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The Impact of Alternative Specifications of the Equity Risk Premium on NCCI's Cost of Capital and Internal Rate of Return Models

Executive Summary

The equity risk premium is typically defined as the additional return—above the return obtainable on a risk-free security, such as a U.S. government bond—that investors require as compensation for assuming the nondiversifiable risks associated with investing in common stocks.

Why, one may ask, is NCCI interested in this, and what does all this have to do with workers compensation?

The answers lie in the nuts and bolts of the financial models that NCCI uses to evaluate the "fairness" of its proposed rates in those states where NCCI rates are subject to regulatory oversight. In general, premium rates are deemed to be fair to both the employer (that is, the policyholder) and the insurance company if the expected rate of return to the insurance company for writing the policy at proposed rates is equal to the industry's estimated cost of capital.

NCCI has developed two financial models, described below, to estimate both of these returns.

A key input to these models is the estimate of the prospective equity risk premium, that is, the additional return required to invest in common stocks vs. investing in a "risk-free" Treasury security. The value of that premium is important because, if it is set too high, estimates of investment income related to common stock will be upwardly biased. The result could be regulatory pressure to reduce rates. Conversely, too low an estimate of the risk premium could result in regulatory concerns regarding possible understatement of investment income, which again, could bring into question the fairness of proposed rates.

This paper examines a wide range of issues relating to the prospective value of the risk premium and how alternative estimates of it impact NCCI models. Key conclusions include:

- A growing body of research suggests a "range of reasonableness" for the prospective equity risk premium of 1% to, at most, 3%—substantially less than the historical average risk premium of roughly 7%.
- Changes in the equity risk premium have similar directional impacts on NCCI's financial models. For example, a lower risk premium reduces both the expected return on common stocks and, to a lesser extent, the estimated cost of capital. As a result, the factor needed to adjust the ultimate insurance rate to generate the P&C industry's cost of capital (i.e., the underwriting contingency factor or UCF) has a muted sensitivity to changes in assumed values of the equity risk premium.
- As a corollary, when analysts are developing estimates of the appropriate UCF, the specific estimate of the equity risk premium is less critical than making sure that the processes used to estimate the cost of capital and the investment return on common stock are consistent.

One broader implication of this analysis is that an average equity risk premium of between 1% and 3% suggests that prospective returns on common stock may prove to be disappointing relative to the stock market's historical performance. Reasons for the lower premium vs. the historical average are discussed in the body of the paper and include factors such as reduced taxes on capital gains and dividends (which imply that pre-tax returns would be competed down) and dramatically lower transaction costs (as result of the advent of competitive commissions in 1975 and technology-related improvements in the handling of stock transactions). That suggests that P&C insurers will need to look increasingly to underwriting, rather than to investment income, to keep the workers compensation line profitable.

Background

As noted above, NCCI has developed two models to address the fairness issue. Those models include:

- A cost of capital model, used to estimate the cost of equity capital[1] in the P&C insurance industry
- An internal rate of return (IRR) model, used to estimate the rate of return to an insurer from writing a workers compensation policy at proposed rates. The IRR model includes all cash flows involved in the insurance transaction, including:
  - Premium inflows
  - Loss and expense outflows
  - Income earned on investing the loss reserves
  - Surplus related to the policy in financial instruments (such as U.S government bonds, tax exempts, industrial bonds, and common stocks)

The two models are linked via an underwriting contingency factor (UCF), which is calculated by "backsolving" the IRR model to the cost of capital estimate generated by the cost of capital model. The UCF is a balancing factor used to ensure that the final rates proposed by NCCI meet the test of fairness to insurers and policyholders alike. NCCI's analysis is based on averages for the P&C industry. Individual carriers should conduct their own analysis of the cost of capital and return on stocks based on their specific financial characteristics and assessment of financial markets.

An estimate of the prospective equity risk premium plays an important role in each of these models:

- In NCCI's cost of capital model, the prospective equity risk premium is used as an input in evaluating the P&C industry's cost of capital via the capital asset pricing model (CAPM). Specifically, the P&C industry's cost of capital is estimated to be equal to the return on a risk-free asset (for example, a U.S. government bond) plus a factor that incorporates the equity risk premium (as defined above) adjusted to reflect the extent to which the share prices of actively traded P&C industry stocks are more or less volatile than stock in general (measured by the S&P 500 stock price index).[2]
- In the IRR model, the prospective equity risk premium is used, in conjunction with estimates of yields on U.S. government securities, to estimate the prospective rate of return on common stock. That return then gets weighted with returns on other investment instruments to develop the overall rate of return on invested funds. (The appendix to this paper provides a table detailing the distribution of the invested assets held in the portfolios of P&C insurers as of year-end 2002.)

How best to estimate the prospective equity risk premium is a subject of ongoing interest among financial economists. Viewed broadly, the discussion centers on the extent to which long-term historical values of the premium are useful in projecting its future value. This paper:

- Examines the historical record of the equity risk premium since the mid-1920s
- Discusses the impact on the risk premium of changes in the structure of the economy and financial markets
- Provides the results of recent research relating to the prospective value of the risk premium
- Demonstrates the impact of alternative risk-premium estimates on NCCI's cost of capital and IRR models

The Equity Risk Premium—A Most Volatile Metric

The equity risk premium has been extremely variable over the 1926–2003 period. Exhibit 1 shows the risk premium on an annual basis. During the 1930s, the annual value ranged from a low of –47% in 1931, to a high of 51% in 1933.

More recently, the premium flipped from –28% in 2002, to 24% in 2003. Interestingly (and as will be more fully explored in subsequent sections of this paper), the mean value of the premium has been drifting lower since the mid-1950's—from an average of 10.3% in the 1926–1956 period to an average of 5.1% for the 1957–2003 time frame.

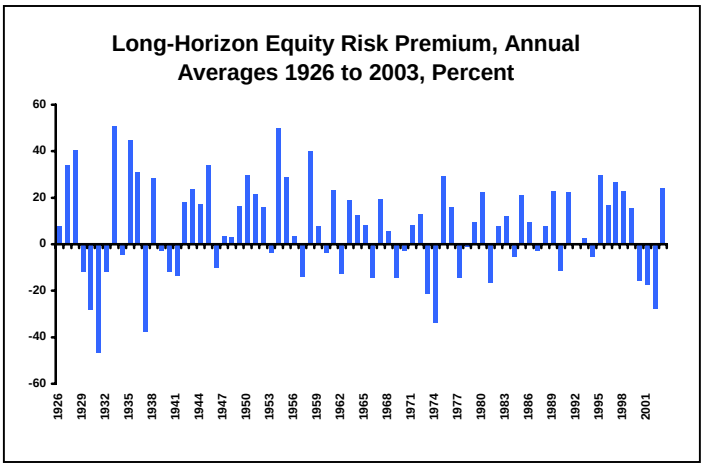

Exhibit 1. Risk Premium on an Annual Basis

Exhibit 1 shows the "long-horizon" risk premium, which

[1] NCCI believes that the cost of capital to the P&C industry is appropriately measured on a pure equity basis (that is, exclusive of debt financing). Insurance companies typically do not hold debt in their capital structure. Rather, debt is held at the "holding company" level and is used to support activities other than insurance.

[2] NCCI's cost of capital model uses both the CAPM method as well as a discounted cash flow (DCF) approach to calculating the cost of capital. The DCF approach is a derivative of the standard Gordon model, in which the cost of capital can be determined on the basis of the current dividend yield and the prospective growth in dividends. The P&C industry's estimated cost of capital is computed as the average of the results of the DCF and CAPM approaches.

relates the return on the S&P 500 stock price average to the return on long-term government bonds.[3]

Exhibit 2 compares the long and short-horizon premiums on a decade average basis. Both series tend to move together, and both show substantial decade-to-decade volatility.

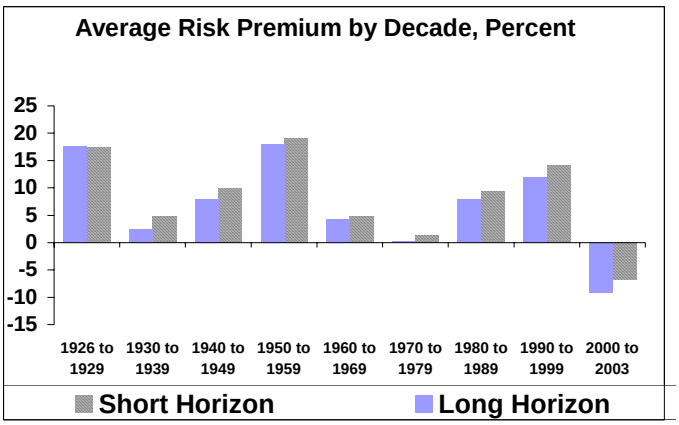

Exhibit 2. The Long- and Short-Horizon Premiums on Decade

In trying to come to grips with this volatility, some researchers have suggested that returns to stock are mean reverting (that is, that they have a tendency to gravitate toward their long-term average). For example, the above-average returns of the mid- to late 1990s were followed by below average returns in 2000–2002, and then by above-average returns in 2003.

This hypothesis has been suggested by Siegel[4] in commenting on the stability of real returns on stocks since the early 1800s, and by Mehra,[5] in noting that the relationship between ex post and ex ante returns are likely to be inverse. (That is, after a bull market, when stock values are high and the ex post premium is high, the ex ante premium is likely to be low. After a major downward correction, such as what occurred in 2000–2002, the ex ante premium is likely to be high at the same time that the ex post premium is low.)

While intuitively appealing, the implementation of a mean-reverting strategy in selecting a short-term ex ante equity premium is easier said than done. Indeed, Mehra cautions that implementing this approach in the short-term is complicated by the equity risk premium's large standard deviation (20.6 percentage points or 2,060 basis points), so that projecting next year's premium on the basis of last year's premium is similar to guessing where the stock averages will be next year.[6] In addition, econometric studies (for example, Finnerty and Leistikow)[7] have found no statistical evidence of mean reversion or time trend. Serial correlations studies of equity risk premium (for example, Ibbotson)[8] show no negative (or for that matter positive) correlations of annual equity risk premiums.

Because of this enormous volatility, Ibbotson Associates suggests that the prospective equity premium is best measured by the arithmetic average of historical risk premiums on a very long-term basis (that is, over the full length of their data set, which begins in 1926).

Ibbotson's rational for using the 1926-to-date average is that such an average captures the widest range possible of events that may occur in an unknown future. Those events would include periods of strong growth, deep recession, accelerating inflation, political shocks and market bubbles, and their aftermath. Since all periods contain "unusual" events, Ibbotson argues that the full data set effectively captures the range of economic factors that could affect the risk premium on a going forward basis.

Based on data from 1926 through 2003, the average long-horizon equity risk premium is 7.2%. Applying that risk premium to an average of recent yields on 20-year Treasury bonds gives an implied return on common stock of 11.9%.

Factors Suggesting a Lower Value for the Equity Risk Premium

The collapse of the stock market following the "bubble" of the late 1990s, along with the results of a growing body of research, suggests that it may be unreasonable to assume a risk premium of 7.2% (implying a near 12% average annual return on stocks) in the years immediately ahead. Indeed, there are a number of factors that are discussed in the literature that suggest that the prospective premium is likely to be substantially less (in the neighborhood of 1% to, at most, 3%) than that obtained via the historical average. A review of those factors follows.

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[3] The source for this data is Ibbotson Associates. Ibbotson also publishes a "short-horizon" premium that is based on the differential between the return on the S&P 500 and 30-day Treasury bills. See Stocks, Bonds, Bills and Inflation, Valuation Edition. Ibbotson Associates, 2004 Yearbook

[4] Jeremy J. Siegel, "Historical Results I," in Equity Risk Premium Forum, November 8, 2001, p. 30.

[5] Rajnish Mehra, "Current Estimates and Prospects for Change II" in Equity Risk Premium Forum, November 8, 2001, p. 62.

[6] Ibid.

[7] John D. Finnerty 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 (see also in this regard Ibbotson Associates, Stocks, Bonds, Bills and Inflation, Valuation Edition, 2003 Yearbook, pp. 74–76.

[8] Ibbotson Associates, Stocks, Bonds, Bills and Inflation, Valuation Edition, 2003 Yearbook, p. 74

Not all Historical Experience May Be Relevant to Current Investors

To what extent does historical market experience affect investor expectations? To some market participants, history is what happened yesterday and ancient history is what happened last week. To the extent that more recent developments drive investors' expectations regarding the equity risk premium, use of the full Ibbotson data set (from 1926 onward) may incorporate events that are no longer relevant in shaping the expectations of current investors. Such events include the Great Depression during the 1930s, World War II and its aftermath, and the "pegging" of interest rates during 1942–1951.

Great Depression

The Great Depression was an economic disruption of enormous magnitude, a decline without parallel since then. For example, the decline in stock market returns was far and away steeper during the early years of the Great Depression than in more recent bear markets. The total return on large-cap stocks declined 25% in 1930 and 43% in 1931, while the return on small-cap stocks was even more horrendous, with declines of 51% in 1929, 38% in 1930, and 50% in 1931. In comparison, total returns on large cap stocks were down 26.5% in 1974 (during the severe bear market in 1973–1974) and down 22% in the bear market of 2002 (while small-cap total returns were down 31% in 1973, 20% in 1974, and 13% in 2002.

In another example of the singular severity of the Great Depression, the unemployment rate soared from 3.2% in 1929, to 24.9% in 1933, and was still an extremely high (by modern-day standards) 14.6% in 1940. In contrast, the highest unemployment rate since the end of WWII was 9.7% in 1982 (associated with the severe recession in that year).

Economic policy is far more responsive and effective now than during the 1930s. Downturns, when they occur, tend to be dealt with swiftly by both monetary and fiscal policymakers. The 2001 recession is a case in point, where the Federal Reserve rapidly reduced short-term interest rates while the Bush administration's tax cuts added substantial purchasing power to the economy. All this suggests that current equity market investors are unlikely to factor in the experience of the Great Depression in formulating their expectations of near-term market performance.

World War II

The economy of the 1940s was dominated by WWII and the immediate post-war recovery period. The war imposed all forms of restrictions on the domestic economy (such as rationing and price controls) and also disrupted the functioning international capital markets. After the war, institutions such as the International Monetary Fund were put in place, a development that provided (and continues to provide) a measure of stability to the global economy. Present-day investors are far more likely to reflect on the implications of a limited conflict (such as in Vietnam or Iraq) than of a massive global conflict in setting their risk expectations.

Interest Rate Controls During WW II and the Korean War

The expectations of current investors are also unlikely to reflect financial market conditions during the 1940s and early 1950s. During that period, the Federal Reserve pegged interest rates in order to provide the Treasury with a low-cost means of financing WWII and the Korean War. It was not until the Treasury—Federal Reserve Accord in 1951 that financial markets were freed up, allowing market forces to determine yields and enabling the Fed to pursue an independent and anti-inflationary monetary policy.

The pegging of interest rates on government securities during WWII and the Korean War probably widened the equity risk premium during that period (since "risk-free" rates were kept low). In addition, markets required some time to react to the lifting of controls and to the changes in Fed policy following the 1951 Accord.

Interestingly, excluding the years surrounding the Great Depression and WWII (that is, excluding the years 1926 through 1949), has a very small impact on the long-term average risk premium. Indeed, the long-horizon premium declined just 0.1 percentage point to 7.1% from 7.2% (See Exhibit 3).

However, excluding the period immediately before and after the Treasury—Fed Accord (through and after the 1953—1954 recession) also results in a far greater decline in the long-horizon risk premium average—to 5.1% for the 1956–2002 period. That's because the long-horizon risk premium averaged 23.6% between 1950 and 1955 (it was 48.8% in 1954 and was nearly 30% in 1955).

Percent		
	Short Horizon	**Long Horizon**
1926 to 2003	8.6	7.2
1930 to 2003	8.1	6.6
1940 to 2003	8.7	7.3
1950 to 2003	8.4	7.1
1956 to 2003	6.4	5.1
1926–2003 Excl.		
1973 and 1974	9.6	8.1
1956–2003 Excl.		
1973 and 1974	7.9	6.5

Exhibit 3. Average Value of Equity Risk Premium in Selected Periods

As an aside, it is also useful to keep in mind that while the use of a shorter time period makes the average more responsive to changes in underlying events, it also makes the average more volatile in terms of the impact of one-time shocks.

For example, the oil price embargo in the early 1970s (and its immediate aftermath) had a major impact on the stock market, with the long-horizon equity risk premium plunging to –21% in 1973, and –34% in 1974. The 1926–2003 long-horizon risk premium excluding those two years would have been 8.1% instead of 7.2% (a 0.9 percentage point difference), while the 1956–2003 average, with those years excluded would have been 6.5% vs. 5.1% (a 1.4 percentage point difference). See Exhibit 3.

All this points to the increased variability in risk premium averages when shorter time periods are used.

Historical Risk Premiums Incorporated Far Higher Transactions Costs

Just as there was a change in financial markets following the Treasury-Fed Accord, so too was there a change in the cost structure of the equity markets following the "big bang" of 1975.

Prior to 1975, commissions on the purchase and sale of investment grade common stocks were largely set by the New York Stock Exchange. With the big bang of 1975, commissions became fully negotiable. The resulting change in cost structure was dramatic. For example, Siegel indicated that one-way transactions costs were more than 1% of the value of the transaction prior to 1975.

Today, institutional and not-so-large investors can pay pennies per share (or less) in commissions. Moreover, indexed funds allow even small investors to be diversified at a cost of less than 0.2% per year. According to Siegel, since transaction costs are less now than before 1975, use of a long-term average (for example, 1926–2002) puts an upward bias on the computed average risk premium.[9]

Taxes on Equity Returns Are Much Reduced

Taxes on equity returns are also less now (for example, lower capital gains tax rates, existence of IRAs and 401ks, 15% top-tax rate on dividends). Current risk premiums should be less now than earlier to reflect the more favorable tax environment.

New Technologies and Improved Data Reporting Have Reduced a Layer of Market Imperfections

It is far easier now than in the 1970s (or even the 1980s) to communicate, effect transactions, and gain financial information. The Internet and Internet-based services, especially e-mail and text messaging, and the increasing pervasiveness of wireless technology, have substantially reduced a layer of market imperfections that contributed to uncertainty and added to the cost of investing in equities. In addition, data on the economy is much improved, both in terms of coverage and ease of use (for example, through user-friendly Web-based data repositories). A lower risk premium would be expected as a result of these technological developments.

Historical Bond Returns Are Biased Downwards, Inflating Ex Post Risk Premiums

Another factor that may have boosted historical equity risk premiums (so that such premiums may not currently be fully appropriate) relates to the real return on bonds.

According to Siegel,[10] bondholders did not anticipate the inflation of the late 1960s and 1970s because inflation was extremely low during the 1930s and 1940s (save for a "pop" at the end of WWII) and prices were also quiescent in the 1950s.

Buyers of 30-year bonds in the 1960s—who thought their purchasing power was relatively safe—came to be sorely disappointed as inflation heated up. Bond prices plummeted as yields rose and the real return to bonds was a negative 4% between 1966 and 1981. This negative return over such a long time period caused a downward bias in the historical real return to bonds, hence inflating historical equity risk premiums.

Conceptual Models Suggest the Current Risk Premium Is Between 0% and 3%

There have been a number of efforts to develop conceptual models to estimate the value of the equity risk premium. Much of the recent research has centered on resolving the "equity risk premium puzzle" first presented by Mehra and Prescott in their 1985 paper. (Prescott is Edward C. Prescott, who won the 2004 Nobel Prize in Economics.) Those authors found that the risk premium, based on the difference between equity returns and Treasury bills, was too large to be justified based on standard models of risk aversion.[11]

Of particular note are recent studies that use the Gordon growth model as a basis for estimating equity returns. The Gordon model is taught in most basic finance courses, and relates the value of a stock to its dividend yield and the expected growth in dividends.[12]

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[9] Siegel, op. cit. p. 33.

[10] Ibid., pp. 32–33

[11] Rajnish Mehra and Edward C. Prescott, "The Equity Risk Premium Puzzle," Journal of Monetary Economics, Volume 15 (1985), pp. 145–161

[12] As noted in endnote 1, NCCI uses the Gordon model as one basis for estimating the cost of capital in the property/casualty insurance industry

In one study, in which the growth of dividends was limited by the growth in GDP, the risk premium was estimated to be at most no more than 3%, and more likely in the range of 0%–2%.[13] In another approach, looking at the differential between the Gordon-based equity return and the yield on Treasury bonds, the authors found the risk premium averaged just 0.7% since 1970 for S&P 500 stocks and 3% for all stocks included in a broader sample of stocks developed by the Federal Reserve.[14]

Perhaps most interestingly, Prescott recently co-authored a paper in which he showed that that his 1985 "puzzling" results could be resolved by calculating the risk premium using long-term bond rates (instead of T-bill rates), and adjusting the data to reflect changes in the tax treatment of equities, regulatory constraints, and diversification costs. (Prescott argues that T-bills should not be used in calculating the risk premium because they are a "negligible part of individuals' long-term holdings.") His findings: the resulting equity risk premium is "modest," with the differential of roughly 0.75% during peacetime periods in the prior century.[15]

Surveys of U.S. CFOs Suggest a Long-Horizon Equity Risk Premium of About 4%

A quarterly survey of some 200 U.S. CFOs (beginning in the second quarter of 2000 with data reported through the third quarter of 2001) provides a number of insights into investor expectations about the ex ante equity risk premium.

- Survey results of the one-year-ahead ex ante risk premium (relative to T-bills) vary considerably on a quarter-to-quarter basis. For example, the projected premium was about 2.4% in the second quarter of 2001, and effectively 0% in the third quarter of 2001. Estimates of the one-year risk premium in the current quarter are positively related to actual returns in the immediate prior quarter (R^2 = .71), suggesting that the surveyed CFOs based their expectations on an extrapolation of recent experience.
- Estimates of the 10-year-ahead equity risk premium (again relative to T-bills) are far more stable, averaging about 4%. There is also a slight positive relationship between the prior quarter's returns and the current quarters estimate (R^2 = .15).[16]

What these CFO surveys suggest is an equity risk premium about 3 to 3.5 percentage points below the Ibbotson-based long-horizon average. It would be interesting to see how/if these survey results have changed in light of the stock market's recent performance. Clearly, a much longer time period is necessary (incorporating periods of high and low/negative returns) to assess the usefulness of such surveys in estimating one-year and ten-year risk premium expectations.

Taken together, the material presented in this section strongly suggests use of an equity risk premium that is substantially less than that obtained by using the 1926–2003 average. In addition, Prescott's analysis suggests that the use of a long-horizon estimate for the premium appears more appropriate than basing the premium on shorter term securities.[17]

Results vary by the data used and the models employed. However, a close reading of current research suggests that a reasonable estimate of the equity premium lies in a range of between roughly 1%, and at most, 3%. A higher premium, such as the 5% long-horizon premium associated with the 1956–2003 average of observed premiums, is directionally correct relative to use of the 1926–2003 average. However, this too, probably overstates the prospective equity premium based on the large reductions in transactions costs and taxes on capital gains and dividends that have occurred since the mid-1970s.

Implications of Alternative Risk Premium Specifications on NCCI Models

The preceding discussion indicated prospective risk premium estimates ranging from a high of 7.9% (average of short- and long-horizon premiums for the 1926–2003 period) to close to 0%. In this section we discuss the sensitivities of NCCI's cost of capital and IRR models to alternative risk premium specifications.

Exhibit 4 indicates the relationships between changes in the equity risk premium and resulting changes in:

- Return on common stock
- Post-tax return on invested funds
- Resultant rate of return if UCF = 0
- P&C industry's cost of capital—the target fair rate of return
- Implied UCF factor that would need to be included in rates to ensure a "fair" rate of return to both insurers and ratepayers

Underlying details are provided in the Exhibit notes.

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[13] Bradford Cornell, Historical Results II, in Equity Risk Premium Forum, November 8, 2001, pp. 38–41

[14] Ravi Jagannathan, Ellen R. McGrattan and Anna Scherbina, "The Declining U.S. Equity Risk Premium," Federal Reserve Bank of Minneapolis, Quarterly Review, Vol. 24, No.4, Fall 2000, pp. 3-19

[15] Ellen R. McGrattan and Edward C. Prescott, "Average Debt and Equity Returns: Puzzling?," Federal Reserve Bank of Minneapolis, Research Department Staff Report 313, January 2003

[16] Campbell Harvey, "Implications for Asset Allocation, Portfolio Management and Future Research II," in Equity Risk Premium Forum, November 8, 2001, pp. 92–96

[17] Ellen R. McGrattan and Edward C. Prescott, op. cit., p. 3

Key take-aways from the Exhibit include:

- A decline in the equity risk premium results in a projected decline in the return on common stock and a decline in the calculated post-tax return on invested assets (as estimated in NCCI's IRR model). The lower investment return reduces the rate of return to the insurance company for writing the policy. The P&C industry's estimated cost of capital also declines because of the lower CAPM return.[18]
- Because both the cost of capital and the rate of return to the insurance company decline along with declines in the equity risk premium, declines in the risk premium have a muted impact on changes in the underwriting contingency factor (UCF). As discussed previously, the UCF brings into balance the internal rate of return from writing a workers compensation policy at proposed rates with the P&C industry's cost of capital. It is calculated by "backsolving" the IRR model to the cost of capital.
- As an example of the sensitivity of the UCF to changes in the equity risk premium, a one percentage point decline in the risk premium results in just a 0.2 percentage point decline in the UCF. In terms of premium rates, a rule of thumb calculation suggests that a one-percentage point change in the UCF will affect premium rates by about 1.5 percentage points.

Impact of Changes in the Equity Risk Premium

Value of Equity Risk Premium (LH Unless Otherwise Indicated)	Pre-Tax Return on Common Stock	Post-Tax Return on Invested Assets	Rate of Return if UCF=0	P&C Industry Cost of Capital	UCF Needed to Earn the Industry's Cost of Capital
Avg., 1926–2003	11.22%	3.35%	8.75%	11.02%	3.26%
Avg., 1956–2003	9.08%	3.08%	8.02%	9.95%	2.87%
5%	9.94%	3.19%	8.31%	10.41%	3.06%
4%	8.94%	3.06%	7.97%	9.91%	2.88%
3%	7.94%	2.94%	7.64%	9.41%	2.68%
2%	6.94%	2.81%	7.30%	8.91%	2.48%
1%	5.94%	2.69%	6.96%	8.41%	2.28%
0%	4.94%	2.56%	6.62%	7.91%	2.07%

Exhibit 4. Relationships Between Changes in the Equity Risk Premium

Exhibit 4 Notes:

- When the rate of return with a 0 UCF is less (greater) than the P&C industry's cost of capital, then a positive (negative) UCF is needed to ensure "fairness" in terms of equating the return from writing WC with the industry's cost of capital. Calculating the return assuming a 0 UCF is the first step in determining the required UCF.
- 1926–2003 and 1956–2003 averages are based on an average of long-horizon (LH) and short-horizon (SH) risk premiums for those respective periods, as calculated by Ibbotson Associates. The LH and SH premiums for the 1926–2003 period are 7.2% and 8.6%, respectively, while those for 1956–2003 are 5.1% and 6.4%. The yields applied to generate the return on common stock are 1.71% for the SH and 4.94% for the long horizon.
- For risk premiums from 5% to 0%, we calculate the pre-tax return on common stock by applying the risk premium to the average yield on 20-year U.S. Treasury bonds for the 13 weeks ending October 29, 2004.
- The return on invested assets is calculated within the IRR model and is based on the portfolio distribution of assets held by P&C insurers and prevailing tax rates. It is shown net of expenses. See the appendix for additional information.
- The rate of return if UCF = 0 is the internal rate of return calculated by NCCI's IRR model assuming no underwriting profit or loss.
- The cost of capital is calculated by averaging the CAPM return, which reflects the value of the equity risk premium, with the independently calculated DCF return (which does not include the risk premium). This has the effect of dampening the impact of changes in the CAPM return on the overall industry cost of capital.
- The UCF is obtained by "backsolving" the IRR model for the UCF so that the combination of investment and underwriting income produces an internal rate of return equal to the cost of capital.

Future Work

NCCI is in the process of refining its IRR and cost of capital models to reflect the thrust of recent research on the equity risk premium. In addition, the IRR model will be enhanced by introducing stochastic simulations of key inputs (such as losses and loss payouts) that will make the model a more dynamic and useful tool.

[18] An average equity risk premium of between 1% and 3% suggests that prospective returns on common stock may prove to be disappointing relative to the stock market's historical performance. That suggests that P&C insurers will need to look increasingly to underwriting (rather than to investment income) to keep the line profitable.

Appendix

Distribution of Investment Assets Held by the P&C Insurance Industry
Year-End 2002, Thousands of Dollars

Invested Asset Type	Market Value on 12/31/02	Asset Distribution 12/31/02
U.S. Government Securities	112,734,385	14.0%
Bonds exempt from U.S. Tax	265,976,196	33.0%
Other Bonds (unaffiliated)	191,493,438	23.8%
Other Bonds (affiliated)	1,911,570	0.2%
Preferred Stocks (unaffiliated)	9,619,156	1.2%
Preferred Stocks (affiliated)	4,956,726	0.6%
Common Stocks (unaffiliated)	99,833,242	12.4%
Common Stocks (affiliated)	37,911,350	4.7%
Mortgage Loans	1,978,829	0.2%
Real Estate	9,430,771	1.2%
Cash and Short-Term Invest.	70,291,250	8.7%