Missouri Gas Energy
Authorized Returns on Common Equity and
Common Equity Ratios for Gas Distribution Companies
for the period October 2004 through September 2006

Company	1 Date	2 Jurisdiction	3 Authorized Return on Common Equity	4 Authorized Common Equity Ratio	5 Moody's A Rated Public Utility Bond Yields (7)	6 Spread between Authorized Return on Common Equity and Moody's A Rated Public Utility Bond Yields (8)
Chattanooga Gas	10/20/04	TN	10.20 %	35.50 %	6.14 %	4.06 %
Indiana Gas	11/30/04	IN	10.60 (1)	50.06	5.94	4.66
Yankee Gas Service	12/08/04	CT	9.90 (1)	47.90	5.94	3.96
Wisconsin Public Service	12/21/04	WI	11.50	57.35	5.97	5.53
Madison Gas and Electric	12/22/04	WI	11.50	57.64	5.97	5.53
Centerpoint Energy Arkla	12/28/04	OK	10.25 (1)	49.86	5.97	4.28
Puget Sound Energy	02/18/05	WA	10.30	43.00	5.97	4.33
SEMCO Energy Gas	03/29/05	MI	11.00 (1)	--	5.61	5.39
Vectren Energy Delivery of Ohio	04/13/05	OH	10.60	48.10 (5)	5.61	4.99
Michigan Consolidated Gas	04/28/05	MI	11.00	39.31 (2, 3)	5.83	5.17
AmerenIP - Formerly Illinois Power	05/17/05	IL	10.00 (1)	53.09	5.83	4.17
CenterPoint Energy Minnegasco	06/08/05	MN	10.18	50.27	5.64	4.54
Atlanta Gas Light	06/10/05	GA	10.90 (1)	-- (6)	5.64	5.26
Entergy Gulf States	07/06/05	LA	10.50 (1)	47.52	5.53	4.97
Wisconsin Power and Light	07/19/05	WI	11.50	61.75	5.53	5.97
Northern States Power	08/11/05	MN	10.40 (1)	50.24 (3)	5.40	--
CenterPoint Energy Arkansas Gas	09/19/05	AR	9.45	31.80 (2)	5.51	--
Northern Illinois Gas - Now Nicor Gas	09/30/05	IL	10.51	56.37	5.50	--
Oklahoma Natural Gas	10/04/05	OK	9.90 (1)	46.76	5.50	4.40
Interstate Power & Light	10/14/05	IA	10.40 (1)	49.35 (3)	5.50	--
South Carolina Electric & Gas	10/31/05	SC	10.25 (1)	50.75	5.52	4.73
Arkansas Western Gas	11/02/05	AR	9.70	33.03 (2)	5.52	--
Bay State Gas	11/30/05	MA	10.00	53.95	5.79	4.21
Arkansas Oklahoma Gas	12/09/05	AR	9.70	41.04 (2, 5)	5.79	3.91
Madison Gas and Electric	12/12/05	WI	11.00	56.65	5.79	5.21
Pacific Gas and Electric	12/16/05	CA	11.35	52.00	5.79	--
San Diego Gas & Electric	12/16/05	CA	10.70	49.00	5.79	4.91
Baltimore Gas & Electric	12/21/05	MD	11.00	46.40	5.88	--
Avista Corporation	12/21/05	WA	10.40 (1)	40.00	5.88	4.52
Wisconsin Public Service	12/22/05	WI	11.00	59.73	5.88	--
Union Light, Heat & Power	12/22/05	KY	10.20	54.45	5.88	4.32
Southern Connecticut Gas	12/28/05	CT	10.00 (1)	51.28	5.88	--
Northern States Power	01/05/06	WI	11.00	53.66	5.88	5.12
Wisconsin Electric Power	01/25/06	WI	11.20	56.34	5.80	--
Wisconsin Gas	01/25/06	WI	11.20	50.20	5.80	5.40
Public Service Co. of Colorado	02/03/06	CO	10.50 (1)	55.49	5.80	4.70
Southwest Gas	02/23/06	AZ	9.50	40.00 (4)	5.71	3.79
Aquila	03/01/06	IA	10.40 (1)	51.39 (5)	5.71	4.69
Sierra Pacific Power	04/26/06	NV	10.60	40.76	5.98	4.62
LS Gas Service / Trans LA Gas	05/25/06	LA	10.40 (1)	48.00 (4)	6.29	4.11
Central Hudson Gas & Electric	07/24/06	NY	9.60	45.00	6.40	3.20
Average			10.49 %	48.90 %	5.79 %	4.67 %
Average of Litigated Cases			10.58 %	48.61 %	5.81 %	4.71 %

Prospective Yield on A Rated Public Utility Bonds (9)	6.39 %
Average Spread between Authorized Returns on Common Equity and Moody's A Rated Public Utility Bond Yields	4.71
Reality Check Indicated Common Equity Cost Rate	11.10 %

Notes:
(1) Order followed stipulation or settlement by the parties. Decision particulars not necessarily precedent-setting or specifically adopted by the regulatory body.
(2) Capital structure includes cost-free items or tax credit balances at the overall rate of return.
(3) Interim rates implemented prior to issuance of final order.
(4) Hypothetical capital structure utilized.
(5) Estimated
(6) Revised
(7) Actual A rated yield represents the yield of the previous month if the order was issued on or after the 21st of each month, or the yield of two months prior if the order was issued on or before the 20th of each month. For example, the yield for 10/20/04 is the A rated Public Utility yield for August 2004. On the other hand, the yield for 11/30/04 is the A rated Public Utility yield for October 2004.
(8) Column 3 - Column 5.
(9) From page 1 of Schedule FJH-28 of this Exhibit.

Source of Information: Major Rate Case Decisions - January 2004 - December 2005
Regulatory Focus - Supplemental Studies, January 12, 2006
Major Rate Case Decisions - January 2006 - September 30, 2006
Regulatory Focus - Supplemental Studies, October 5, 2006
Published by Regulatory Research Associates, Inc., An SNL Energy Company
Mergent Bond Record Monthly Update, September 2006, Vol. 73, No. 9

Current Authorized Returns on Common Equity and Common Equity Ratios for
Witness Murray's Proxy Group of Six Comparable Natural Gas Distribution Companies for Missouri Gas Energy
and Two Natural Gas Distribution Companies Identified by Witness Murray as having operations in Missouri
As of October 31, 2006

Witness Murray's Proxy Group of Six Comparable Natural Gas Distribution Companies for Missouri Gas Energy	Authorized Returns on Equity (1)	Authorized Common Equity Ratios (2)	Order Date (3)
AGL Resources Inc. (4)	10.47 %	44.93 %	--
New Jersey Resources Corp.	11.50	52.74	01/94
Northwest Natural Gas Company (5)	10.20	49.50	--
Piedmont Natural Gas Co., Inc. (6)	11.15 (9)	51.14	--
South Jersey Industries, Inc.	10.00	46.00	07/04
WGL Holdings, Inc. (7)	10.62	50.92	--
Average	10.66 %	49.20 %	
Two Natural Gas Distribution Companies Identified by Witness Murray as Having Operations in Missouri			
Atmos Energy Corporation (8)	10.89 %	48.90 %	--
The Laclede Group, Inc.	-- (10)	--	10/05
Average	10.89 %	48.90 %	

Notes: (1) Most recent reported state-level allowed return rate on common equity (ROE). ROE for companies operating in multiple jurisdictions are averages.
(2) Most recent authorized common equity ratios.
(3) The date of the commission order authorizing reported ROE. For companies operating in multiple jurisdictions, no date is given because the reported ROE is an average derived from multiple commission orders issued at different times.
(4) AGL Resources through its major operating subsidiaries, Atlanta Gas Light, Chattanooga Gas Company, City Gas of Florida, Elizabethtown Gas Company and Virginia Natural Gas, provides gas distribution services in the states of Georgia, Tennessee, Florida, New Jersey and Virginia, respectively.
(5) Northwest Natural Gas Company operates as itself in the states of Oregon and Washington.
(6) Piedmont Natural Gas as itself and through its two major operating subsidiaries, North Carolina Natural Gas and Nashville Gas, provides gas distribution services in the states of South Carolina, North Carolina and Tennessee.
(7) WGL Holdings, Inc., through its operating subsidiary, Washington Gas Light Company, provides gas distribution services in the District of Columbia, Maryland and Virginia.
(8) Atmos Energy Corporation through its various operating subsidiaries, all of which are now doing business as Atmos energy Corporation, provides gas distribution services in the following states: Colorado, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Tennessee, Texas and Virginia.
(9) The averages for Piedmont Natural Gas Company are based on the most recent order for North Carolina Natural Gas, and Piedmont's order of its own operations in North Carolina, which was issued in October 2002. Please note that the order from October 2002 is not the most recent order, which was issued in November 2005. However, since such order is silent regarding ROE issues, the order from 2002 was used for the study.
(10) The most recent order for Laclede Gas Company, which is Laclede Groups' operating subsidiary in the state of Missouri, is silent regarding ROE issues. Also, the previous order from October 2002 was silent regarding ROE issues.

Source of Informati Focus Notes
Regulatory Focus - January 1, 1998 through October 31, 2006
Major Rate Case Decisions - January 1990 - December 2005
Regulatory Focus - Supplemental Studies, October 5, 2006
Major Rate Case Decisions - January 2006 - September 30, 2006
Regulatory Focus - Supplemental Studies, October 5, 2006
Major Rate Case Decisions - January 2004 - December 2005
Regulatory Focus - Supplemental Studies, January 12, 2006
Major Rate Case Decisions - January 2003 - December 2004
Regulatory Focus - Supplemental Studies, January 14, 2005
Published by Regulatory Research Associates, Inc., An SNL Energy Company
AUS Monthly Utility Report - December 2006
Published by AUS Utility Reports
Company Annual Forms 10-Ks, 10-Qs, Company Provided

REGULATORY FINANCE:

UTILITIES' COST OF CAPITAL

Roger A. Morin, PhD

in collaboration with
Lisa Todd Hillman

1994
PUBLIC UTILITIES REPORTS, INC.
Arlington, Virginia

First Printing, March 1994
Library of Congress Catalog Card No. 94-66184
ISBN 0-910325-46-4

Printed in the United States of America

A few points regarding consolidated capital structures are in order. First, the debt of the consolidated company is the sum of the holding company's debt and the subsidiary's debt. Hence, the consolidated cost of debt is a weighted cost of parent and subsidiary debt. Second, the cost of equity of the holding company is identical to that of the consolidated entity. This is because the value of the parent holding company's stock expressly recognizes subsidiary income to parent investment if accounted on an equity basis. Accounting on the equity basis treats subsidiary net income as income to the parent's equity investment whether such income is received as dividends or not. The parent's retained earnings necessarily reflect this. Accordingly, the cost of equity associated with market valuation of holding company equity is also the cost of equity for the consolidated network. Third, a consolidated capital structure is equivalent to a double-levered capital structure when all the parent's subsidiaries have the same amounts of leverage. Lastly, some analysts contend that assignment of the consolidated weighted cost to the equity cost of the subsidiary is equivalent to imputation of the holding company's equity cost. This can only be true in the highly unlikely event that the costs of consolidated debt and equity are exactly equal, or, if they are unequal, that the differences in weights between the consolidated and the subsidiary capital structure exactly offset the differences in costs. This is proven formally in Morin and Andrews (1993).

20.2 Critique of Double Leverage

Adherents to the double leverage calculation argue that the true cost of capital to a utility subsidiary is the weighted cost of its own debt and the weighted cost of the parent's debt and equity funding. Moreover, unless the subsidiary's equity is assigned the parent's weighted cost of capital, parent shareholders will reap abnormally high returns. Although persuasive on the surface, these arguments conceal serious conceptual and practical problems. Moreover, the validity of double leverage rests on questionable assumptions.

The flaws associated with the double leverage approach have been discussed thoroughly in the following academic literature. Pettway and Jordan (1983) and Beranek and Miles (1988) pointed out the flaws in the double leverage argument, particularly the excess return argument, and also demonstrated that the stand-alone method is a superior procedure. Rozeff (1983) discussed the ratepayer cross-subsidies of one subsidiary by another when employing double leverage. Lerner (1973) concluded that the returns granted an equity investor must be based on the risks to which the investor's capital is exposed and not on the investor's source of funds.

Theoretical Issues

The double leverage approach contradicts the core of the cost of capital concept. Financial theory clearly establishes that the cost of equity is the risk-adjusted opportunity cost to the investors and not the cost of the specific capital sources employed by investors. The true cost of capital depends on the use to which the capital is put and not on its source. The *Hope* and *Bluefield* doctrines have made clear that the relevant considerations in calculating a company's cost of capital are the alternatives available to investors and the returns and risks associated with those alternatives. The specific source of funding and the cost of those funds to the investor are irrelevant considerations.

Carrying the double leverage standard to its logical conclusion leads to even more unreasonable prescriptions. If the common shares of the subsidiary were held by both the parent and by individual investors, the equity contributed by the parent would have one cost under the double leverage computation while the equity contributed by the public would have another. This is clearly illogical. Or, does double leverage require tracing the source of funds used by each individual investor so that its cost can be computed by applying double leverage to each individual investor? Of course not! Equity is equity, irrespective of its source, and the cost of that equity is governed by its use, by the risk to which it is exposed.

For example, if an individual investor borrows money at the bank at an after-tax cost of 8% and invests the funds in a speculative oil exploration venture, the required return on the investment is not the 8% cost but rather the return foregone in speculative projects of similar risk, say 20%. Yet, under the double leverage approach, the individual's fair return on this risky venture would be 8%, which is the cost of the capital source, and not 20%, which is the required return on investments of similar risk. Double leverage implies that for all investors who inherited stock or received stock as a gift, the allowed return on equity would be zero, since the cost of the stock to the investors is zero. It also implies that if, tomorrow morning, a subsidiary were sold to a company with a higher cost of capital than the parent, the subsidiary's cost of equity would suddenly become higher as a result of the change in ownership. If we assumed that the double leverage concept were appropriate, we would also have to assume that the day following AT&T's divestiture in 1984, the cost of equity of the newly created Bell Regional Holding Companies suddenly rose by a substantial amount. This is logically absurd, as it is the use of capital that governs its cost, and not its source. For example, if a subsidiary with a double leverage cost of equity of 12% were sold to another company with a higher cost of capital of, for example, 15%, would regulation alter the return accordingly just because of the change in ownership?

If so, the same utility with the same assets and providing the same service under the new management would have a higher cost of service to ratepayers because of the transfer of ownership. Clearly, if a utility subsidiary were allowed an equity return equal to the parent's weighted cost of capital while the same utility were allowed a fair, presumably higher, return were it not part of a holding company complex, an irresistible incentive to dissolve the holding company structure would exist in favor of the one-copany operating utility format. The attendant benefits of scale economies and diversification would then be lost to the ratepayers.

The cost of capital is governed by the risk to which to the capital is exposed and not by the cost of those funds or whether it is they were obtained from bondholders or common shareholders. The identity of the subsidiary's shareholders should have no bearing on its cost of equity because it is the risk to which the subsidiary's equity is exposed that governs its cost of money, not whether it is borrowed from bondholders or sold to common shareholders for issued shares. Had the parent company not been in the picture, and had the subsidiary's stock been widely held by the public, the subsidiary would be entitled to a return that would fully cover the cost of both its debt and equity.

Just as individual investors require different returns from different assets in managing their personal affairs, why should regulation cause parent companies making investment decisions on behalf of their shareholders to act any differently? A parent company normally invests money in many operating companies of varying sizes and varying risks. These operating subsidiaries pay different rates for the use of investor capital, such as long-term debt capital, because investors recognize the differences in capital structure, risk, and prospects between the subsidiaries. Yet, the double leverage calculation would assign the same return to each activity, based on the parent's cost of capital. Investors do recognize that different subsidiaries are exposed to different risks, as evidenced by the different bond ratings and cost rates of operating subsidiaries. The same argument carries over to common equity. If the cost rate for debt is different because the risk is different, the cost rate for common equity is also different, and the double leverage adjustment should not obscure this fact.

The double leverage concept is at odds with the opportunity cost concept of economics. According to this principle of economics, the cost of any resource is the cost of an alternative foregone. The cost of investing funds in an operating utility subsidiary is the return foregone on investments of similar risk. If the fair risk-adjusted return assigned by the market on utility investments is 15%, and the regulator assigns a return less than 15% because of a double leverage calculation, there is no incentive or defensible reason for a parent holding company to invest in that utility.

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$$K_e = \rho + [\rho - i(1 - T)]\, B/S$$

$$12\% = \rho + [\rho - .08\,(1 - .40)].35/.65$$

from which $\rho = 9.48\%$. Inserting the latter value of ρ in the equation and using the new capital structure, the revised cost of equity is obtained:

$$K_e = .0948 + [.0948 - .08\,(1 - .40)]\,.40/.60 = .1260 = 12.60\%$$

Still another way to tackle the problem is to compute an unlevered beta, as in Example 1 of Chapter 14 using Equation 14-1, then relever the beta with the new capital structure. The CAPM formula is then employed to measure the cost of equity under the new capital structure.

The major thrust of this example is that an estimate of cost of capital on the basis of an observed capital structure is erroneous if the capital structure is expected to change. The revised cost of equity can be estimated with three methodologies: the Modigliani-Miller, Miller, and the levered beta-CAPM equations.

Comparable Groups

A measurement problem similar to that of the previous numerical example can arise when using the cost of equity capital of other companies as a check against estimates based on the market data for the utility itself. If the group of comparable companies has been carefully designed using adequate risk filters for both business risk and capital structure differences, this will not be a problem. But if substantial capital structure differences exist between the utility and the reference companies, all else being constant, the same remedial correction as in the above example is necessary, using Equation 17-7 and the average capital structure of the reference group to compute the cost of capital for an all-equity firm, and the subject utility's own capital structure to compute its cost of capital using the same equation in reverse. Here also the unlevered-relevered beta approach discussed in Chapter 14 and illustrated in the General Gas case example can be used to adjust the results of the comparable groups for differences in leverage.

Hypothetical Capital Structures

Another implication of leverage theory is that cost of capital estimates based on a utility's current market data and the capital structure expected by investors cannot be applied to any other capital structure without the adjustment described in previous examples. Regulators frequently assign hypothetical, or deemed, capital structures to utility companies for purposes of revenue requirements computation. This procedure is appropriate only if the cost of equity estimated from current investor expectations is revised to take into account the new capital structure prescribed by the regulator. The cost of equity estimate based on the actual capital structure is no longer consistent with the new capital structure. Of course, the imposition of an hypothetical capital structure presupposes that the existing actual capital structure is not optimal in the first place.

If it is assumed for a moment that it is proper to impute a capital structure consisting of substantially more debt, the higher common equity cost rate related to a changed common equity ratio must be reflected in the approach. In ascribing a capital structure different from the company's actual capital structure, which, for example, imputes a higher debt amount, the repercussions on equity costs must be recognized. As discussed in previous chapters, it is a rudimentary tenet of basic finance that the greater the amount of financial risk borne by common shareholders, the greater the return required by shareholders in order to be compensated for the added financial risk imparted by the greater use of senior debt financing. In other words, the greater the debt ratio, the greater is the return required by equity investors. Both the cost of incremental debt and the cost of equity must be adjusted to reflect the additional risk associated with the hypothetical capital structure. The arguments work in reverse if a hypothetical capital structure consisting of less debt than the actual were to be imputed.[2]

In summary, it is logically inconsistent to combine a fictitious capital structure with a return on equity estimate that excludes the effects of the proposed capital structure. By omitting the repercussions on equity costs and debt costs, a serious conceptual error would be committed in determining the cost of equity capital.

A similar problem arises in the double leverage approach to computing equity costs. If a cost of equity estimate based on a given capital structure is not modified to account for the double levered capital structure used by the regulator to determine the allowed return, a distorted measure of capital cost results. The double leverage issue is discussed at length in Chapter 20.

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2 The use of hypothetical capital structures necessarily entails the use of hypothetical equity costs, hypothetical debt costs, hypothetical interest payments, and hypothetical taxation.

Stocks, Bonds, Bills, and Inflation

SBBI

Valuation Edition
2006 Yearbook

ibbotson

The Market Benchmark and Firm Size

Although not restricted to include only the 500 largest companies, the S&P 500 is considered a large company index. The returns of the S&P 500 are capitalization weighted, which means that the weight of each stock in the index, for a given month, is proportionate to its market capitalization (price times number of shares outstanding) at the beginning of that month. The larger companies in the index therefore receive the majority of the weight. The use of the NYSE "Deciles 1–2" series results in an even purer large company index. Yet many valuation professionals are faced with valuing small companies, which historically have had different risk and return characteristics than large companies. If using a large stock index to calculate the equity risk premium, an adjustment is usually needed to account for the different risk and return characteristics of small stocks. This will be discussed further in Chapter 7 on the size premium.

The Risk-Free Asset

The equity risk premium can be calculated for a variety of time horizons when given the choice of risk-free asset to be used in the calculation. The *Stocks, Bonds, Bills, and Inflation Yearbook* provides equity risk premia calculations for short-, intermediate-, and long-term horizons. The short-, intermediate-, and long-horizon equity risk premia are calculated using the income return from a 30-day Treasury bill, a 5-year Treasury bond, and a 20-year Treasury bond, respectively.

Although the equity risk premia of several horizons are available, the long-horizon equity risk premium is preferable for use in most business-valuation settings, even if an investor has a shorter time horizon. Companies are entities that generally have no defined life span; when determining a company's value, it is important to use a long-term discount rate because the life of the company is assumed to be infinite. For this reason, it is appropriate in most cases to use the long-horizon equity risk premium for business valuation.

20-Year versus 30-Year Treasuries

Our methodology for estimating the long-horizon equity risk premium makes use of the income return on a 20-year Treasury bond; however, the Treasury currently does not issue a 20-year bond. The 30-year bond that the Treasury recently began issuing again is theoretically more correct due to the long-term nature of business valuation, yet Ibbotson Associates instead creates a series of returns using bonds on the market with approximately 20 years to maturity. The reason for the use of a 20-year maturity bond is that 30-year Treasury securities have only been issued over the relatively recent past, starting in February of 1977, and were not issued at all through the early 2000s.

The same reason exists for why Ibbotson does not use the 10-year Treasury bond; that is, a long enough history of market data is not available for 10-year bonds. Ibbotson Associates has persisted in using a 20-year bond to keep the basis of the time series consistent.

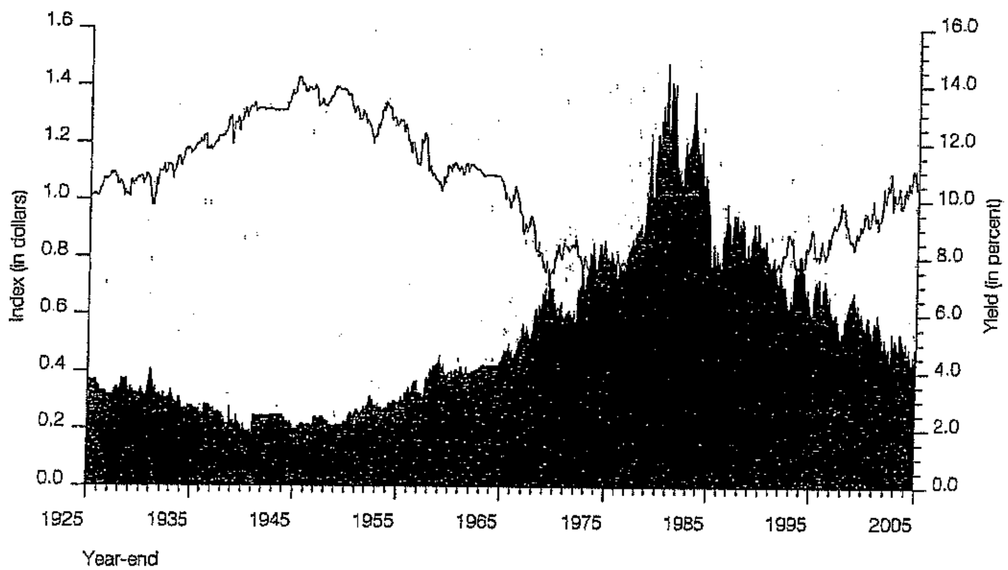
Income Return

Another point to keep in mind when calculating the equity risk premium is that the income return on the appropriate-horizon Treasury security, rather than the total return, is used in the calculation. The total return is comprised of three return components: the income return, the capital appreciation return, and the reinvestment return. The income return is defined as the portion of the total return that results from a periodic cash flow or, in this case, the bond coupon payment. The capital appreciation return results from the price change of a bond over a specific period. Bond prices generally change in reaction to unexpected fluctuations in yields. Reinvestment return is the return on a given month's investment income when reinvested into the same asset class in the subsequent months of the year. The income return is thus used in the estimation of the equity risk premium because it represents the truly riskless portion of the return.[2]

Yields have generally risen on the long-term bond over the 1926–2005 period, so it has experienced negative capital appreciation over much of this time. This trend has turned around since the 1980s, however. Graph 5-2 illustrates the yields on the long-term government bond series compared to an index of the long-term government bond capital appreciation. In general, as yields rose, the capital appreciation index fell, and vice versa. Had an investor held the long-term bond to maturity, he would have realized the yield on the bond as the total return. However, in a constant maturity portfolio, such as those used to measure bond returns in this publication, bonds are sold before maturity (at a capital loss if the market yield has risen since the time of purchase). This negative return is associated with the risk of unanticipated yield changes.

Graph 5-2

Long-term Government Bond Yields versus Capital Appreciation Index
1925–2005



2 Please note that the appropriate forward-looking measure of the riskless rate is the yield to maturity on the appropriate-horizon government bond. This differs from the riskless rate used to measure the realized equity risk premium historically. Chapter 4 includes a thorough discussion of riskless rate selection in this context.

For example, if bond yields rise unexpectedly, investors can receive a higher coupon payment from a newly issued bond than from the purchase of an outstanding bond with the former lower-coupon payment. The outstanding lower-coupon bond will thus fail to attract buyers, and its price will decrease, causing its yield to increase correspondingly, as its coupon payment remains the same. The newly priced outstanding bond will subsequently attract purchasers who will benefit from the shift in price and yield; however, those investors who already held the bond will suffer a capital loss due to the fall in price.

Anticipated changes in yields are assessed by the market and figured into the price of a bond. Future changes in yields that are not anticipated will cause the price of the bond to adjust accordingly. Price changes in bonds due to unanticipated changes in yields introduce price risk into the total return. Therefore, the total return on the bond series does not represent the riskless rate of return. The income return better represents the unbiased estimate of the purely riskless rate of return, since an investor can hold a bond to maturity and be entitled to the income return with no capital loss.

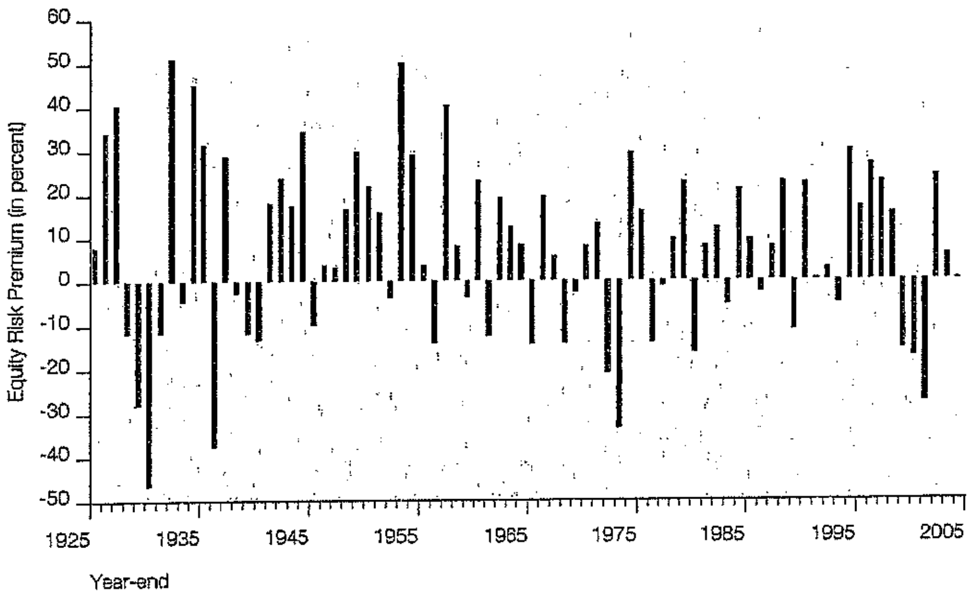
Arithmetic versus Geometric Means

The equity risk premium data presented in this book are arithmetic average risk premia as opposed to geometric average risk premia. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number. This is because both the CAPM and the building block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance, since it represents the compound average return.

The argument for using the arithmetic average is quite straightforward. In looking at projected cash flows, the equity risk premium that should be employed is the equity risk premium that is expected to actually be incurred over the future time periods. Graph 5-3 shows the realized equity risk premium for each year based on the returns of the S&P 500 and the income return on long-term government bonds. (The actual, observed difference between the return on the stock market and the riskless rate is known as the realized equity risk premium.) There is considerable volatility in the year-by-year statistics. At times the realized equity risk premium is even negative.

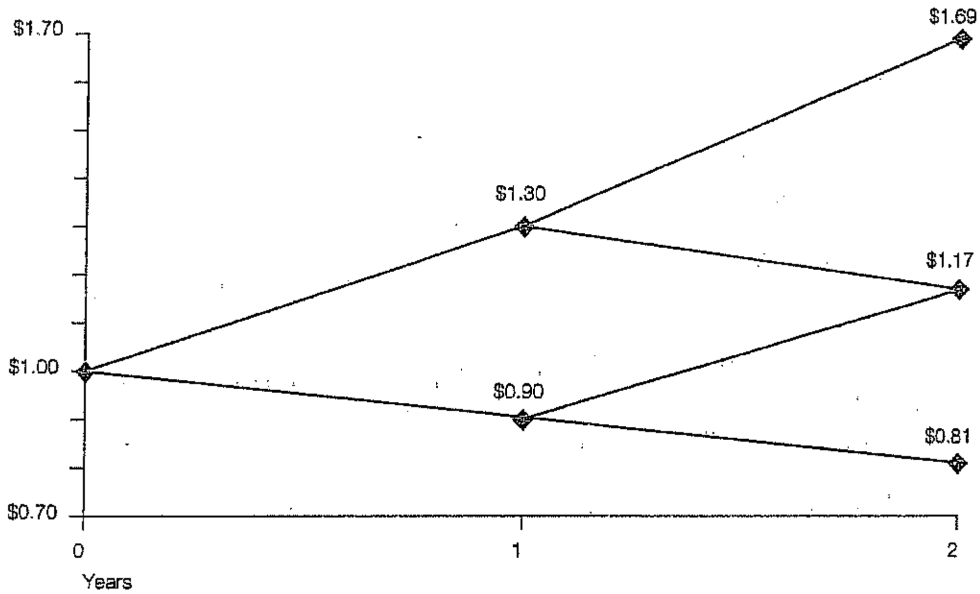
Graph 5-3

Realized Equity Risk Premium Per Year
1926–2005



To illustrate how the arithmetic mean is more appropriate than the geometric mean in discounting cash flows, suppose the expected return on a stock is 10 percent per year with a standard deviation of 20 percent. Also assume that only two outcomes are possible each year— +30 percent and –10 percent (i.e., the mean plus or minus one standard deviation). The probability of occurrence for each outcome is equal. The growth of wealth over a two-year period is illustrated in Graph 5-4.

Graph 5-4
Growth of Wealth Example



The most common outcome of \$1.17 is given by the geometric mean of 8.2 percent. Compounding the possible outcomes as follows derives the geometric mean:

$$[(1+0.30)\times(1-0.10)]^{1/2}-1=0.082$$

However, the expected value is predicted by compounding the arithmetic, not the geometric, mean. To illustrate this, we need to look at the probability-weighted average of all possible outcomes:

(0.25 × \$1.69) =	\$0.4225
+ (0.50 × \$1.17) =	\$0.5850
+ (0.25 × \$0.81) =	\$0.2025
Total	\$1.2100

Therefore, \$1.21 is the probability-weighted expected value. The rate that must be compounded to achieve the terminal value of \$1.21 after 2 years is 10 percent, the arithmetic mean:

$$\$1\times(1+0.10)^2=\$1.21$$

The geometric mean, when compounded, results in the median of the distribution:

$$\$1\times(1+0.082)^2=\$1.17$$

The arithmetic mean equates the expected future value with the present value; it is therefore the appropriate discount rate.

Appropriate Historical Time Period

The equity risk premium can be estimated using any historical time period. For the U.S., market data exists at least as far back as the late 1800s. Therefore, it is possible to estimate the equity risk premium using data that covers roughly the past 100 years.

The Ibbotson Associates equity risk premium covers the time period from 1926 to the present. The original data source for the time series comprising the equity risk premium is the Center for Research in Security Prices. CRSP chose to begin their analysis of market returns with 1926 for two main reasons. CRSP determined that the time period around 1926 was approximately when quality financial data became available. They also made a conscious effort to include the period of extreme market volatility from the late twenties and early thirties; 1926 was chosen because it includes one full business cycle of data before the market crash of 1929. These are the most basic reasons why Ibbotson Associates' equity risk premium calculation window starts in 1926.

Implicit in using history to forecast the future is the assumption that investors' expectations for future outcomes conform to past results. This method assumes that the price of taking on risk changes only slowly, if at all, over time. This "future equals the past" assumption is most applicable to a random time-series variable. A time-series variable is random if its value in one period is independent of its value in other periods.

Does the Equity Risk Premium Revert to Its Mean over Time?

Some have argued that the estimate of the equity risk premium is upwardly biased since the stock market is currently priced high. In other words, since there have been several years with extraordinarily high market returns and realized equity risk premia, the expectation is that returns and realized equity risk premia will be lower in the future, bringing the average back to a normalized level. This argument relies on several studies that have tried to determine whether reversion to the mean exists in stock market prices and the equity risk premium.[3] Several academics contradict each other on this topic; moreover, the evidence supporting this argument is neither conclusive nor compelling enough to make such a strong assumption.

Our own empirical evidence suggests that the yearly difference between the stock market total return and the U.S. Treasury bond income return in any particular year is random. Graph 5-3, presented earlier, illustrates the randomness of the realized equity risk premium.

3 Fama, Eugene F., and Kenneth R. French. "Permanent and Temporary Components of Stock Prices," *Journal of Political Economy*, April 1988, pp. 246–273. Poterba, James M., and Lawrence H. Summers. "Mean Reversion in Stock Prices," *Journal of Financial Economics*, October 1988, pp. 27–59. Lo, Andrew W., and A. Craig MacKinlay. "Stock Market Prices Do Not Follow Random Walks: Evidence from a Simple Specification Test," *The Review of Financial Studies*, Spring 1988, pp. 41–66. Finnerty, John D., and Dean Leistikow. "The Behavior of Equity and Debt Risk Premiums: Are They Mean Reverting and Downward-Trending?" *The Journal of Portfolio Management*, Summer 1993, pp. 73–84. Ibbotson, Roger G., and Scott L. Lummer. "The Behavior of Equity and Debt Risk Premiums: Comment," *The Journal of Portfolio Management*, Summer 1994, pp. 98–100. Finnerty, John D., and Dean Leistikow. "The Behavior of Equity and Debt Risk Premiums: Reply to Comment," *The Journal of Portfolio Management*, Summer 1994, pp. 101–102.

A statistical measure of the randomness of a return series is its serial correlation. Serial correlation (or autocorrelation) is defined as the degree to which the return of a given series is related from period to period. A serial correlation near positive one indicates that returns are predictable from one period to the next period and are positively related. That is, the returns of one period are a good predictor of the returns in the next period. Conversely, a serial correlation near negative one indicates that the returns in one period are inversely related to those of the next period. A serial correlation near zero indicates that the returns are random or unpredictable from one period to the next. Table 5-3 contains the serial correlation of the market total returns, the realized long-horizon equity risk premium, and inflation.

Table 5-3

Interpretation of Annual Serial Correlations
1926–2005

Series	Serial Correlation	Interpretation
Large Company Stock Total Returns	0.03	Random
Equity Risk Premium	0.04	Random
Inflation Rates	0.65	Trend

The significance of this evidence is that the realized equity risk premium next year will not be dependent on the realized equity risk premium from this year. That is, there is no discernable pattern in the realized equity risk premium—it is virtually impossible to forecast next year's realized risk premium based on the premium of the previous year. For example, if this year's difference between the riskless rate and the return on the stock market is higher than last year's, that does not imply that next year's will be higher than this year's. It is as likely to be higher as it is lower. The best estimate of the expected value of a variable that has behaved randomly in the past is the average (or arithmetic mean) of its past values.

Table 5-4 also indicates that the equity risk premium varies considerably by decade, from a high of 17.9 percent in the 1950s to a low of 0.3 percent in the 1970s. This look at the historical equity risk premium reveals no observable pattern.

Table 5-4

Long-Horizon Equity Risk Premium by Decade
1926–2005

1920s*	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s**	1996-2005
17.6%	2.3%	8.0%	17.9%	4.2%	0.3%	7.9%	12.1%	–5.1%	5.1%

*Based on the period 1926–1929.

**Based on the period 2000–2005.

Finnerty and Leistikow perform more econometrically sophisticated tests of mean reversion in the equity risk premium. Their tests demonstrate that—as we suspected from our simpler tests—the equity risk premium that was realized over 1926 to the present was almost perfectly free of mean reversion and had no statistically identifiable time trends.[4] Lo and MacKinlay conclude, "the rejection of the random walk for weekly returns does not support a mean-reverting model of asset prices."

Choosing an Appropriate Historical Period

The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical equity risk premium is relatively stable.[5] Furthermore, because an average of the realized equity risk premium is quite volatile when calculated using a short history, using a long series makes it less likely that the analyst can justify any number he or she wants. The magnitude of how shorter periods can affect the result will be explored later in this chapter.

Some analysts estimate the expected equity risk premium using a shorter, more recent time period on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain "unusual" events. Some of the most unusual events of this century took place quite recently, including the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, and the development of the European Economic Community—all of these happened approximately in the last 30 years.

It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impending short-term volatility without considering the stock market crash and market volatility of the 1929–1931 period.

Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. The 80-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific

4 Though the study performed by Finnerty and Leistikow demonstrates that the traditional equity risk premium exhibits no mean reversion or drift, they conclude that, "the processes generating these risk premiums are generally mean-reverting." This conclusion is completely unrelated to their statistical findings and has received some criticism. In addition to examining the traditional equity risk premia, Finnerty and Leistikow include analyses on "real" risk premia as well as separate risk premia for income and capital gains. In their comments on the study, Ibbotson and Lummer show that these "real" risk premia adjust for inflation twice, "creating variables with no economic content." In addition, separating income and capital gains does not shed light on the behavior of the risk premia as a whole.

5 This assertion is further corroborated by data presented in *Global Investing: The Professional's Guide to the World of Capital Markets* (by Roger G. Ibbotson and Gary P. Brinson and published by McGraw-Hill, New York). Ibbotson and Brinson constructed a stock market total return series back to 1790. Even with some uncertainty about the accuracy of the data before the mid-nineteenth century, the results are remarkable. The real (adjusted for inflation) returns that investors received during the three 50-year periods and one 51-year period between 1790 and 1990 did not differ greatly from one another (that is, in a statistically significant amount). Nor did the real returns differ greatly from the overall 201-year average. This finding implies that because real stock-market returns have been reasonably consistent over time, investors can use these past returns as reasonable bases for forming their expectations of future returns.

events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time, and their return expectations reflect this.

A Look at the Historical Results

It is interesting to take a look at the realized returns and realized equity risk premium in the context of the above discussion. Table 5-5 shows the average stock market return and the average (arithmetic mean) realized long-horizon equity risk premium over various historical time periods. Similarly, Graph 5-5 shows the average (arithmetic mean) realized equity risk premium calculated through 2005 for different starting dates. The table and the graph both show that using a longer historical period provides a more stable estimate of the equity risk premium. The reason is that any unique period will not be weighted heavily in an average covering a longer historical period. It better represents the probability of these unique events occurring over a long period of time.

Table 5-5

Stock Market Return and Equity Risk Premium Over Time
1926–2005

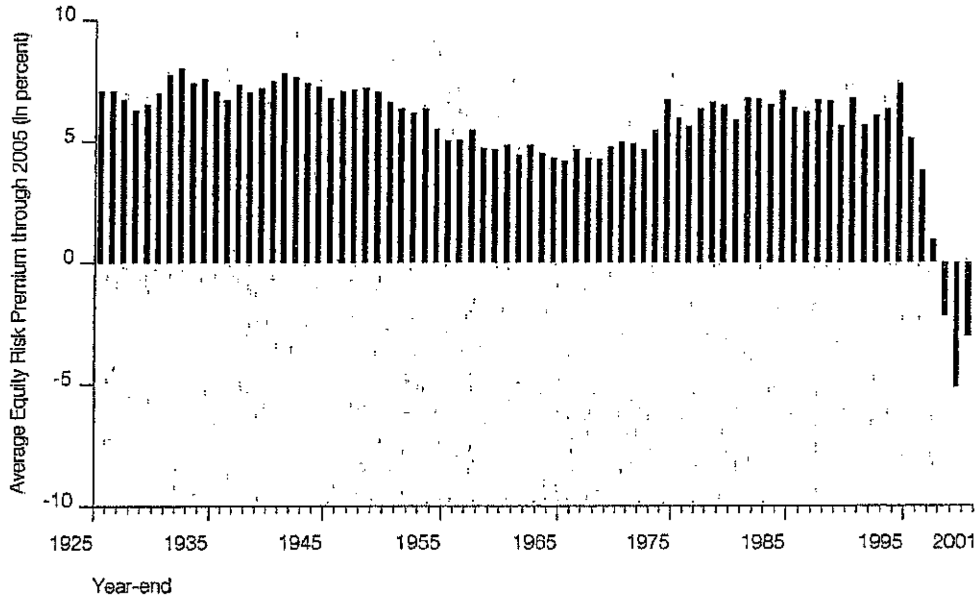
Period Length	Period Dates	Large Company Stock Arithmetic Mean Total Return	Long-Horizon Equity Risk Premium
80 years	1926–2005	12.3%	7.1%
70 years	1936–2005	12.5%	7.0%
60 years	1946–2005	12.8%	6.8%
50 years	1956–2005	11.7%	5.0%
40 years	1966–2005	11.6%	4.2%
30 years	1976–2005	13.8%	6.0%
20 years	1986–2005	13.2%	6.4%
15 years	1991–2005	13.0%	6.7%
10 years	1996–2005	10.7%	5.1%
5 years	2001–2005	2.1%	-3.0%

Looking carefully at Graph 5-5 will clarify this point. The graph shows the realized equity risk premium for a series of time periods through 2005, starting with 1926. In other words, the first value on the graph represents the average realized equity risk premium over the period 1926–2005. The next value on the graph represents the average realized equity risk premium over the period 1927–2005, and so on, with the last value representing the average over the most recent five years, 2001–2005. Concentrating on the left side of Graph 5-5, one notices that the realized equity risk premium, when measured over long periods of time, is relatively stable. In viewing the graph from left to right, moving from longer to shorter historical periods, one sees that the value of the realized equity risk premium begins to decline significantly. Why does this occur? The reason is that the severe bear market of 1973–1974 is receiving proportionately more weight in the shorter, more recent average. If you continue to follow the line to the right, however, you will also notice that when 1973 and 1974 fall out of the recent average, the realized equity risk premium jumps up by nearly 1.3 percent.

Graph 5-5

Equity Risk Premium Using Different Starting Dates

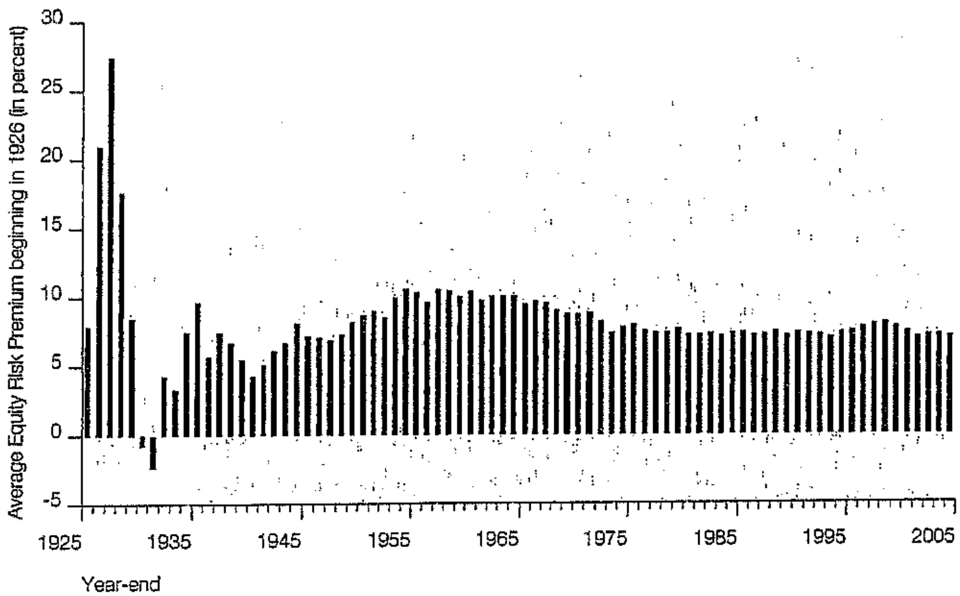
1926–2005



Additionally, use of recent historical periods for estimation purposes can lead to illogical conclusions. As seen in Table 5-5, the recent bear market has caused the realized equity risk premium in the shorter historical periods to be much lower than the long-term average.

The impact of adding one additional year of data to a historical average is lessened the greater the initial time period of measurement. Short-term averages can be affected considerably by one or more unique observations. On the other hand, long-term averages produce more stable results. A series of graphs looking at the realized equity risk premium will illustrate this effect. Graph 5-6 shows the average (arithmetic mean) realized long-horizon equity risk premium starting in 1926. Each additional point on the graph represents the addition of another year to the average. Although the graph is extremely volatile in the beginning periods, the stability of the long-term average is quite remarkable. Again, the "unique" periods of time will not be weighted heavily in a long-term average, resulting in a more stable estimate.

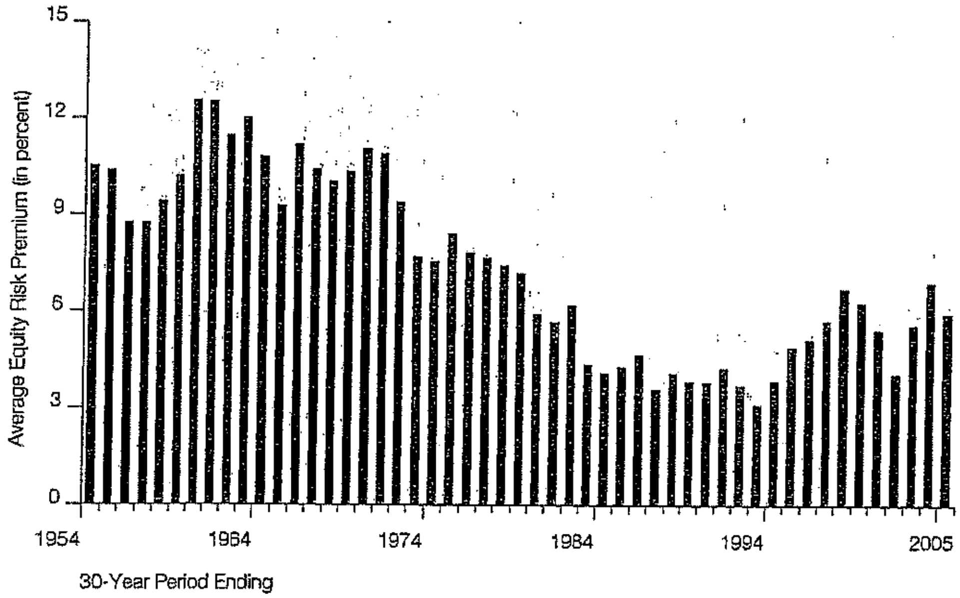
Graph 5-6
Equity Risk Premium Using Different End Dates
1926–2005



Some practitioners argue for a shorter historical time period, such as 30 years, as a basis for the equity risk premium estimation. The logic for the use of a shorter period is that historical events and economic scenarios present before this time are unlikely to be repeated. Graph 5-7 shows the equity risk premium measured over 30-year periods, and it appears from the graph that the premium has been trending downwards. The 30-year equity risk premium remained close to 4 percent for several years in the 1980s and 1990s. However, it has fallen and then risen in the most recent 30-year periods.

Graph 5-7

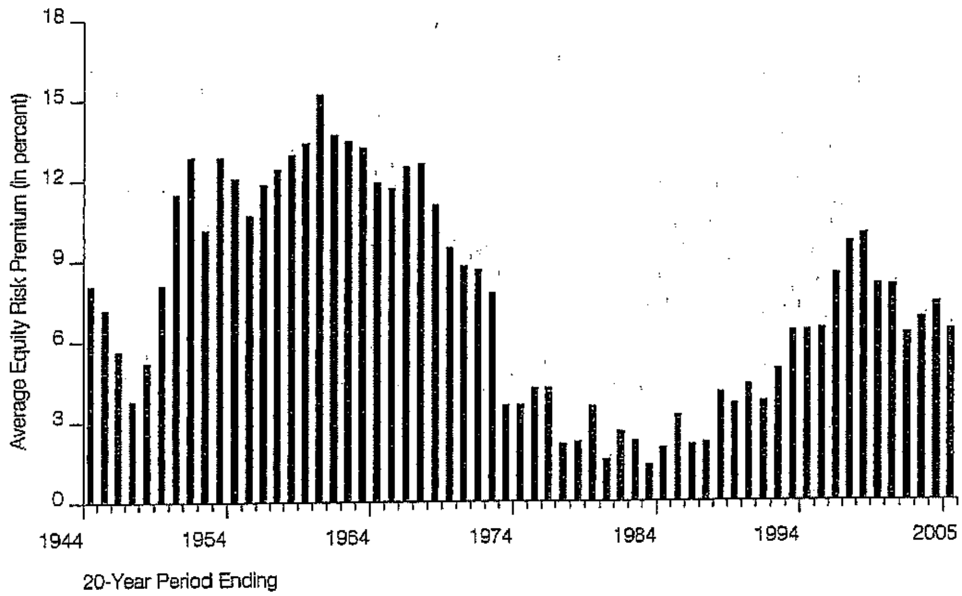
Equity Risk Premium Over 30-Year Periods
1926–2005



The key to understanding this result lies again in the years 1973 and 1974. The oil embargo during this period had a tremendous effect on the market. The equity risk premium for these years alone was 21 and 34 percent, respectively. Periods that include the years 1973 and 1974 result in an average equity risk premium as low as 3.1 percent. In the most recent 30-year periods that excludes 1973 and 1974, the average rises to over 6 percent. The early 2000s have also had an enormous effect on the equity risk premium.

The effect of the 1973–1974 period is even more pronounced when looking at the equity risk premium over 20-year periods, as seen in Graph 5-8. Using the 20-year historical average equity risk premium results in a very unstable estimate. Periods that include the years 1973 and 1974 result in an equity risk premium as low as 1.4 percent. In the more recent 20-year periods that exclude 1973 and 1974, the average rises dramatically to over 9.0 percent in some cases. It is difficult to justify such a large divergence in estimates of return over such a short period of time. This does not suggest, however, that the years 1973 and 1974 should be excluded from any estimate of the equity risk premium; rather, it emphasizes the importance of using a long historical period when measuring the equity risk premium in order to obtain a reliable average that is not overly influenced by short-term returns. The same holds true when analyzing the poor performance of the early 2000s.

Graph 5-8
Equity Risk Premium Over 20-Year Periods
1926–2005



Does the Equity Risk Premium Represent Minority or Controlling Interest?

There is quite a bit of confusion among valuation practitioners regarding the use of publicly traded company data to derive the equity risk premium. Is a minority discount implicit in this data? Recall that the equity risk premium is typically derived from the returns of a market index: the S&P 500, the New York Stock Exchange (NYSE), or the NYSE Deciles 1-2. (The Ibbotson Associates' size premia that are covered in Chapter 7 are derived from the returns of companies traded on the NYSE, in addition to those on the AMEX and NASDAQ). Both the S&P 500 and the NYSE include a preponderance of companies that are minority held. Does this imply that an equity risk premium (or size premium) derived from these data represents a minority interest premium? This is a critical issue that must be addressed by the valuation professional, since applying a minority discount or a control premium can have a material impact on the ultimate value derived in an appraisal.

Since most companies in the S&P 500 and the NYSE are minority held, some assume that the risk premia derived from these return data represent minority returns and therefore have a minority discount implicit within them. However, this assumption is not correct. The returns that are generated by the S&P 500 and the NYSE represent returns to equity holders. While most of these companies are minority held, there is no evidence that higher rates of return could be earned if these companies were suddenly acquired by majority shareholders. The equity risk premium represents expected premiums that holders of securities of a similar nature can expect to achieve on average into the future. There is no distinction between minority owners and controlling owners.

The discount rate is meant to represent the underlying risk of being in a particular industry or line of business. There are instances when a majority shareholder can acquire a company and improve the cash flows generated by that company. However, this does not necessarily have an impact on the general risk level of the cash flows generated by the company.

When performing discounted cash flow analysis, adjustments for minority or controlling interest value may be more suitably made to the projected cash flows than to the discount rate. Adjusting the expected future cash flows better measures the potential impact a controlling party may have while not overstating or understating the actual risk associated with a particular line of business.

Appraisers need to note the distinction between a publicly traded value and a minority interest value. Most public companies have no majority or controlling owner. There is thus no distinction between owners in this setting. One cannot assume that publicly held companies with no controlling owner have the same characteristics as privately held companies with both a controlling interest owner and a minority interest owner.

Other Equity Risk Premium Issues

There are a number of other issues that are commonly brought up regarding the equity risk premium that, if correct, would reduce its size. These issues include:

1. Survivorship bias in the measurement of the equity risk premium
2. Utility theory models of estimating the equity risk premium
3. Reconciling the discounted cash flow approach to the equity risk premium
4. Over-valuation effects of the market
5. Changes in investor attitudes toward market conditions
6. Supply side models of estimating the equity risk premium

In this section, we will examine each of these issues.

Survivorship

One common problem in working with financial data is properly accounting for survivorship. In working with company-specific historical data, it is important for researchers to include data from companies that failed as well as companies that succeeded before drawing conclusions from elements of that data.

The same argument can be made regarding markets as a whole. The equity risk premium data outlined in this book represent data on the United States stock market. The United States has arguably been the most successful stock market of the twentieth century. That being the case, might equity risk premium statistics based only on U.S. data overstate the returns of equities as a whole because they only focus on one successful market?

In a recent paper, Goetzmann and Jorion study this question by looking at returns from a number of world equity markets over the past century.[6] The Goetzmann-Jorion paper looks at the survivorship bias from several different perspectives. They conclude that once survivorship is taken

6 Goetzmann, William, and Philippe Jorion. "A Century of Global Stock Markets," Working Paper 5901, National Bureau of Economic Research, 1997.

REGULATORY FINANCE:

UTILITIES' COST OF CAPITAL

Roger A. Morin, PhD

in collaboration with
Lisa Todd Hillman

1994
PUBLIC UTILITIES REPORTS, INC.
Arlington, Virginia

First Printing, March 1994
Library of Congress Catalog Card No. 94-66184
ISBN 0-910325-46-4

Printed in the United States of America

EXAMPLE 4-1

We have the following market data for Utility X:

current dividend per share = \$1.62

current stock price = \$13.00

expected dividend growth = 4%

From Equation 4-8, the standard DCF model produces a cost of equity of:

$$K = D_1/P_0 + g$$

$$= D_0(1 + g)/P_0 + g$$

$$= \$1.62(1.04)/\$13 + .04$$

Note that next year's expected dividend is the current spot dividend increased by the expected growth rate in dividends. In general, implementation of the approach requires finding D_0 and P_0 from readily available sources of market data; the growth rate, g, can be estimated using several techniques. One way is to extrapolate the historical compound growth of dividends over some past period. Chapter 5 will discuss the applicational aspects of the DCF formulation in detail.

Standard DCF Model Assumptions

The assumptions underlying the standard DCF model have been the source of controversy, confusion, and misunderstanding in rate hearings. This section will attempt to clarify these assumptions.

Theories are simplifications of reality and the models articulated from theories are necessarily abstractions from the existing world so as to facilitate understanding and explanation of the real world. The DCF model is no exception to the rule. A model should not be judged by the severity and surrealism of its assumptions, but rather by its intended use and ability to predict, explain, and help the decision-maker attain his or her goal. The assumptions of the standard DCF model are as follows:

Assumption #1. The 4 assumptions discussed earlier in conjunction with the general classical theory of security valuation still remain in force.

Assumption #2. The discount rate, K, must exceed the growth rate, g. In other words, the standard DCF model does not apply to growth stocks. In Equation 4-7, it is clear that as g approaches K, the denominator gets progressively smaller, and the price of the stock infinitely large. If g exceeds K, the price becomes negative, an implausible situation. In the derivation of the standard DCF equation (4-7) from the general stock valuation equation (4-5), it was necessary to assume g less than K in order for the series of terms to converge toward a finite number. With this assumption, the present value of steadily growing dividends becomes smaller as the discounting effect of K in the denominator more than offsets the effect of such growth in the numerator.

This assumption is realistic for most public utilities. Investors require a return commensurate with the amount of risk assumed, and this return likely exceeds the expected growth rate in dividends for most public utilities. Although it is possible that a firm could sustain very high growth rates for a few years, no firm could double or triple its earnings and dividends indefinitely.

Assumption #3. The dividend growth rate is constant in every year to infinity. This assumption is not as problematic as it appears. It is not necessary that g be constant year after year to make the model valid. The growth rate may vary randomly around some average expected value. Random variations around trend are perfectly acceptable, as long as the mean expected growth is constant. The growth rate must be "expectationally constant," to use formal statistical jargon. This assumption greatly simplifies the model without detracting from its usefulness.

If investors expect growth patterns to prevail in the future other than constant infinite growth, more complex DCF models are available. For example, investors may expect dividends to grow at a relatively modest pace for the first 5 years and to resume a higher normal steady-state course thereafter, or conversely. The general valuation framework of Equation 4-5 can handle such situations. The "non-constant growth" model presented later in the chapter is an example of such a model.

It should be pointed out that the standard DCF model does not require infinite holding periods to remain valid. It simply assumes that the stock will be yielding the same rate of return at the time of sale as it is currently yielding.

EXAMPLE 4-2

To illustrate this point, consider a 3-year holding period in the previous numerical example. If both price and dividend grow at the 4% expected rate, dividends for each of the next 3 years are $1.68

$1.75, and $1.82, respectively, and the price at the end of the third year is $13 (1 + .04)^3 = $14.62. If the investor sells the stock at the end of the third year, the return expected by the investor is still 17%, because the present value of the dividend stream and the stock price at resale is exactly equal to the current purchase price:

$$P_0 = \frac{1.68}{1.17} + \frac{1.75}{1.17^2} + \frac{1.82}{1.17^3} + \frac{14.62}{1.17^3}$$

$$= \$13$$

This will be true for any length of holding period. The main result of the DCF model does not depend on the value of n.

Another way of stating this assumption is that the DCF model assumes that market price grows at the same rate as dividends. Although g has been specified in the model to be the expected rate of growth in dividends, it is also implicitly the expected rate of increase in stock price (expected capital gain) as well as the expected growth rate in earnings per share. This can be seen from Equation 4-7, which in period 1 would give:

$$P_1 = D_2/(K - g)$$

but $\quad D_2 = D_1\,(1 + g)$, and $P_0 = D_1/(k - g)$

so that $\quad P_1 = D_1\,(1 + g)/(K - g) = P_0\,(1 + g)$

Hence, g is the expected growth in stock price. Similarly, if a fixed fraction of earnings are distributed in dividends, then:

$$D_1 = aE_1$$

$$D_2 = aE_2$$

where a is the constant payout ratio and E the earnings per share. Since $D_2 = D_1\,(1 + g)$, we also have $E_2 = E_1\,(1 + g)$ and, hence, g is the expected growth in earnings per share.

Still another way to express the idea that the validity of the standard DCF model does not depend on the value of the investor's holding period is to say that investors expect the ratio of market price to dividends (or earnings) in year n, P_n/D_n, to be the same as the current price/dividend ratio, P_0/D_0. This must be true if the infinite growth assumption is made. Investors will only expect $(P/E)_n$ to differ from $(P/E)_0$ if they believe that the growth following year n will differ from the growth expected before year n, since the price in year n is the present value of all subsequent dividends from $n + 1$ to infinity.

The constancy of the price/earnings (P/E) assumption is not prohibitive to DCF usage. If there is reason to believe that stock price will grow at a different rate than dividends, for example, if the stock price is expected to converge to book value, a slightly more complex model is warranted. Such a model is presented in section 4.6.

Assumption #4. Investors require the same return K every year. The assumption of a flat yield curve was alluded to earlier, but requires elaboration. A firm's cost of capital, K, varies directly with the risk of the firm. By assuming the constancy of K, the model abstracts from the effects of a change in risk on the value of the firm. If K is to remain constant, the firm's capital structure policy and dividend payout policy must be assumed to remain stable so as to neutralize any effect of capital structure changes or dividend policy changes on K.

The assumption of a constant dividend payout policy not only simplifies the mathematics but also insulates the model from any effects of dividend policy on risk, if any, and hence on K. Besides, this assumption was indirectly stated earlier; a constant dividend policy implies that dividends and earnings grow at the same rate. The assumption of constant dividend payout is realistic. Most firms, including utilities, tend to maintain a fixed payout rate when it is averaged over several years.

The simplification of a constant capital structure may be acceptable if the utility exhibits a near constant debt-equity ratio over time and is expected to do so in the future.

Assumption #5. The standard DCF model assumes no external financing. All financing is assumed to be conducted by the retention of earnings. No new equity issues are used or, if they are, they are neutral in effect with respect to existing shareholders. The latter neutrality occurs if the market-to-book ratio is 1. Without this assumption, the per share dividends could be watered down by a new stock issue, violating the constant growth assumption. A more comprehensive model allowing for external stock financing is presented in a later section.

4.4 The Determinants of Dividend Growth

It is instructive to describe the factors that cause growth in dividends to occur and to disaggregate the g term in the standard DCF model into its contributory elements.

Missouri Gas Energy
Total Returns on Large Company Stocks
1926 to 2005

Large Company Stocks

						2004				
						1988	2003	1997		
				1990	**2005**	1986	1999	1995		
				1981	1994	1979	1998	1991		
				1977	1993	1972	1996	1989		
				1969	1992	1971	1983	1985		
				1962	1987	1968	1982	1980		
				1953	1984	1965	1976	1975		
			2001	1946	1978	1964	1967	1955		
			2000	1940	1970	1959	1963	1950		
			1973	1939	1960	1952	1961	1945		
		2002	1966	1934	1956	1949	1951	1938	1958	
		1974	1957	1932	1948	1944	1943	1936	1935	1954
1931	1937	1930	1941	1929	1947	**1926**	1942	1927	1928	1933

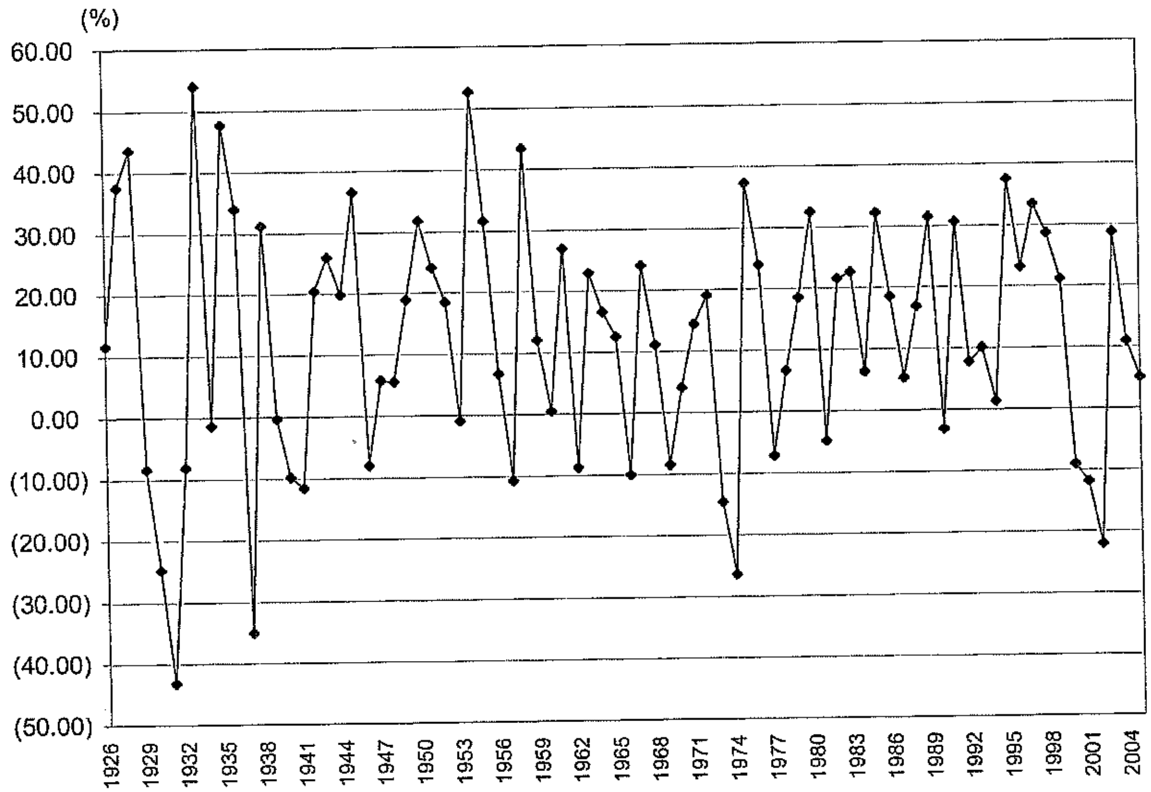
-50% -40% -30% -20% -10% 0% 10% 20% 30% 40% 50% 60%

(Percent)

Arithmetic Mean: $r_A = \sum_{t=1}^{n} r_t \;/\; n$

Source : Stocks, Bonds, Bills, and Inflation – Valuation Edition 2006 Yearbook, pp. 30-31, Ibbotson Associates, Chicago, IL

Missouri Gas Energy
Large Company Stock Returns
From 1926 to 2005



Source of Information:
Stocks, Bonds, Bills and Inflation Valuation Edition 2006 Yearbook,
Ibbotson Associates, Chicago, Il

Frank Hanley

From: "Frank Hanley" <fhanley@ausinc.com>
To: <profmorin@msn.com>
Sent: Thursday, August 31, 2000 3:18 PM
Subject: ECAPM

Dr. Morin,

Quite some time ago I sent you e mail about the ECAPM. You replied that critics were wrong when they say that using the ECAPM with adjusted beta is a double counting. You said that you would provide me with some proof. Could you please send me something or point me to specific empirical support that use of adjusted beta in the ECAPM is not double counting ?

I know that you are a very busy man so I give you many thanks in advance for any time you take in responding to me.

Appreciatively,

Frank Hanley

Frank Hanley

From: "profmorin" <profmorin@email.msn.com>
To: <fhanley@ausinc.com>
Sent: Friday, September 01, 2000 11:51 AM
Attach: response to F.Hanley.doc
Subject: Re: ECAPM

Dear Frank:

I have attached a response to your concern. I also point out that the New York PSC has endorsed the Morin ECAPM following the massive generic cost of capital hearing of a few years ago. I have the exact cite if you need it.

> ----- Original Message -----
> **From:** Frank Hanley
> **To:** profmorin@msn.com
> **Sent:** Thursday, August 31, 2000 4:18 PM
> **Subject:** ECAPM
>
> Dr. Morin,
>
> Quite some time ago I sent you e mail about the ECAPM. You replied that critics were wrong when they say that using the ECAPM with adjusted beta is a double counting. You said that you would provide me with some proof. Could you please send me something or point me to specific empirical support that use of adjusted beta in the ECAPM is not double counting ?
>
> I know that you are a very busy man so I give you many thanks in advance for any time you take in responding to me.
>
> Appreciatively,
>
> Frank Hanley

MORIN ECAPM

Some have argued that the Morin ECAPM constitutes a double beta adjustment. I do not share the view that the ECAPM is equivalent to a beta adjustment.

There are two distinct separate issues involved when implementing the CAPM. First, given the validity of the standard CAPM, what is the best proxy for expected beta? Second, and more fundamentally, does the standard form of the CAPM provide the best explanation of the risk-return relationship observed on capital markets?

i. Beta measurement

Unadjusted raw betas are inappropriate to use in a CAPM analysis. The raw unadjusted beta is not the appropriate measure of market risk to use. Current stock prices reflect expected risk, that is, expected beta, rather than historical risk or historical beta. Historical betas, whether raw or adjusted, are only surrogates for expected beta. The best of the two surrogates is adjusted beta a la Value Line, Merrill Lynch, and Bloomberg betas.

ii. Standard CAPM

There have been countless empirical tests of the CAPM to determine to what extent security returns and betas are related in the manner predicted by the CAPM. The results of the tests support the idea that beta is related to security returns, that the risk-return tradeoff is positive, and that the relationship is linear. The contradictory finding is that the risk-return tradeoff is not as steeply sloped as the predicted CAPM. That is, low-beta securities earn returns somewhat higher than the CAPM would predict, and high-beta securities earn less than predicted. This is one of the most well-known results in finance. A CAPM-based estimate of cost of capital underestimates the return required from low-beta securities and overstates the return from high-beta securities, based on the empirical evidence. The empirical form of the CAPM refines the standard form of the CAPM to account for this phenomenon.

Thus, I do not share the view that the ECAPM is equivalent to a beta adjustment. For utility stocks with betas less than one, the CAPM understates the return. The ECAPM allows for the CAPM's inherent bias by ascribing a higher intercept and flatter slope to the CAPM. The ECAPM is a return (Y-axis, vertical axis) adjustment. It is not a beta risk (x-axis, horizontal) adjustment. The ECAPM is not an attempt to increase the beta estimate, which would be a horizontal x-axis adjustment. The ECAPM is a return adjustment rather than a risk adjustment.

There is a huge financial literature which supports both the use of the ECAPM and the use of adjusted betas. The empirical support for adjusted betas and for the ECAPM is summarized in Chapter 13 of my book, Regulatory Finance, Public Utility Reports Inc., Arlington, Va., 1994.

With few exceptions, the empirical studies support the finding that the implied intercept term exceeds the risk-free rate and the slope term is less than predicted by the CAPM.