIPS).

This basic risk-free rate *includes inflation expectations*. Therefore, when this rate is used to estimate a cost of capital to discount expected future net cash flows, those future net cash flows should also reflect the expected effect of inflation. In the economic sense of nominal versus real dollars, we are building a cost of capital in nominal terms, and it should be used to discount expected returns that also are expressed in nominal terms.

One can estimate the long-term overall economic inflation forecast imbedded in the risk-free rate by taking the difference in yield between the risk-free security and the yield on TIPS. While this long-term estimated inflation rate provides an overall inflation framework for a valuation, it is not necessarily equal to the estimated rate of inflation embedded in the net cash flows as the rate of inflation likely will vary year-to-year and will be specific to the circumstances of the subject company.

Long-term U.S. government bonds are generally considered free of default risk but are not entirely "risk-free." Bonds are sensitive to future interest rate fluctuations.

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[1] The recession technically began in December 2007 and lasted 18 months to June 2009, the longest since the 1929 crisis. But in many persons' opinion the recession continued, hence why this author is using the term the Great Recession of 2008-2010.

Investors are not sure of the purchasing power of the dollars they will receive upon maturity or the reinvestment rate that will be available to them to reinvest the interest payments received over the life of the bond. As a result, the long-term empirical evidence is that returns on long-term government bonds on the average exceed the returns on T-bills.[2]

The long-term premium of government bond returns in excess of the average expected interest rates on T-bills (average of future forward rates) is commonly referred to as the *horizon premium*. The horizon premium compensates the investor for the maturity risk of the bond. The horizon premium equals the additional return expected on long-term bonds *on the average* due to inflation and interest rate risk. As interest rates change unexpectedly in the future, the bond price will vary. That is, bonds are subject to market risk due to unexpected changes in interest rates. The horizon premium compensates investors for the market risk that their expectations of interest rates today, period by period over the term of the bond, will in fact be wrong.

In valuing "going-concern" businesses and long-term investments made by businesses, practitioners generally use long-term U.S. government bonds as the risk-free security and estimate the ERP in relation to long-term U.S. government bonds. This convention represents a realistic, simplifying assumption. Most business investments have long durations and suffer from a reinvestment risk comparable to that of long-term U.S. government bonds. As such, the use of long-term U.S. government bonds and an ERP estimated relative to long-term bonds more closely matches the investment horizon and risks confronting business managers making capital allocation decisions and valuators in applying valuation methods.

Many financial analysts today use the 20-year (constant-maturity) U.S. government bond yield to maturity as of the date of valuation. Some analysts use either a 10-year or a 30-year yield, but as a practical matter these yields have not differed greatly from the 20-year yield.

While the choice of risk-free rate was relatively easy during periods of stability, the very use of a risk-free rate as the building block upon which the cost of equity capital is based became problematic beginning in September 2008, as the financial crisis started to unfold. All U.S. government security yields declined and long-term U.S. government bond yields, the typical benchmark used in cost of equity capital models, became abnormally low for several months. If the analyst used historical realized risk premiums as an estimated equity risk premium as is often typically used, these abnormally low interest rates resulted in unreasonably low estimates of the cost of equity capital as of the important valuation date, December 31, 2008.[3] Exhibit I displays the 10-year and 20-year yields on constant maturity U.S. government bonds from 2005 through 2010.

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[2] When short-term interest rates exceed long-term rates, the yield curve is said to be "inverted."

[3] Roger J. Grabowski, "Cost of Capital Estimation in the Current Distressed Environment," *The Journal of Applied Research in Accounting and Finance* (July 2009): 31–40.

EXHIBIT 1: 10-year and 20-year (constant maturity) U.S. Government Bond Yields

	U.S. Government Bond Yields			U.S. Government Bond Yields	
	10-Year	20-Year		10-Year	20-Year
Year End 2005	4.39	4.61	May-09	3.47	4.34
Year End 2006	4.71	4.91	Jun-09	3.53	4.30
Year End 2007	4.04	4.50	Jul-09	3.52	4.29
			Aug-09	3.40	4.14
Jan-08	3.67	4.35	Sep-09	3.31	4.02
Feb-08	3.53	4.37	Oct-09	3.41	4.19
Mar-08	3.45	4.30	Nov-09	3.21	4.07
Apr-08	3.77	4.49	Dec-09	3.85	4.58
May-08	4.06	4.74	Jan-10	3.63	4.38
Jun-08	3.99	4.59	Feb-10	3.61	4.40
Jul-08	3.99	4.63	Mar-10	3.84	4.55
Aug-08	3.83	4.47	Apr-10	3.69	4.36
Sep-08	3.85	4.43	May-10	3.31	4.05
Oct-08	4.01	4.74	**Jun-10**	2.97	**3.74**
Nov-08	2.93	**3.71**	**Jul-10**	2.94	**3.74**
Dec-08	2.25	**3.05**	**Aug-10**	2.47	**3.23**
Jan-09	2.87	**3.86**	**Sep-10**	2.53	**3.38**
Feb-09	3.02	**3.98**	**Oct-10**	2.63	**3.64**
Mar-09	2.71	**3.61**	**Nov-10**	2.81	**3.80**
Apr-09	3.16	4.10	Dec-10	3.30	4.13

Source: Board of Governors of the Federal Reserve System

Most analysts would agree that the world economies were (and likely still are as of the date of this writing) in crisis. Financial crises are often accompanied by a "flight to quality" such that the nominal returns on "risk-free" securities fall dramatically for reasons other than inflation expectations, and, thus, without adjustment, become less reliable as the best building block upon which to estimate the cost of equity capital.

Macroeconomic research suggests that short-term inflation expectations remain fairly stable, and therefore the dramatic decline in the government bond yields in November and December 2008 was not likely due to expected declines in expected long-term inflation.[4] In fact, long-term (10-year horizon) Consumer Price Index (CPI) expectations continued to be at 2.5% at the end of 2008.[5]

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[4] V. V. Chari, Lawrence Christiano, and Patrick J. Kehoe, "Facts and Myths about the Financial Crisis of 2008," Federal Reserve Bank of Minneapolis Research Department, Working paper 666, October 2008.
[5] "Survey of Professional Forecasters: Fourth Quarter 2008," Federal Reserve Bank of Philadelphia (November 17, 2008); "The Livingston Survey: December 2008," Federal Reserve Bank of Philadelphia (December 9, 2008).

While short-term inflation expectations had decreased,[6] many commentators were warning that long-term inflation would increase, not decrease, given the projected U.S. budget deficit. Based on surveys of professional forecasters, yields on long-term U.S. government bonds were also expected to increase.

Following the bottom at December 31, 2008, yields on 20-year (constant maturity) U.S. government bonds did indeed increase. For example, as of September 30, 2009, the yield had risen to 4.1%. It appeared that the "flight to quality" that drove yields on U.S. government bonds to unreasonably low levels as of December 2008 had eased and yields on U.S. government bonds appeared to have returned to more normalized levels.

Ben Bernanke, Chairman of the Board of Governors of the Federal Reserve System (the "Federal Reserve" or the "Fed"), addressed in his prepared testimony to the U.S. House of Representatives' Budget Committee on June 3, 2009, the issue of observed increases in yields on longer-term government bonds and fixed rate mortgages:

> "These increases appear to reflect concerns about large federal deficits but also other causes, including greater optimism about the economic outlook, a reversal of flight-to-quality flows, and technical factors related to the hedging of mortgage holdings."

Further evidence of the "flight to quality" and its impact on U.S. government interest rates was the implied forward volatility (based on options on exchange traded funds or "ETFs") on 20-year U.S. government bonds in November and December of 2008. The volatility had increased significantly (to approximately double the implied forward volatility in earlier months[7]), suggesting that the market was uncertain that the lower yields (and correspondingly higher prices) in November and December of 2008 were sustainable. (See Exhibit 2). By the fall of 2009 and spring of 2010, the implied forward volatility had decreased to a level similar to the average observed in the months leading up to the November-December 2008 "flight to quality."

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[6] "The Livingston Survey: June 2009," Federal Reserve Bank of Philadelphia (June 9, 2009): 1.
[7] Implied volatility for 3-month options on iShares Lehman 20+year Treasury Bonds averaged 31.5% in November and December 2008 compared to an average of 15.0% during the first 10 months of 2008. The implied volatility averaged 13.4% for the six months of October, 2009 to March 2010.

Exhibit 2: Implied Volatilities for Options on S&P 500 and Options on U.S. Government Bonds and Interest Rates on Constant Maturity 20-Year U.S. Government Bonds

	S&P 500 ETF Implied Volatility		iShares Lehman 20+ Year Treasury Bond		20-Year Treasury
	30 Day	3 Month	30 Day	3-Month	Yield
Year End 2005	10.77	12.66	8.70	9.24	4.61
Year End 2006	10.26	11.02	7.49	8.08	4.91
Year End 2007	21.53	22.60	14.95	14.36	4.50
Jan-08	26.12	23.98	17.58	16.29	4.35
Feb-08	24.58	24.93	17.81	17.31	4.37
Mar-08	25.04	24.59	16.85	17.24	4.30
Apr-08	19.40	19.98	12.95	13.34	4.49
May-08	15.93	18.89	13.08	14.17	4.74
Jun-08	22.80	22.51	11.52	12.97	4.59
Jul-08	22.06	21.84	11.09	12.32	4.63
Aug-08	19.11	21.25	10.76	12.13	4.47
Sep-08	39.17	31.30	18.69	16.12	4.43
Oct-08	52.08	46.36	16.81	18.46	4.74
Nov-08	**51.76**	**48.39**	**28.84**	**31.09**	**3.71**
Dec-08	**36.27**	**37.57**	**31.33**	**31.21**	**3.05**
Jan-09	**39.63**	**38.68**	**26.10**	**25.26**	**3.86**
Feb-09	**40.92**	**39.48**	**25.14**	**25.41**	**3.98**
Mar-09	**39.53**	**39.39**	**17.99**	**19.40**	**3.61**
Apr-09	33.32	33.16	19.81	19.88	4.10
May-09	26.76	28.11	22.02	21.80	4.34
Jun-09	23.94	25.28	18.97	19.45	4.30
Jul-09	22.76	24.48	16.90	17.80	4.29
Aug-09	22.70	25.42	16.11	17.26	4.14
Sep-09	22.63	23.02	15.86	16.79	4.02
Oct-09	26.93	25.37	15.59	16.31	4.19
Nov-09	21.56	23.03	13.25	14.53	4.07
Dec-09	17.57	20.34	12.49	14.32	4.58
Jan-10	21.68	21.78	10.89	12.43	4.38
Feb-10	16.64	18.87	9.87	10.93	4.40
Mar-10	14.84	16.92	10.94	11.94	4.55
Apr-10	17.65	19.03	10.89	12.55	4.36
May-10	27.15	26.47	17.48	18.41	4.05
Jun-10	**29.82**	**28.78**	**16.15**	**16.43**	**3.74**
Jul-10	**21.29**	**23.07**	**13.49**	**14.41**	**3.74**
Aug-10	**24.36**	**25.92**	**20.38**	**19.24**	**3.23**
Sep-10	**20.42**	**22.38**	**15.97**	**16.54**	**3.38**
Oct-10	**19.29**	**19.98**	**17.71**	**16.80**	**3.64**
Nov-10	**20.52**	**21.17**	**18.06**	**17.36**	**3.80**
Dec-10	15.31	17.89	16.40	16.49	4.13

(1) 30 day implied volatility
(2) 3 month implied volatility
Sources: Bloomberg and *Board of Governors of the Federal Reserve System*

In summary and examining the data in Exhibit 2, the evidence suggests that the yields on 20-year U.S. government bonds represented aberrations during the last months of 2008 and the first months of 2009, overly influenced by the temporary "flight to quality" (low interest rates in bold).

Subsequently, the risk-free rate returned to more "normal" levels until the summer of 2010 as the European sovereign debt crisis caused another "flight to quality". In addition, concerned about signs that the U.S. economic recovery was stalling, the Federal Reserve Bank began making massive purchases of U.S. government securities (referred to as Quantitative Easing round 2 or "QE2"). While the Federal Reserve made purchases of securities with maturities of 10-years or less, the combination of the sovereign debt crisis, uncertainty about the pace of economic recovery, and QE2 purchases appear to have driven interest rates to abnormally low levels and caused implied forward volatilities to increase during the summer and fall of 2010.

The entire process of normalizing risk-free interest rates begins with identifying whether the market interest rate has been influenced by a "flight to quality." On a monthly basis, we follow changes in the market interest rates relative to a rolling average of prior months interest rates and various economic indicators, for example, the flow of funds, the implied volatility derived from options, changes in estimates of inflation, etc. Once we suspect that the market interest rates are abnormally low, we use a build-up approach to estimate a normalized risk-free rate looking at the real rate of interest and inflation estimates.

If one was estimating the cost of equity capital in any of these periods of abnormally low interest rates, one would need to be cautious that one's application of the cost of equity capital model does not result in an unrealistically low cost of equity estimate, particularly if we are in the presence of economic turmoil.

EQUITY RISK PREMIUM

The *equity risk premium* (often interchangeably referred to as the *market risk premium*) is defined as the extra return (over the expected yield on risk-free securities) that investors expect to receive from an investment in a diversified portfolio of common stocks.

Several of the discussions and debates surrounding ERP have stemmed primarily from the following three driving forces:

1. What returns can be expected by retirement plans from investments in publicly traded common stocks?
2. What expected returns are being priced in the observed values of publicly traded common stocks?
3. What is the appropriate cost of capital to use in discounting future cash flows of a company or a project to their present value equivalent?

Because of the importance of the ERP estimate and the fact that we find many practitioners confused about estimating ERP, we report on recent studies of the long-term average or *unconditional ERP*. That is, what is a reasonable range of ERP that can be expected over an entire business cycle?

Research has shown that ERP is cyclical during the business cycle. We use the term *conditional ERP* to mean the ERP that reflects current market conditions.

We report on reasonable ERP estimates through the Great Recession of 2008-2010 and conclude with our recommended ERP.

DEFINING THE EQUITY RISK PREMIUM

The ERP (or notational RP_m) is defined as:

$$RP_m = R_m - R_f$$

where:

RP_m = the equity risk premium

R_m = the expected return on a fully diversified portfolio of equity securities

R_f = the rate of return expected on a risk-free security

The ERP means, in practice, a general equity risk premium using as a proxy for the "market," either the Standard & Poor's (S&P) 500 index or the New York Stock Exchange (NYSE) composite stock index. ERP is a forward-looking concept. It is an expectation as of the valuation date for which no market quotes are directly observable.

In this paper, we are addressing returns of publicly traded stocks. Those returns are commonly used to establish a beginning benchmark for estimating the cost of equity capital for closely held investments.

ESTIMATING THE ERP

While an analyst can observe premiums realized over time by referring to historical data (i.e., realized return approach or *ex post* approach), such realized premium data do not represent the ERP expected in prior periods, nor do they necessarily represent the current ERP. Rather, realized premiums may, at best, represent a sample from prior periods of what may have then been the *expected* ERP at a certain point in time.

To the extent that realized premiums on the average equate to expected premiums in prior periods, such samples *may be* representative of current expectations. But to the extent that prior events that are not expected to reoccur caused realized returns to differ from prior expectations, such samples should be adjusted to remove the effects of these nonrecurring events. Such adjustments are needed to improve the predictive power of the sample.

Alternatively, you can derive implied forward-looking estimates for the ERP from data on the underlying expectations of growth in corporate earnings and dividends or from projections of specific analysts as to dividends and future stock prices (*ex ante* approach).[8]

The goal of either approach is to estimate the true *expected* ERP as of the valuation date. Even then, the expected ERP can be thought of in terms of a *normal* or *unconditional* ERP (i.e., the long-term average) and a *conditional* ERP based on current levels of the stock market and economy relative to the long-term average.[9] We address issues involving the conditional ERP later in this article.

There is no one universally accepted methodology for estimating ERP. A wide variety of premiums are used in practice and recommended by academics and financial advisors.

REALIZED RISK PREMIUM (*EX POST*) APPROACH

Let us examine briefly the issues surrounding estimating the *unconditional ERP* using realized risk premium data. While academics and practitioners agree that ERP is a forward-looking concept, some practitioners, including taxing authorities and regulatory bodies, use exclusively historical data to estimate the ERP under the assumption that historical data are a valid proxy for current investor expectations (the *ex post* approach). They like the appearance of accuracy, and we do emphasize the word *appearance*. There are alternative conventions one could use to summarize realized risk premiums. Before one concludes on the accuracy of using realized risk premiums as an estimate of the ERP, one must consider the adjustments to the realized risk premiums.

In using the realized risk premiums, there are certain issues besides deciding on the risk-free rate (short-term or long-term) upon which to benchmark the ERP estimate that one must address:

- Is the arithmetic average or geometric average the more appropriate method of summarizing realized return data over the sample period for use in discounting expected cash flows?

- Should returns be measured over one-year holding periods or over longer holding periods?

- Do we introduce bias by using arithmetic averages of realized risk premiums[10]?

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[8] See, for example, Eugene F. Fama and Kenneth R. French, "The Equity Premium," *Journal of Finance* (April 2002): 637–659.

[9] Robert Arnott, "Historical Results," *Equity Risk Premium Forum, CFA Institute (AIMR)* (November 8, 2001): 27.

[10] These issues are discussed in detail in Appendix 9A of *Cost of Capital: Applications and Examples* 4th ed.

In the realized risk premium approach, the estimate of the ERP is the risk premium (realized return on stocks in excess of the risk-free rate) that investors have, on the average, realized over some historical holding period.

The underlying theory is that the past provides a reasonable indicator of how the market will behave in the future and investors' expectations are influenced by the historical performance of the market. If period returns on stocks (e.g., monthly stock returns) are not auto-correlated (e.g., this month's stock returns are not predictable based on last month's returns), and if expected stock returns are stable through time, then the arithmetic average of historical stock returns provides an unbiased estimate of expected future stock returns.

Similarly, the arithmetic average of realized risk premiums provides an unbiased estimate of expected future risk premiums (the ERP). Because of this statistical characteristic, this author has chosen to present all conclusions in terms of their arithmetic average equivalency, even where the methodology used to estimate the ERP is not based on realized risk premiums. Converting all analyses to a common equivalent measurement also facilitates the reader's ability to draw meaningful comparisons.

A more indirect justification for use of the realized risk premium approach is the contention that, for whatever reason, securities in the past have been priced in such a way as to earn the returns observed. By using an estimated cost of equity capital incorporating the average of realized risk premiums, you may to some extent replicate this level of pricing.

SELECTING A SAMPLE PERIOD

The average realized risk premium is sensitive to the period chosen for the average. While the selection of 1926 as a starting point corresponds to the initial publishing of the forerunner to the current S&P 500, that date is otherwise arbitrary.

In addition, the average realized returns calculated using 1926 return data as a beginning point may be too heavily influenced by the unusually low interest rates during the World War II period. Some observers have suggested that the period including the 1930s, 1940s, and the immediate post–World War II boom years may have exhibited an unusually high average realized return premiums. The 1930s exhibited extreme volatility while the 1940s and early 1950s saw a combination of record low interest rates and rapid economic growth that led the stock market to outperform Treasury bonds by a wide margin.

"The low real rates on bonds may have contributed to higher equity returns in the immediate postwar period. Since firms finance a large part of their capital investment with bonds, the real cost of obtaining such funds increased returns to shareholders. It may not be a coincidence that the highest 30-year average equity return occurred in a period marked by very low real returns on bonds. As real returns on fixed-income

assets have risen in the last decade, the equity premium appears to be returning to the 2% to 3% norm that existed before the postwar surge."[11]

And the years 1942 through 1951 marked a period of artificial stability in U.S. government bond yields. In April 1942, the Federal Reserve publicly committed itself to maintaining an interest rate ceiling on government debt, both long term and short term, to support the financing of World War II. The Fed accomplished this by acquiring large quantities of government securities, pushing up prices and thereby driving down yields. After World War II, the Fed continued to maintain an interest rate ceiling, fearing return to the high unemployment of the Great Depression. But postwar inflationary pressures led the U.S. Treasury and the Fed to reach an accord announced March 4, 1951, freeing the Fed of its obligation of pegging interest rates at artificially low levels. [12]

Exhibit 3 displays the income returns on long-term U.S. government bonds for the years 1942 through 1951 (the return used by Morningstar in calculating the realized risk premiums) versus inflation.

Exhibit 3: Bond Income Returns vs. Inflation 1942-1951

Year	Income Return	Rate of Inflation
1942	2.46%	9.29%
1943	2.44%	3.16%
1944	2.46%	2.11%
1945	2.34%	2.25%
1946	2.04%	18.16%
1947	2.13%	9.01%
1948	2.40%	2.71%
1948	2.25%	-1.80%
1950	2.12%	5.79%
1951	2.38%	5.87%

Source: Shannon P. Pratt and Roger J. Grabowski, *Cost of Capital: Applications and Examples* 4th ed. (John Wiley and Sons, Inc., 2010), page 122.Used with permission.

During these 10 years long-term U.S. government income returns averaged 2.3% while inflation averaged 5.66%, indicating that the realized risk premiums calculated for these years was biased high compared to a more normal risk-free rate benchmark. To better understand the effect of the interest rate accord on the realized risk premiums, this author recalculated the realized risk premiums for 1926 through 2010 after normalizing

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[11] Jeremy Siegel, *Stocks for the Long Run* (New York: McGraw-Hill, 1994), 20.

[12] For an account of the history during this period, see for example "The Treasury-Fed Accord: A New Narrative Account" by Robert L. Hetzel and Ralph F. Leach, located at http://www.richmondfed.org/publications/research/economic_quarterly/2001/winter/pdf/hetzel.pdf.

the income return on long-term U.S. government bonds for the years 1942 through 1951 to an amount at least equal to the annual rate of inflation as reported in the *SBBI Yearbook* (except 1949 when inflation was -1.8%). Making that adjustment lowered the realized risk premium from the published 6.7% to 6.2% for 1926 - 2010. One can interpret the results as the realized risk premium data reported in the *SBBI Yearbook* is biased high by 50 basis points (.50%). We will term this the WWII Interest Rate Agreement bias.

HAS THE RELATIONSHIP BETWEEN STOCK AND BOND RISK CHANGED?

If we disaggregate the 85 years reported in the *SBBI Yearbook* into two sub-periods, the first covering the periods before and the second covering the periods after the mid-1950s, we find that the period since the mid-1950s has been characterized by a more stable stock market and a more volatile bond market compared to the earlier period. Interest rates, as reflected in Long-term U.S. Government Bond Income Return statistics as summarized in the *SBBI Yearbook*, have become more volatile in the later period. The effect is amplified in the volatility of Long-term U.S. Government Bond Total Returns as summarized in the *SBBI Yearbook,* which include the capital gains and losses associated with interest rate fluctuations. From these data, we can conclude that the relative risk of stocks versus bonds has narrowed; based on this reduced relative risk, we would conclude that the ERP is likely lower today. As a result, we question the validity of using the arithmetic average of one-year returns since 1926 as the basis for estimating today's ERP.

Exhibit 4: Realized Equity Risk premiums over Long-Term U.S. Government Bond Returns

Nominal (i.e. without inflation removed)	1926–1955	1956–2010
Realized risk premiums:		
Arithmetic Average	10.5%	4.6%
Geometric Average	7.5%	3.1%
Standard Deviations:		
Stock Market Annual Returns	25.3%	17.4%
Long-term U.S. Government Bond Total Returns	4.7%	11.2%
Ratio of Equity Volatility to Bond Volatility	5.4	1.6

Source: Calculated (or derived) based on CRSP® data, ©2011 Center for Research in Security Prices (CRSP®), University of Chicago Booth School of Business.

Evidence since 1871 clearly supports the premise that the difference between stock and bond returns is a function of the long-run difference in volatility between these two asset classes.[13] And if you examine the volatility in stock returns (as measured by rolling 10-year average standard deviation of real stock returns), you find that the volatility beginning in 1929 dramatically increased up to the mid-1950s; since then, volatility has returned to levels observed prior to 1926 until the period preceding the Great Recession of 2008-2010.[14] This also suggests that the arithmetic average realized risk premiums reported for the entire data series since 1926 as reported in the *SBBI Yearbook* (for 1926-2010 equal to 6.72%) likely overstate expected future returns.[15]

If the average expected risk premium has changed through time, then averages of realized risk premiums using the longest available data become questionable. A shorter-run horizon may give a better estimate if changes in economic conditions have created a different expected return environment than that of more remote past periods. Why not use the average realized return over the past 20-year period? A drawback of using averages over shorter periods is that they are susceptible to large errors in estimating the *true* ERP due to high volatility of annual stock returns. Also, the average of the realized premiums over the past 20 years may be biased high due to the general downward movement of interest rates since 1981 (and is subject to a large standard error).

While we can only observe realized returns in the stock market, we can observe both expected returns (yield to maturity) and realized returns in the bond market. Prior to the mid-1950s, the difference between the yield at issue and the realized returns was small since bond yields and therefore bond prices did not fluctuate very much.

Since the mid-1950s until 1981, bond yields trended upward, a bond prices to generally decrease. Realized bond returns were generally lower than returns expected when the bonds were issued (as the holder experienced a capital loss if sold before maturity). Beginning in 1981, bond yields trended downward, causing bond prices to generally increase. Realized bond returns were generally higher than returns expected when the bonds were issued (as the holder experienced a capital gain if sold before maturity). If we choose the period during which to measure realized premiums beginning from the late 1950s/early 1960s to today, we will be including a complete interest rate cycle.[16]

Even if we use long-term observations, the volatility of annual stock returns will be high. Assuming that the 85-year average provides an unbiased estimate, still a 95%

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[13] Clifford S. Asness, "Stocks versus Bonds: Explaining the Equity Risk Premium," *Financial Analysts Journal* (March/April 2000): 96–113.

[14] Laurence Booth, "Estimating the Equity Risk Premium and Equity Costs: New Ways of Looking at Old Data," *Journal of Applied Corporate Finance* (Spring 1999):100–112 and "The Capital Asset Pricing Model: Equity Risk Premiums and the Privately-Held Business," 1998 CICBV/ASA Joint Business Valuation Conference (September 1998): 23.

[15] The Duff & Phelps *Risk Premium Report* uses data on returns since 1963.

[16] Booth, footnote 12.

confidence interval for the unobserved *true* ERP spans a range of approximately 2.4% to 11.0%.[17]

COMPARING INVESTOR EXPECTATIONS TO REALIZED RISK PREMIUMS

Much has recently been written comparing the realized returns as reported in sources such as the *SBBI Yearbook* and the ERP that must have been expected by investors, given the underlying economics of publicly traded companies (e.g., expected growth in earnings or expected growth in dividends) and expected trends in the economy (e.g., expected growth in gross domestic product [GDP]). Such studies conclude that investors could not have expected as large an ERP as the equity risk premiums actually realized.[18]

▪ Elroy Dimson, Paul Marsh, and Mike Staunton studied the realized equity returns and equity premiums for 17 countries (including the United States) from 1900 to the end of 2009.[19]

Dimson, Marsh, and Staunton observe larger equity returns earned in the second half of the twentieth century compared to the first half due to (1) corporate cash flows growing faster than investors anticipated (fueled by rapid technological advances and unprecedented growth in productivity and efficiency), (2) transaction and monitoring costs falling over the course of the century, (3) inflation rates generally declining over the final two decades of the century with a resulting increase in real interest rates, and (4) required rates of return on equity declining due to diminished business and investment risks.

They conclude that the observed increase in the overall price-to-dividend ratio during the century is attributable to the long-term decrease in the required risk premium and that the decrease will most likely not continue into the future.

They also conclude that to arrive at a forward ERP it is prudent to perform downward adjustments to the realized risk premiums that take into consideration the non recurring nature of these events. Specifically, downward adjustments due to the increase in price-to-dividend ratio, as well as to the historic average dividend yield relative to today's dividend yield are both reasonable. One can estimate a range of likely forward ERP estimates by removing the increase in price-to-dividend ratio (simply making that single adjustment results in an estimate in the high-end of the

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[17] Calculated as two standard errors around the average; 6.72% +/− (1.96 × 2.22%).
[18] Studies by Robert D. Arnott and Peter L. Bernstein, "What Risk Premium is Normal?" *Financial Analysts Journal* (March/April 2002): 64–85 and Eugene F. Fama and Kenneth R. French, "The Equity Premium," *Journal of Finance* (April 2002): 637–659 are discussed in Chapter 9, *Cost of Capital: Applications and Examples* 4th ed.
[19] Elroy Dimson, Paul Marsh, and Mike Staunton, "Global Evidence on the Equity Premium," *Journal of Applied Corporate Finance* (Summer 2003): 27–38; "The Worldwide Equity Premium: A Smaller Puzzle" *EFA 2006 Zurich Meetings Paper,* April 7, 2006; *Credit Suisse Global Investment Returns Sourcebook 2010* (London: Credit Suisse/London Business School, 2010).

range) and adjusting dividend yield to current levels (making both adjustments results in ERP estimate in the low-end of the range).

Assuming that the standard deviation of annual returns on equity will approximately equal the historical standard deviation, their analysis indicates an estimate of the U.S. ERP in early 2010 of 4.0% - 4.5% arithmetic average versus long-term U.S. government bonds for one-year holding period returns.[20]

- Roger Ibbotson and Peng Chen performed a study in which they estimated forward-looking long-term sustainable equity returns and expected ERPs since 1926. They first analyzed historical equity returns by decomposing returns into factors including inflation, earnings, dividends, price-to-earnings ratio, dividend-payout ratio, book values, return on equity, and GDP per capita (the fundamental building blocks of "supply side" equity returns). They forecast the ERP through supply side models built from historical data. These authors determine that the long-term ERP that could have been expected given the underlying economics was less than the realized premium.[21] In the most recent update to this study, as reported in the *SBBI Yearbook*, the long-term ERP since 1926 that could have been expected given the underlying economics (the supply side model estimate) was approximately 5.2% calculated on an arithmetic average basis compared to the realized risk premium of 6.7% calculated on an arithmetic average basis.[22] The greater-than-expected realized risk premiums were caused by an unexpected increase in market multiples relative to economic fundamentals (i.e., decline in the discount rates) for the market as a whole.

William Goetzmann and Roger Ibbotson, commenting on the supply side approach of estimating expected risk premiums, note:

> "These forecasts tend to give somewhat lower forecasts than historical risk premiums, primarily because part of the total returns of the stock market have come from price-earnings ratio expansion. This expansion is not predicted to continue indefinitely, and should logically be removed from the expected risk premium."[23]

So one can interpret that a forward estimate of the long-term ERP derived from data in the *SBBI Yearbook* should be 5.2% (supply side model on an arithmetic average basis) minus the .50% WWII Interest Rate bias discussed above or 4.7% for one-year holding period returns. So a reasonable range of forward ERP estimates derived from the supply side model adjusted is consistent with the Dimson, Marsh and Staunton forward estimate.

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[20] Based on Grabowski's converting premium over total returns on bonds as reported by Dimson, Marsh, and Staunton, removing the impact of the growth in price-to-dividend ratios from the geometric average historical premium and converting to an approximate arithmetic average.

[21] Roger G. Ibbotson and Peng Chen, "Long-Run Stock Market Returns: Participating in the Real Economy," *Financial Analysts Journal* (January/February 2003): 88–98; Charles P. Jones and Jack W. Wilson, "Using the Supply Side Approach to Understand and Estimate Stock Returns," Working paper, June 6, 2006.

[22] *2010 Ibbotson SBBI Valuation Yearbook* (Morningstar, 2010): 66.

[23] William N. Goetzmann and Roger G. Ibbotson, "History and the Equity Risk Premium," *Handbook of the Equity Risk Premium*, Rajnish Mehra, editor (Elsevier, 2008), Chapter 12, pp 522-523.

Each of these studies attempts to improve the estimate of the *true* ERP by removing the effects of changes in underlying economics that caused the realized risk premiums to differ from the ERP investors expected. The greater than expected historical realized equity returns were caused by an unexpected increase in market multiples and a decline in discount rates relative to economic fundamentals.

Such changes in economics that caused unexpectedly large realized risk premiums include an unexpected shift in relative market volatility of returns of bonds compared to stocks and an unexpected reduction in total income taxes paid by businesses and investors as a percentage of business operating earnings.

CONDITIONAL ERP ESTIMATES

The evidence presented in most of the studies represents a long-term average or *unconditional* estimate of the ERP. That is, what is a reasonable range of ERP that can be expected over an entire business cycle? Based on the studies and the data presented we conclude that a reasonable long-term range of conditional ERP estimates over the entire business cycle is 3.5% to 6.0%. This compares to the realized risk premiums for the period 1926-2010 of 6.72%.

Several academic studies suggest that the ERP varies over the business cycle; it is lowest in periods of business expansion and greatest in periods of recession. The ERP appears to be positively correlated with long-term bond yields (increasing as bond yields increase) and with the default premium (increasing as the differential between Aaa- and Baa-rated bond yields increases).[24]

We use the term *conditional ERP* to mean the ERP that reflects current market conditions. For example, when the economy is near or in recession (as reflected in recent relatively low returns on stocks), the *conditional* ERP is at the higher end of the range (e.g., at December 31, 2008). When the economy improves (with expectations of improvements reflected in recent increasing stock returns), the *conditional* ERP moves toward the midpoint of the range. When the economy is near its peak (and reflected in recent relatively high stock returns), the *conditional* ERP is more likely at the lower end of the range.

Forward-looking (*ex ante*) approaches can be used to estimate the conditional ERP as of the date the estimate was made.[25] Forward-looking approaches can be categorized into three groups based on the approach taken:

1. *Bottom-up implied ERP estimates.* This category of approach uses expected growth in earnings or dividends to estimate a bottom-up rate of return for a number of companies. An expected rate of return for an individual company can be implied by

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[24] For example, see Fabio Fornari, "The Size of the Equity Premium," Working paper, January 2002.

[25] Forward-looking approaches can be used to estimate the range of the long-term average ERP also by looking at the results of the forward-looking approaches over a long period of time, such as, over the entire span of a business cycle. The results of such an analyses are discussed in detail in Chapter 9 of *Cost of Capital: Applications and Examples* 4th ed.

solving for the present value discount rate that equates the current market price of a stock with the present value of expected future dividends, for example. A bottom-up implied ERP begins with the averaging of the implied rates of return (weighted by market value) for a large number of individual companies and then subtracting the government bond rate. The bottom-up approach attempts to directly measure investor's expectations concerning the overall market by using forecasts of the rate of return on publicly traded companies.

2. *Top-down implied ERP estimates.* This category of approach examines the relationships across publicly traded companies over time between real stock returns, price/earnings ratios, earnings growth, and dividend yields. An estimate of the expected rate of equity return is developed from current economic observations applied to the historical relationships. Subtracting the current rate of interest provides an estimate of the *expected* ERP implied by the historical relationships.

3. *Surveys.* This approach relies on opinions of investors and financial professionals through surveys of their views on the prospects of the overall market and the return expected in excess of a risk-free benchmark.

In comparing implied ERP estimates to realized risk premiums, one should compare the implied estimates to the geometric average of realized risk premiums, remembering that the implied estimates are forward looking and the realized risk premiums are historical.[26] Therefore, when presenting implied ERP estimates, we convert the implied ERP estimate to an equivalent arithmetic average.[27]

CONDITIONAL ESTIMATE OF ERP AND THE GREAT RECESSION OF 2008-2010

Beginning in September 2008 the stock market and the economy started to plunge into a crisis.

If one considers the pricing of the stock market over the long-term, one can observe in Exhibit 5 the long-term versus the short-term relationships. In scenario A we see the long-term trend in the returns in large company stocks. This trend parallels the long-term ERP estimate over time. We all know that the stock market goes through cycles. Stocks get bid up at times leading to higher returns relative to the long-term average. In scenario A we see a depiction of one of those upward cycles when the returns increase faster than the long-term average ("above average"). Assume we are estimating the conditional ERP at the valuation date (indicated by the vertical line). The conditional ERP will be lower than the average for some time in order for the average over the long-run to revert back to

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[26] The authors confirmed this interpretation with both Roger Ibbotson and Aswath Damodaran.
[27] In making that adjustment we used the following estimated relationship: arithmetic average equivalent = geometric average risk premium estimate + (standard deviation of risk premium estimates)^2/2. We used the standard deviation of realized risk premiums for the years 1956-2010 of approximately 17% to arrive at an estimate of 1.4% to add to the geometric averages to estimate the arithmetic average equivalents.

the average (that is, because it was above the average for a period, it will be below average to then get back to the average). These above average returns occurred during the "tech boom"; were our valuation date taking place at the peak of the tech boom, the conditional ERP at that point would be less than the average.

Similarly in scenario B we see a decline from the long-term average (e.g., last half of 2008). Assume we are estimating the conditional ERP at the valuation data (indicated by the vertical line). The conditional ERP will be greater than the average for some time in order for the average over the long-run to return to the average (that is, because it was below the average for a period, i.e., losses during 2008, it will be above average to then get back to the average).

As the stock market declined and the uncertainty (risk) to the economy increased, implied ERP estimates increased while realized risk premiums decreased. If one were estimating cost of equity capital using a method just like "normal times" (e.g., using realized risk premiums), the estimate would be flawed.

Exhibit 5: Relationship of conditional ERP to long-term ERP

Scenario A: Conditional ERP Estimate at Peak of Stock Market Cycle
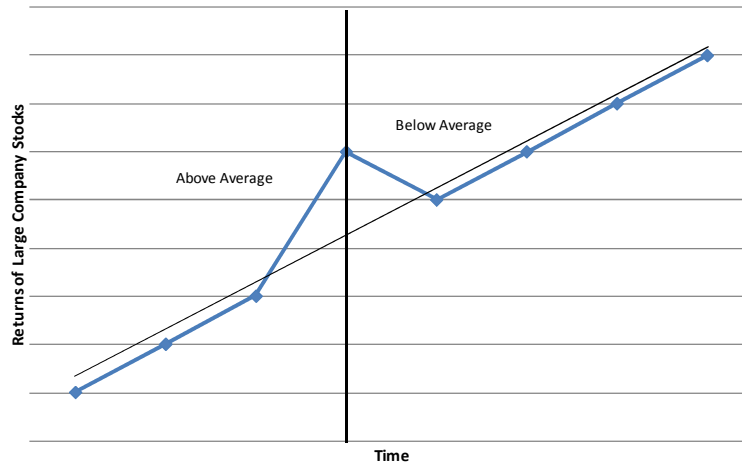
Scenario B: Conditional ERP Estimate at Trough of Stock Market Cycle

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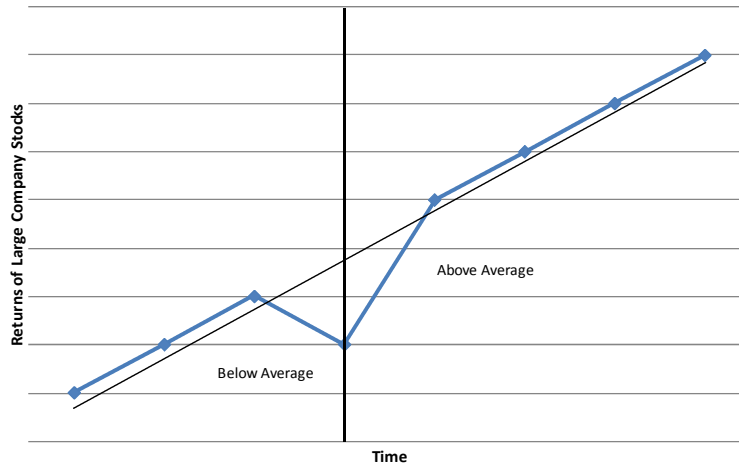
The Great Recession of 2008-2010 has proven to be anything but ordinary times. The "standard" practice of many practitioners has been to simply add the "spot" yield on 20-year U.S. government bonds to the arithmetic average of realized risk premiums as reported by Morningstar once each year at the prior year-end in the *SBBI Yearbook* as their base cost of capital estimate. But this methodology has created numerous erroneous estimates of a base cost of equity capital all through the Great Recession of 2008-2010.

For example, as of December 2007, the yield on 20-year U.S. government bonds equaled 4.5% and the Morningstar realized risk premiums for 1926-2007 was 7.1%. But at December 2008, the yield on 20-year U.S. government bonds was 3.0% and the Morningstar realized risk premiums for 1926-2008 was 6.5%. So just at the time that the risk in the economy *increased* to maybe the highest point, the base cost of equity capital using realized risk premiums *decreased* from 11.6% (4.5% plus 7.1%) to 9.5% (3.0% plus 6.5%).

Similarly at August 31, 2010, the yield on 20-year U.S. government bonds was 3.3% and the Morningstar realized risk premiums for 1926-2009 was 6.7%. So during the summer of 2010 when the Euro sovereign debt crisis was at its height, the base cost of equity capital using realized risk premiums was 10.1% (3.4% plus 6.7%), which was less than the base cost of equity capital before the beginning of the Great Recession.

Let us relate this relationship to observations of implied volatilities of the stock and bond markets, interest rates, and implied ERP estimates. For our comparison we will use data on implied volatility on options for the S&P 500 and U.S. government bonds and interest rates on constant maturity 20-year U.S. government bonds (Exhibit 2).

Implied volatility is the market's best estimate of the future volatility over the term of the option. When the crisis began to unfold (September 15, 2008, Lehman Brothers filing for bankruptcy), the stock market moved down and fear enveloped the financial markets. We see that the implied volatilities increased in the S&P 500 and long-term U.S. government bond options, peaking in the October - December 2008 period. At the same time, though, the interest rates on U.S. government bills and bonds declined to levels below those justified by the real rate of interest plus expected rates of inflation. This increased volatility in the expected interest rates implies that the market questioned

whether such low interest rates were sustainable. It also reflected market participants' uncertainty about the trajectory of economic and financial market conditions, leading investors to continuously re-balance their holdings of government securities. Exhibit 2 also displays the interest rates on a month-to-month basis.

So anyone estimating the implied ERP at the end of December 2008 had to deal with both the declining stock market (function of increased risk evidenced by the increasing volatility of the S&P 500 options) and the declining long-term U.S. government interest rates.

BOTTOM-UP IMPLIED ERP ESTIMATES

While one can use various sources as is discussed in *Cost of Capital: Applications and Examples* 4th ed., we summarize the work of Professor Damodaran in this paper. Professor Aswath Damodaran calculates implied ERP estimates for the S&P 500 index and now publishes his estimates on his website. He uses a two-stage model projecting expected distributions (dividends and stock buy-backs) based on average of analyst estimates for earnings growth for individual firms comprising the S&P 500 for the first 5 years and he assumes that growth thereafter will equate to the risk-free rate. He solves for the expected return (discount rate) that equates the expected distributions to the current level of the S&P 500. He benchmarks his implied ERP estimates by subtracting the current yield on 10-year U.S. government bonds from the expected return on the S&P 500.

Professor Damodaran's implied ERP estimate, converted to an arithmetic average equivalent over 20-year U.S. government bonds, as of December 31, 2010 equaled approximately 5.30%.

TOP-DOWN ERP ESTIMATES

Stephen Hassett has developed a model for estimating the implied ERP and the estimated S&P 500 based on the current yield on long-term U.S. government bonds and the *risk premium factor* (RPF). The RPF is the empirically derived relationship between the risk-free rate, S&P 500 earnings, real interest rates and real GDP growth to the S&P 500 over time. The RPF appears to change only infrequently.[28] The model can be used monthly or even daily to estimate the S&P 500 and the *conditional* ERP based on the current level of interest rates.

The formula is as follows:

$$\text{S\&P 500} = \text{S\&P Estimated Earnings} / \{[R_f \text{ x } (1+ \text{RPF})] - [(R_f - \text{Real Interest Rate} + \text{Long-Term GDP growth})]\}$$

where the implied $\text{ERP} = R_f \text{ x } (1+ \text{RPF})$.

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[28] Stephen D. Hassett, "The RPF Model for Calculating the Equity Market Risk Premium and Explaining the Value of the S&P 500 with Two Variables," *Journal of Applied Corporate Finance* 22, 2 (Spring 2010): 118-130.

Hassett's implied ERP estimate, converted to an arithmetic average equivalent over 20-year U.S. government bonds, as of December 31, 2010 equaled approximately 5.50%.

ERP SURVEYS

John Graham and Campbell Harvey report the results from surveys of chief financial officers of U.S. corporations.[29] Their most recent survey, converted to an arithmetic average equivalent over 20-year U.S. government bonds, as of mid-December, 2010, implied an ERP of approximately 3.5%.

MATCHING IMPLIED ERP ESTIMATES WITH THE RISK-FREE RATE

The question is during periods when risk-free rates are abnormally low due to the "flight to quality": do you measure the implied ERP against the *actual* risk-free rates or against *normalized* risk-free rates? If one estimates the ERP against the actual risk-free rates, the conditional ERP will be greater simply by the fact that risk-free rates are lower than one would expect given the real rate of interest, inflation expectations and reinvestment risk. Comparing implied ERP estimates over-time and comparing implied ERP estimates to realized risk premiums become problematic as most prior periods did not have interest rates so dramatically influenced by a "flight to quality."

We have prepared Exhibit 6 which display implied ERP monthly estimates measured against the *actual* benchmark 20-year U.S. government bond yields and against *normalized* yields (adjusting the yields for December 2008 through March 2009 and June 2010 through November 2010) based on the Damodaran bottom-up implied ERP estimates and the Hassett top-down estimates (converted to an equivalent premium over 20-year U.S. government bonds) from December 2008 through December 2010. Given that the implied ERP estimates are comparable to the geometric average of realized risk premiums, we converted the implied ERP estimates to their arithmetic average equivalent.

This author believes that using a normalized risk-free rate and benchmarking one's estimate of ERP against that normalized risk-free rate is likely easier for most practitioners to implement. Why?

First, in any period in which the risk-free rate is temporarily reduced due to a flight-to-quality, one must re-estimate the ERP. This requires a monthly re-estimate of ERP.

Second, the monthly re-estimate of ERP assumes that the implied ERP model is accurate and that inputs are updated in a timely fashion (remembering that in aggregate analysts tend to update their estimates of expected growth in earnings only with a lag).

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[29] John R. Graham and Campbell R. Harvey, "Expectations of Equity Risk Premia, Volatility and Asymmetry from a Corporate Finance Perspective," National Bureau of Economic Research Working paper, July 2003; John R. Graham and Campbell R. Harvey, "The Equity Risk Premium in 2010," Working paper, August 2010; December 2010 survey data provided by Campbell Harvey.

Third, are we assuming a degree of precision in our cost of equity capital estimates that is realistic? Given that we are valuing entire businesses, do the values of the subject businesses change monthly with such precision? Are future years' cash flow estimates for the business changing monthly with such precision?

This author has adopted the convention of making a periodic update to our ERP as economic conditions and market expectations change benchmarked against a "normalized" risk-free rate on 20-year U.S. government bond. We monitor both ERP estimates and changes in risk-free rates monthly and only after we see evidence from several sources that a change in ERP estimate is warranted, do we implement a change.

For example, after much consideration, this author recommended using an ERP of 6% benchmarked against a 4.5% "normalized" yield on U.S. 20-year government bonds as of December 31, 2008. That is, this author recommended using as the basic building blocks upon which to estimate the cost of equity capital at December 31, 2008, 4.5% as the yield on U.S. 20-year government bonds and an ERP of 6%.

Similarly, after much consideration, this author recommended using an ERP of 5.5% benchmarked against a 4.0% "normalized" the yield on U.S. 20-year government bonds during the summer and early fall of 2010.

Other authors may offer alternative views to this approach, but this author believes his approach is well supported.[30]

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[30] Aswath Damodaran, "What is the Riskfree Rate? A Search for the Basic Building Block," Stern School of Business Working paper, December 2008.

Exhibit 6: Implied ERP estimates benchmarked against actual and normalized 20-year U.S. government (constant maturity) bond yields

	S&P 500	Risk-Free Rate		Hassett Implied ERP		Damodaran Implied ERP	
		Actual	Normalized	vs. Actual Risk-Free Rate	vs. Normalized Risk-Free Rate	vs. Actual Risk-Free Rate	vs. Normalized Risk-Free Rate
Dec-08	903.25	3.03%	4.50%	7.09%	5.62%	7.05%	5.58%
Jan-09	825.88	3.94%	4.50%	6.18%	5.62%	7.20%	6.64%
Feb-09	735.09	4.01%	4.50%	6.11%	5.62%	8.09%	7.60%
Mar-09	797.87	3.55%	4.50%	6.57%	5.62%	7.57%	6.62%
Apr-09	872.81	4.10%	4.10%	5.17%	5.17%	6.78%	6.78%
May-09	919.14	4.32%	4.32%	5.72%	5.72%	6.49%	6.49%
Jun-09	919.32	4.29%	4.29%	5.90%	5.90%	6.50%	6.50%
Jul-09	987.48	4.30%	4.30%	5.86%	5.86%	6.08%	6.08%
Aug-09	1,020.62	4.15%	4.15%	5.72%	5.72%	5.95%	5.95%
Sep-09	1,057.08	4.03%	4.03%	5.59%	5.59%	5.53%	5.53%
Oct-09	1,036.19	4.20%	4.20%	5.69%	5.69%	5.58%	5.58%
Nov-09	1,095.63	4.06%	4.06%	5.33%	5.33%	5.28%	5.28%
Dec-09	1,115.10	4.58%	4.58%	6.41%	6.41%	5.03%	5.03%
Jan-10	1,073.87	4.41%	4.41%	6.03%	6.03%	5.18%	5.18%
Feb-10	1,104.49	4.41%	4.41%	5.98%	5.98%	5.04%	5.04%
Mar-10	1,169.43	4.58%	4.58%	6.38%	6.38%	4.82%	4.82%
Apr-10	1,186.69	4.37%	4.37%	6.22%	6.22%	5.26%	5.26%
May-10	1,089.41	4.07%	4.07%	5.57%	5.57%	5.43%	5.43%
Jun-10	1,030.71	3.76%	4.00%	6.36%	6.12%	5.71%	5.47%
Jul-10	1,101.60	3.77%	4.00%	6.35%	6.12%	5.35%	5.12%
Aug-10	1,049.33	3.27%	4.00%	6.85%	6.12%	5.70%	4.97%
Sep-10	1,141.20	3.41%	4.00%	6.71%	6.12%	5.83%	5.24%
Oct-10	1,183.26	3.67%	4.00%	6.44%	6.12%	5.47%	5.14%
Nov-10	1,180.55	3.80%	4.00%	6.31%	6.12%	5.49%	5.29%
Dec-10	1,257.64	4.14%	4.14%	5.48%	5.48%	5.76%	5.76%

Source: www.damodaran.com and Duff & Phelps calculations

As our focus is valuation of businesses and investments by businesses, the *conditional* ERP will generally be of less importance over time, and once the worst of the crisis is behind us we can fall back on using the long-term, *unconditional* ERP in developing discount rates. But as of the beginning of 2011, it is this author's opinion that we have not returned to a period of economic stability and the appropriate *conditional* ERP is at the higher end of the long-term range. This can be depicted by looking at the long-term relationship of the pricing of the S&P 500 in Exhibit 7. This exhibit maps the total returns (TR) obtained today by investing $1 in the S&P 500 index in January 1953.

Exhibit 7: S&P 500 Index from January 1953- December 2010

Legend: Log(S&P 500 TR) Linear (Log(S&P 500 TR))
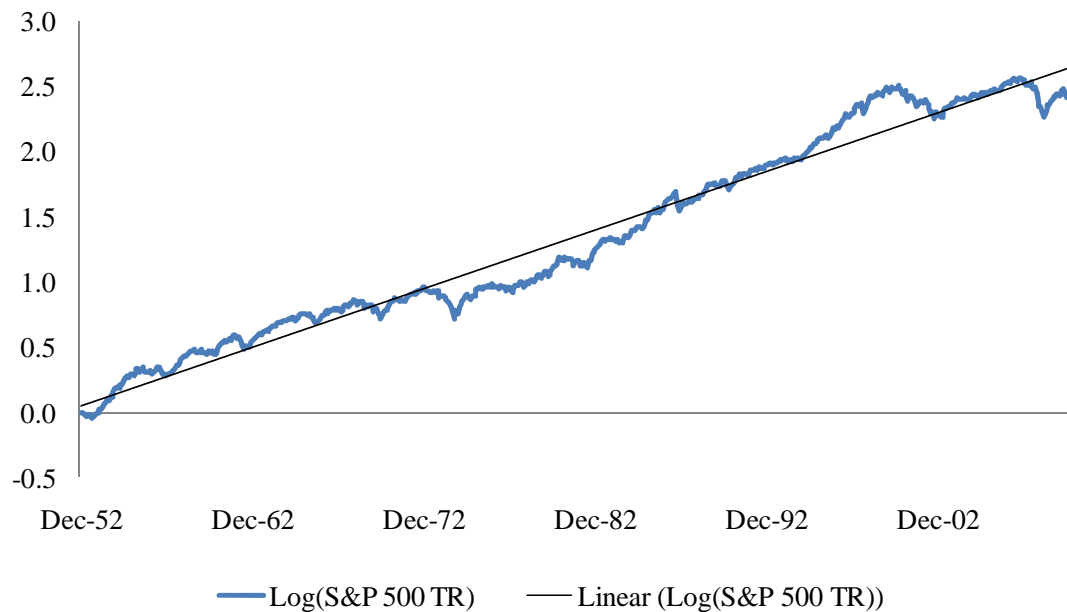
MATCHING THE CONDITIONAL ERP WITH THE HISTORIC REALIZED RISK PREMIUMS IN THE DUFF & PHELPS RISK PREMIUM REPORT

For those who use the Duff & Phelps *Risk Premium Report* in estimating the cost of equity capital, the conditional ERP estimate should also be considered in using the *Size Study* exhibits and the *Risk Study* exhibits for use in the build-up method. In deriving the average realized risk premiums reported in their exhibits, the Duff & Phelps studies use realized risk premiums since 1963.

If one's estimate of the ERP on a forward-looking basis were materially different from the average historical realized premium since 1963, it may be reasonable to assume that the other historical portfolio returns reported would differ on a forward-looking basis by approximately a similar differential. For example, at the end of 2010, the average realized premium since 1963 of the market equaled 4.3%. This is the market risk premium, RP_m, inherent in the *Size Study* exhibits and the *Risk Study* exhibits.

The risk premiums displayed in the *Size Study* exhibits for the build-up method equals RP_{m+s} (RP_m, the market risk premium, plus RP_s, a size premium). Similarly, the risk premiums displayed in the *Risk Study* exhibits for the build-up method equals RP_{m+s+u}, (RP_m plus RP_s plus RP_u, the unsystematic or company-specific premium).

Assume that one adopts this author's estimate of the ERP at the end of 2010 of 5.5%. That difference (1.2% = 5.5% minus 4.3%) can be added to the average risk premium, RP_{m+s}, for the portfolio (observed or "smoothed") that matches to the size of the

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subject company to arrive at an adjusted "forward-looking" risk premium for the subject company (matching one's forward-looking ERP estimate). Then this forward-looking risk premium can be added to the risk-free rate as of the valuation date to estimate an appropriate cost of equity capital for the subject company. This estimate of the cost of equity capital is before consideration of any risk premium attributable to the specific company, RP_u ,or to the industry.

Similarly, that difference (1.2% = 5.5% minus 4.3%) can be added to the average risk premium, RP_{m+s+u}, for the portfolio (observed or "smoothed") that matches to the risk of the subject company to arrive at an adjusted "forward-looking" risk premium for the subject company (matching the forward-looking ERP estimate). Then this forward-looking risk premium can be added to the risk-free rate as of the valuation date to estimate an appropriate cost of equity capital for the subject company.

CONCLUDING REMARKS

The results presented in this chapter do not point to a single estimate of ERP. They point to a conclusion that the normal ERP is in a range that is consistent with the principle that investor's expectations are not homogeneous, amongst themselves and over time. Different investors have different cash flow expectations and future assessments of the risk that those cash flows will be realized. You can think of this in terms of the dividend discount model; numerous combinations of expected future cash flows and discount rates equate to the existing price.[31]

Estimating the ERP is one of the most important issues when you estimate the cost of capital of a subject business or project. You need to consider a variety of alternative sources, including examining realized returns over various periods and employing forward-looking estimates such as those implied from projections of future prices, dividends, and earnings.

What is a reasonable estimate of the *unconditional* or long-range ERP? While giving consideration to long-run historical arithmetic average of realized risk premiums, this author concludes that the post-1925 historical arithmetic average of one-year realized risk premiums as reported in the *SBBI Yearbook* results in an expected unconditional ERP estimate that is too high. This author also believes that the common practice of mechanically estimating the cost of equity capital based on the reported realized risk premiums should be abandoned. For example, the decline in the ERP estimate from December 2007 to December 2008 if one mechanically applies this data, results in nonsensical estimate of the cost of equity capital as of December 31, 2008.

Some practitioners express dismay over the necessity of considering a forward ERP since that would require changing their current "cookbook" practice of relying

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[31] Pablo Fernandez, "Equity Premium: Historical, Expected, Required and Implied," Working paper, February 18, 2007: 28.

exclusively on the post-1925 historical arithmetic average of one-year realized premiums reported in the *SBBI Yearbook* as their estimate of the ERP. Remember that valuation is a forward-looking concept, not an exercise in mechanical application of formulas. Correct valuation requires applying value drivers reflected in today's market pricing. One needs to mimic the market. The entire valuation process is based on applying reasoned judgment to the evidence derived from economic, financial, and other information and arriving at a well-reasoned opinion of value. Estimating the ERP is no different.

After considering the evidence, a reasonable long-term estimate of the *normal* or *unconditional* ERP should be in the range of 3.5% to 6%. This estimate is consistent with the *SBBI Yearbook* supply side ERP estimate (5.2% as of the beginning of 2010) minus the WWII Interest Rate bias (due to the interest rate accord from 1942 through 1951) or 4.7%.

This conclusion is consistent with the reasoning of the Delaware Chancery Court in *Global GT LP and Global GT LTD v. Golden Telecom, Inc. (Del. Court of Chancery, April 23, 2010).*

Golden's expert selected 7.1%, the long-term "historical" ERP from Morningstar's *2008 Ibbotson SBBI Valuation Yearbook* (based on realized risk premiums over the selected time period, in this case 1926−2007).

The petitioners' expert, on the other hand, selected an ERP of 6.0% "… based on his teaching experience, the relevant academic and empirical literature, and the 'supply side' ERP reported in the *2007 Ibbotson Yearbook*."

In regards to the selection of ERP, the Court rejected the use of the Morningstar/Ibbotson ERP of 7.1% and instead chose the lower estimate of 6% citing the "… wealth of recent academic and professional writings that supports a lower ERP estimate…" that were put forth in the hearing. The Court went on to say that the "…relevant professional community has mined additional data and pondered the reliability of past practice and come, by a healthy weight of reasoned opinion, to believe that a different practice should become the norm..."

The Court continued:

> *"… to cling to the Ibbotson Historic ERP blindly gives undue weight to Ibbotson's use of a single data set. 1926 might have been a special year because, for example, that was the year when Marilyn Monroe was born, but it has no magic as a starting point for estimating long-term equity returns.…*
>
> If one is going to use an approach that simply involves taking into account historical equity returns, then one has to consider that very well-respected scholars have made estimates in peer-reviewed studies of long-term equity returns for periods much longer than Ibbotson, and have come to an estimate of the ERP that is closer to the supply side rate Ibbotson himself now publishes as a reliable ERP for use in a DCF valuation…

In arguing that continued use of the simple Historic ERP is unjustifiable, (the petitioners' expert) has substantial support in the professional and academic valuation literature. Shannon Pratt, for example, has urged his readers who still use an ERP of 7% to 'immediately make a downward adjustment to reflect recent research results,' and has written that the 'ERP as of the beginning of 2007 should be in the range of 3.5% to 6%'"

The Delaware Chancery Court handles more valuation matters than any other court. Its decisions have been cited by other courts and this author would expect that other courts will likely consider this decision in their future deliberations.

In regards to forward-looking ERP estimates as of December 31, 2010, this author concludes that given the risks still present in the economy as we begin 2011, that the *conditional* ERP should be at the upper-end of the long-term range relative to long-term U.S. government bond yields. Therefore, benchmarked against the actual 4.14% yield on 20-year government bonds as of December 31, 2010 (which we will assume is approximately equal to a *normalized*, long-term U.S. government bond yield), the ERP of 5.5% appears reasonable.