Expectations of equity risk premia, volatility and asymmetry

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ABSTRACT

We present new evidence on the distribution of the ex ante risk premium based on a multi-year survey of Chief Financial Officers (CFOs) of U.S. corporations. We have responses from surveys conducted from the second quarter of 2000 through the third quarter of 2002. The results in this paper will be augmented as future surveys become available. We find direct evidence that the one-year risk premium is highly variable through time and the ten-year expected risk premium is stable. In particular, after periods of negative returns, CFOs significantly reduce their one-year market forecasts, disagreement (volatility) increases and returns distributions are more skewed to the left. We also examine the relation between ex ante returns and ex ante volatility. The relation between the one-year expected risk premium and expected risk is negative. However, our research points to the importance of the time horizon. We find a significantly positive relation between expected returns and expected risk at the 10-year horizon.

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1. Introduction

The current market capitalization of U.S. equities is approximately $10 trillion. A shift in the equity risk premium by just one percent could add or subtract $1 trillion in market value. In addition, corporate investment decisions hinge on the expectations of the risk premium (via the cost of capital) as do both U.S. and international asset allocation decisions. Therefore, it is important for financial economists to have a thorough understanding of the expected risk premium and the factors that influence it.

The expected market risk premium has traditionally been estimated using long-term historical average equity returns. Using this approach, in December 1999, the arithmetic average return on the S&P 500 over and above the U.S. Treasury bill was reported by Ibbotson Associates (2000) to be 9.32%. This is an extraordinarily high risk premium – though it seems to have influenced the views of a great many academics [Welch (2000)]. Fama and French (2001) conclude that average realized equity returns are in fact higher than ex ante expected returns over the past half century because realized returns included “large unexpected capital gains”. If this is true, then using historical averages to estimate the risk premium is misleading.

We use a different approach to estimate the expected risk premium and offer a number of new insights. We base our estimate on a multiyear survey of Chief Financial Officers (CFOs), designed to measure their expectations of risk premia over both short and long horizons. Our survey is unique in that we obtain a measure of the entire risk premium distribution, rather than just the expected value (mean). That is, our survey captures both market volatility and asymmetries implicit in the respondents’ probability distributions. In addition, we shed light on how recent stock market performance impacts the ex ante risk premium, volatility and asymmetries. We also study the relation between expected risk and expected return.
There are many methods to estimate the equity risk premium and we can not tell which method is the best – because the variable of interest is fundamentally unobservable. The average of past returns is the method with the longest tradition. However, there are other time-series methods that use measures like dividend yields to forecast returns. These models are difficult to estimate and often structurally unstable [see Garcia and Ghysels (1999)].

There is considerable recent interest in what might be referred to as the implied method. There are two streams of this research. The original is based on the work of Black and Litterman (1990, 1991) and French and Poterba (1991). They argue that one can use investment weights to determine the equilibrium expected returns on equities as well as other assets. Graham and Harvey (1996) use a variant of this method to study the time-series behavior of equity risk premia implicit in the asset allocation recommendations of investment advisors.

A second approach uses fundamental data to deduce risk premia. Gebhardt, Lee and Swaminathan (2000) use firm level cash flow forecasts to derive an internal rate of return, or cost of capital, given the current stock price. Fama and French (2001) study the risk premia on the S&P 500 from 1872-2000 using fundamental data. They argue that the ex ante risk premia is between 2.55% and 4.32% for 1951-2000 period which is much lower than the historical average excess returns. Ibbotson and Chen (2001) estimate a long-term risk premium between 4 and 6%.

The final approach to estimate the equity risk premium category directly measures investor’s and analyst expectations using survey methods. For example, Welch (2000) analyzes the views of financial economists. Fraser (2001) and Harris and Marston (2001) consider the evidence from financial analysts.

We, instead, survey CFOs. We think that this approach has several advantages. First, one could argue that the financial economists are not directly connected to the allocation decisions in the economy - either capital allocation (financial investment decisions) or real allocation (choosing real investment projects).
CFOs, in contrast, are directly involved in their firms’ financial and real allocation decisions.

The CFOs determine the hurdle rate for their firm’s investments, and presumably, the equity risk premium plays an important role. Indeed, the evidence in Graham and Harvey (2001) indicates that three-fourths of firms use the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965) to establish their cost of capital. The equity risk premium is a critical input into the CAPM.

Second, biases in analysts’ earnings expectations are well documented. Claus and Thomas (2001) use analysts’ earnings expectations to derive an estimated market risk premium of 3.4%. However, to obtain a risk premium this low they dampen the analysts’ earnings growth projections for earnings more than five years in the future. When growth is not dampened, Harris and Marston (2001) find an implicit risk premium of 9.2% in 1998. More to the point, Brav and Lehavy (2001) show that analysts’ target stock returns are also biased upward. Brav and Lehavy find that analysts’ target prices predict a 22% average annual increase in stock prices from 1997-1999, while realized returns average only 15%. In contrast, there is no reason to think that CFOs are biased in their view of the market equity premium.

Our paper offers much more than a survey of CFO’s expectations for the market. Our survey is multiyear and rich with additional information. We ask CFOs about their expectations of market performance over both one and 10-year horizons. We ask questions designed to determine their assessment of market volatility. These questions allow us to deduce each CFO’s view about the distribution for the market risk premium, and we can observe how the shape and location of these distributions vary with market conditions.

The temporal dimension distinguishes our work from most previous survey work. We are able to address issues such as whether volatility and the risk premium are positively correlated through time. We are able to determine whether
recent stock market performance changes expected returns. The interplay of recent equity performance and volatility expectations allows us to say something about asymmetric volatility. Our survey even allows us to deduce a measure of ex ante skewness.

While the surveys are anonymous, we have information on each respondent’s industry, size by revenue, number of employees, headquarters location, ownership and percentage of foreign sales. We use this information to see if there are systematic differences in expectations based on firm characteristics.

Importantly, this is on-going research. We have conducted surveys representing over 1,900 total responses, from the second quarter of 2000 through the first quarter of 2002. We plan to update this paper as new surveys are conducted.

Our results indicate that the one-year risk premium averages between 0.4 and 5.2 percent depending on the quarter surveyed. The 10-year premium is much less variable and ranges between 3.0 and 4.7 percent. We find that the CFOs’ assessment of market volatility is much lower than popular alternative measures, strongly suggesting that CFOs are very confident in their opinions (i.e., their individual distributions for the market risk premium are tight).

We also find that the recent performance of the S&P 500 has a significant effect on the short-term expected risk premium as well as forecasted volatility. Recent stock market performance also has a pronounced effect on CFO’s ex ante skewness. In general, when recent stock market returns have been low, the expected risk premium is low, its distribution has a relatively fat left tail, and expected market volatility is high. We document a negative ex ante relation between expected returns and expected volatility at the one-year horizon and a positive relation at the 10-year horizon. Our results support the notion of a positive tradeoff between risk and expected return – but only at longer horizons.
Finally, one of our surveys was FAXed during the morning of September 10, 2001. Given the events of the next day, we are able to see how respondents’ assessments of risk and expected return changed amid a crisis situation.

The paper is organized as follows. The second section details the methodology and the sampling procedure. The results are presented in the third section. An analysis conditional on firm characteristics is outlined in the fourth section. Some concluding remarks are offered in the final section.

2. Methodology

2.1 Design

The quarterly survey project is a joint effort with Financial Executives International (FEI). FEI has approximately 14,000 members that hold policy-making positions as CFOs, treasurers, and controllers at 8,000 companies throughout the U.S. and Canada. Every quarter, Duke University and FEI poll these financial officers with a one-page survey on important topical issues (Graham, 1999). The usual response rate for the quarterly survey is 5%-8%.

The history of the survey instrument appears on the Internet at the address http://www.duke.edu/~charvey/Research/indexr.htm. Exhibit 1 details the exact questions that we ask regarding the equity premium.

2.2 Delivery and response

The survey is administered by a third-party data processing firm (Office Remedies Inc.). FEI faxes out approximately 4,000 surveys to a sample of their membership. The executives return their completed surveys by fax to the third-party data vendor. Using a third party ensures that the survey responses are anonymous. Although we do not know the identity of the survey respondents, we do know a number of firm-specific characteristics, as discussed below. FEI
changed the delivery mechanism to the Internet as of the December 4, 2001 survey. Among other things, we now collect the IP addresses (though not their identity or company) of the respondents and are now able examine consistency of respondents across different surveys.

The surveys analyzed in this paper were distributed on the following days: June 6, 2000; September 7, 2000; December 4, 2000; March 12, 2001; June 7, 2001, September 10, 2001, December 4, 2001, March 11, 2002, and June 4, 2002. In each case, the survey contained information about the yield on the 10-year Treasury bond at the close of the previous business day, and the respondents were given approximately five business days to return the survey. The date and time the survey is received is recorded on the survey. This allows us to examine if recent equity returns impact the CFOs’ responses when they fill out the survey. Usually, two-thirds of the surveys are usually returned within two business days.

We also conducted a survey at the North Carolina CFO Symposium on August 22, 2000. In this case, we were able to obtain a response from nearly every executive in the room. By comparing these responses with the other quarterly survey responses, we are able to examine whether the response rate on the quarterly survey affects the CFO predictions about the equity market risk premium. (For example, perhaps predominantly “optimists” respond to the quarterly survey.) The North Carolina CFO survey also gathered some additional information about the 10-year risk premium not found on the quarterly surveys. We find that the responses for the North Carolina CFO survey are consistent with those from the quarterly survey. We integrate the responses from this survey into our main results. In our graphical analysis, we highlight this particular survey with a different symbol.1

1 Later in our analysis, using the non-CFO Symposium data, we test whether headquarters location explains variation in the risk premium across respondents. We find no evidence of a headquarters effect which provides another justification for integrating the CFO Symposium into our results.
2.3 The survey instrument and summary statistics

The risk premium questions are a subset of a larger set of questions in the Duke-FEI quarterly survey of CFOs. Copies of the surveys can be found on the Internet.

We ask respondents for their one- and 10-year forecasts of the S&P500 given the current 10-year Treasury bond rate (see Exhibit 1A for the FAX version and Exhibit 1B for the Internet version). The CFOs also complete the following statement: “During the next year, there is a 1-in-10 chance that the S&P 500 return will be **higher** than ___%” as well as the analogous question for the “lower” equity return. This allows us to examine each respondent’s distribution of expected returns. We can recover a measure of volatility as well as skewness from each individual’s responses.

While the survey is anonymous, we ask questions about the firms' characteristics. Fig. 1 presents summary information about the firms in our sample. For this figure, we do not include the characteristics of the firms that participated in the North Carolina CFO Symposium – but concentrate on the quarterly survey participants. We examine three characteristics: industry, revenue, and number of employees.

3. The market risk premium and volatility

3.1 Risk premium

For the ex ante one and ten-year risk premia, we calculate a histogram for each quarter’s survey.\(^2\) These 18 histograms are available on the Internet. Fig. 2 focuses on two quarters’ histograms: March 12, 2001 and March 11, 2002. These

\(^2\) We trim the data by removing the two highest and lowest forecasted returns. This is roughly equivalent to a 1 percent trim. This serves to remove some questionable responses. For example, one respondent thought the average annual equity market return over the next 10 years would be 50 percent. The non-robust results are available on request.
two quarters are chosen on the basis of past equity market performance. The survey of March 12, 2001 followed a substantial downward move in the equity market (the S&P 500 lost 12% in the month prior to the survey). The survey of March 11, 2002 followed a substantial upward move in the market (the S&P 500 gained 6% in the month prior to the survey).

The one-year premium is presented in panels A and B of Fig. 2. The mean (median) premium from the March 12, 2001 survey following poor market performance is 0.9% (0.6%). The mean (median) premium from the March 11, 2002 survey following positive market performance is 5.2% (4.0%). The one-year premium histograms suggest that respondents’ assessments of future returns are influenced by past returns.

In panels C and D of Fig. 2, the ten-year risk premium is much more stable. The survey that followed the negative market episode suggests a mean (median) premium of 4.4% (4.1%) whereas the survey following positive returns had a mean (median) premium of 3.0% (2.7%). This preliminary look at the data suggests that the longer-term expectations are influenced by different factors. The ten-year expectations are consistent with the idea that if the market has risen (fallen), expected returns are lower (higher) – the idea of mean reversion in expectations. However, the small difference between the ten-year premia make it unlikely that the difference is statistically significant.

Fig. 2 examines only two quarters. In Fig 3, we use mean premiums from each of the quarterly surveys to examine whether the past quarter's market performance affects the average risk premium.\(^3\) In panel A of Fig. 3, there is a strong positive relation between the one-year risk premium and the previous quarter's return. Note that the data for the North Carolina CFO survey is presented with a different

\(^3\) We also examined the past month’s return. The results are broadly similar and are available on request. We considered the analysis on medians. Again, the results were very similar.
symbol, a circle. The results of this survey do not appear unusual. Panel B shows that there is no relation between recent quarterly returns and the ten-year risk premium. While CFOs’ assessments of the one-year risk premium appear heavily influenced by recent returns, there is no such influence on the ten-year premium.

Table 1 presents regressions that use all of the data (rather than the means of the surveys which are presented in Fig. 3). We estimate weighted least squares regressions where the weights are the inverse of each quarter’s variance. Consistent with the graphical analysis, recent realized returns significantly impact the respondents’ forecasts of the one-year premium. There is an insignificant (at the 5% level) negative relation between the previous quarter’s return and the 10-year premium and a negative (but economically small) effect if we examine the previous month’s return. Our one-year results might be capturing an “expectational” momentum effect. Momentum occurs when future returns are related to past returns. We find that expected future returns are related to past returns.

It is also interesting to inquire whether expected risk premium are related to past expected risk premia. While we do not know the identity of the survey respondents, for the last two surveys we have collected each respondent’s IP address. In unreported results, we find a strong positive relation between the expected one-year premium and the past quarter’s expected one-year premium. While this is not particularly surprising because of the overlap in forecasting horizons (three quarters), if there were no relation, it would open up the

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5 Given that we know the day that the survey was returned, we also investigate whether the past day’s return affects the forecasted risk premium. We find evidence that the past day’s return has an impact on the one-year forecast and little impact on the ten-year forecast. These results are available on request.

6 This is also consistent with Welch (2001) who shows in a survey of economists that the mean one-year premium in 1998 was 5.8% (near the peak of the stock market) and only 3.4% in 2001 (after a sizable retreat in the market).
possibility that the CFOs are just throwing darts. The correlation suggests a degree of consistency in the forecasts.

3.2 Volatility and disagreement

We use Davidson and Cooper’s (1976) method to recover the probability distribution:

\[
\text{Variance} = \left(\frac{x(0.90) - x(0.10)}{2.65}\right)^2
\]

where \(x(0.90)\) and \(x(0.10)\) represent the 90th and 10th percentile of the respondent’s distribution. Keefer and Bodily (1983) show that this simple approximation is the preferred method of estimating the variance of a probability distribution of random variables, given information about the 10th and 90th percentiles. Note that this method allows us to estimate the market variance for each individual survey response.

We present the March 11, 2001 and March 12, 2002 distributions of the individual volatilities in panels A and B of Fig. 4. Notice that the average of individual volatility after the quarter with large negative returns is 6.8 percent. In contrast, the average volatility is only 4.9 percent after the positive returns in the first quarter of 2002. This is suggestive of a negative relation between past returns and ex ante volatility.

There is another interesting observation from the histograms. In both cases, the mean annual volatility is less than eight percent on an annual basis. Indeed, the mean volatility is less than eight percent in every one of our surveys. This is sharply lower than other benchmark measures of volatility, such as the implied volatility on S&P100 index options (VIX). During this time period, the VIX trades between 21 and 35%. However, the VIX roughly measures the standard

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7 Histograms of the individual volatilities from other quarters’ surveys are available on the Internet.
deviation of daily returns over the next month whereas we are looking for a longer-term volatility. But even if we examine the historical standard deviation of one-year returns (13.0% 1980-2000; 20.1% 1926-2000), the difference between this benchmark and the individual responses suggests that there is a large gap between the individual and market’s assessments of volatility. Because the CFO’s distributions are very tight, another interpretation is that the CFOs are very confident in their risk premium assessments.

While many studies have econometrically documented a relation between the past returns and volatility, to the best of our knowledge, we are the first to examine the relation in the context of survey evidence. Panel A of Fig. 5 shows an insignificant negative relation between the average of the individual ex ante volatilities and the previous quarter's return. The regression evidence in Table 2 that uses all the observations is also shows no consistent relation.

Importantly, market volatility is not the average of individual volatilities. To see this, it is possible that everybody has highly confident forecasts (low individual volatility) but considerable disagreement exists across individuals (high cross-sectional dispersion in the risk premium forecasts).

Panel B of Fig. 5 explores this second component of market volatility -- the notion of disagreement. Our evidence suggests a significantly negative relation between disagreement and recent returns. That is, large negative returns are

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8 There are fewer observations in Tables 2 and 3 than Table 1 because a number of respondents did not fill in the range questions.

9 Market variance is the sum of the average of the forecasters’ variances and the variance of the forecasters’ means, \( \text{Var}_r = \text{E}[\text{Var}(r|Z)] + \text{Var}(\text{E}[r|Z]) \), where \( r \) is the market return, \( Z \) is the information that the CFOs use to form their forecasts, \( \text{E}[r|Z] \) the expected risk premium conditional on the CFO’s information (their forecast), \( \text{E}[\text{Var}(r|Z)] \) is the average of each CFO’s individual volatility estimate, and \( \text{Var}(\text{E}[r|Z]) \) is disagreement volatility or the variance of the CFO’s forecasts of the premium.
associated with a lot of disagreement. The effect is robust to using the previous month instead of the previous quarter's return (unreported).\footnote{In looking at Fig. 5, there is a possibility that with high past excess returns, volatility increases. However, this is entirely driven by a single data point, green square.}

Panel C of Fig. 5 examines disagreement over the ten-year risk premium and past returns. With this longer horizon forecast, there is no relation between disagreement and past returns.

Finally, it is natural to inquire whether expectations of volatility are autoregressive. Such a relation is foundational for the econometric models pioneered by Engle (1982) and Bollerslev (1986). In contrast to previous research, we observe both ex post volatility and ex ante volatility. Our survey has already shown that negative past returns impact ex ante volatility. In unreported results, we test whether past realized volatility forecasts future ex ante volatility (both disagreement and average). We measure past volatility as the standard deviation of daily returns over the past quarter. There is no significant relation between ex post standard deviation and ex ante standard deviation. We also look at past values of the VIX and test whether there is information in the VIX that is relevant for future ex ante volatility. For both average and disagreement volatility, there is a significant positive relation between the ex ante measure of volatility and the past VIX.

3.3 Asymmetry in distributions

The survey also captures information on skewness in the individual distributions, which we call asymmetry. We employ a simple metric of asymmetry. We look at the difference between each individual’s 90% tail and the mean forecast and the mean minus the 10% tail. Hence, if the respondent's forecast of the risk premium is 6% and the tails are -8% and +11%, then the distribution is negatively skewed with a value of -9%.
Panels C and D of Fig. 4 presents histograms of this asymmetry measure for the March 11, 2001 and March 12, 2002 surveys. In both of these surveys, the average asymmetry is negative. Indeed, we see negative average asymmetry in all of the quarterly surveys. However, the histograms suggest more negative asymmetry after negative returns.\footnote{11}

Fig. 6 combines the information from all the surveys and finds a significant positive relation between recent returns and asymmetry. Large negative returns are associated with negative asymmetry in the respondents’ distribution of the ex ante risk premium. Table 3 confirms the significant positive relation in all four specifications.

3.4 The relation between expected returns and volatility

Our results offer some new insights on the modeling of volatility. We have already demonstrated that low or negative realized returns are associated with higher expected volatility and more negative asymmetry in the ex ante returns distributions. This is consistent with the statistical evidence of asymmetry in GARCH modeling (e.g., Nelson (1992) and Glosten, Jagannathan and Runkle (1994)). The statistical evidence usually relies on the leverage hypothesis of Black (1976) and Christie (1982). We refer to this work as statistical evidence because the volatility is measured statistically from past returns data.\footnote{12} We offer corroboration by linking past returns to a survey-based ex ante measure of volatility.

Given that we have new measures of expected (rather than realized) returns and ex ante volatility, we can say something about the link between expected returns to expected risk – a fundamental component of asset pricing theory. Indeed, there is a considerable research on this topic which exclusively relies on statistical

\footnote{11} A complete set of histograms is available on the Internet.
measures of both the mean and volatility based on historical data. However, the literature is evenly split on whether there is a positive relation or a negative relation between the mean and volatility.


Though our sample size is limited, we are able to document the relation between a survey-based ex-ante mean and volatility over our surveys. Panel A of Fig. 7 shows there is a negative relation between the one-year mean and the average volatility. The relation is sharper with disagreement volatility (panel B).\footnote{Figlewski and Wang (2001) re-examine the leverage effect using options implied volatility as an alternative to volatility estimated from past returns.}

Almost all of the past research focuses on short-horizon forecasts of the risk premium and volatility. Our results link well to this past research. However, we also offer some insights on longer-term forecasts. While we only have a measure of disagreement for the one-year forecasts (we do not ask respondents about the 10\textsuperscript{th} and 90\textsuperscript{th} percentiles of the 10-year distribution and, therefore, cannot deduce 10-year volatility\footnote{We have begun to ask this question on the Internet survey. To date, we have only three surveys.}), our evidence suggests a significantly positive relation...
between expected returns and expected risk in panel C of Fig. 7. That is, the ex ante relation between mean and volatility appears to be sensitive to the time horizon.

It is possible that the difference between the short-horizon and long-horizon provides some resolution to the conflicting findings in the literature. It seems reasonable that short-horizon expected returns could move around substantially producing either a positive or negative expected returns. Longer horizon returns, on the other hand, are more stable, as we document.

Pástor and Stambaugh (2001) have recently presented a Bayesian analysis of long-horizon risk premia. They find that the risk premium in the 1990s is 4.8% which is consistent with our results. However, a critical component of their analysis is the tying of their prior to a positive relation between the premium and volatility. If Pástor and Stambaugh instead chose a diffuse prior relation between volatility and the premium, their estimate of the risk premium in June 1999 rises dramatically to 27.7%. The lower risk premium in the 1990s in the face of high ex post average returns is a result of lower volatility in the market.\textsuperscript{15} Our results support the prior they impose.\textsuperscript{16}

\subsection*{3.5 Do firm characteristics impact expectations?}

Our survey collects information on six firm characteristics: industry, revenue, number of employees, headquarters location, ownership and percentage of sales from foreign sources. It is possible that expectations of market-wide measures like the risk premium might depend on firm characteristics. For example, we have

\textsuperscript{15} Pastor and Stambaugh show the volatility is 12.8% in the 1990s compared to 17.0% in their full sample.

\textsuperscript{16} As a robustness check, we obtain data from the Federal Reserve Board of Philadelphia’s Survey of Professional Forecasters. Once a year, the quarterly survey asks a question about the respondent’s expected 10-year return on the S&P 500 index. While the data are quite noisy, there is a weak positive relation between disagreement and the 10-year premium.
established that the one-year premium depends on past market returns. Is the premium significantly different across the respondents’ industries? Given that a market-wide measure is being forecasted, our null hypothesis is that there are no significant differences across firm characteristics.

In unreported results, we estimate six regression models (one for each of the characteristics). We regress the risk premium on a series of indicator variables representing fixed effects for each firm characteristic. We also include an indicator variable for each survey date. In all six regressions, the coefficients on the characteristic indicators are not significant at the usual levels of confidence. As a result, we do not reject the null hypothesis that firms’ characteristics have no impact on market-wide expectations.

3.6 The September 11, 2001 crisis

One of our surveys was faxed to CFOs at 8:00am on September 10, 2001. The results in the tables and figures only include data for September 10 from that quarter’s survey. However, we have responses that were returned after the crisis. Although the post-crisis sample is small, it allows us to examine the impact of a shock to systematic risk (assuming terrorism is undiversifiable in world markets).

Table 4 presents summary statistics for both the September 10 and the post-September 11 sample. We exclude September 11 because some of the surveys we received may have been completed the day before.

The first panel examines the one-year premium which decreases from 0.05% to –0.70% even though both measures of volatility increase substantially. The second panel shows an increase in the 10-year premium from 3.63% to 4.82%. Consistent with the one-year analysis, the volatility increases. While these differences are economically interesting, they are not significantly different because of the small number of observations in the post-September 11 sample.
3.7 Horizon and cost of capital

The differences between the one-year premium and the ten-year premium in Table 4 is consistent with our other analysis: the one-year premium seems to be very sensitive to current events and the ten-year premium seems to obey a positive risk-expected return tradeoff. A natural question is why.

One hypothesis is that the responses to the one-year premium are what the CFOs think will happen near-term in the market – not necessarily what they would require to make a capital investment. Following the December 4, 2001 survey, we randomly selected a small group of CFOs for telephone interviews. The format was simple. First, we asked them the questions on the survey. If the one-year risk premium was different from the ten-year, we asked them an open ended “why”. If the numbers were the same, we asked them whether there would be a scenario where they would be different and “why”. Third, we asked them how they used the risk premium in their cost of capital. While the number of interviews was small (four), their responses were remarkably consistent.

Each respondent provided a reason describing why the one-year expected market return was different from the ten-year expected return. Three explicitly mentioned the recessionary conditions and believed that the one-year return would be lower than average. Each respondent believed that the ten-year expected return reflects “long-term required returns” of equity investors.

With regard to the mechanism that linked the risk premium to their cost of capital, each firm said they used the capital asset pricing model. Three of four firms said they always used the ten-year premium in their cost of capital model – even if the project had a shorter duration. The fourth firm always used the ten-year premium because the minimum life of their projects was ten years.

While these interviews represent a far less comprehensive sample – compared to our 1900+ respondents in the quarterly surveys, they provide valuable information. From the corporate finance perspective, the only risk premium that
appears relevant is the ten-year premium. From an investment perspective, it is reassuring that it is this same ten-year premium that obeys the positive risk/expected return tradeoff.

6. Conclusions

While surveys of the risk premium are not new, we provide a number of new insights. First, we survey Chief Financial Officers of U.S. corporations and argue that they are uniquely well suited to assess the risk premium given that they routinely use this input in their capital allocation decisions. In addition, we are not particularly concerned that the CFOs are biased in their assessment of the premium – a concern that we have for surveys of financial analysts.

Our survey is designed to look at different horizons (one-year versus ten-year) and, most importantly, to recover the distribution of the risk premium through time. Our survey evidence finds that the one-year premium varies between 0.4 and 5.2% and the 10-year premium falls in the 3.0 to 4.7% range. We find that recent past stock market performance has a large effect on the expected one-year premium and only a small effect on the ten-year premium.

We find that past returns impact volatility as well as the degree of asymmetry in the respondents’ distributions. Indeed, we find evidence that recent low returns are associated with higher volatility and more negative asymmetry (i.e., relatively large left tails in the distributions of the expected risk premium). Our evidence supports the statistical evidence that negative return shocks increase volatility.

We also attempt to shed light on the relation between expected return and risk. All previous research has relied on historical data to statistically measure the mean and the variance and this research is split on whether there is a positive relation or negative relation between reward and risk. Our evidence suggests that at the one-year horizon there is a negative relation between the mean and the variance. This poses a challenge to asset pricing theory which requires a positive
tradeoff between risk and expected return. However, at the 10-year horizon, there is evidence of a significantly positive relation.

While we have over 1,900 survey responses, much of the analysis relies on ten aggregated observations. Indeed, this is the reason that we have mainly presented the data graphically. By viewing these data, each reader can judge the influence of particular observations. Our goal is to continue the survey and dynamically augment this research as new results arrive.

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Exhibit 1A

FAX survey question regarding the risk premium
Format from surveys administered from June 6, 2000 to September 10, 2001

4. On June 6th, the annual yield on 10-yr treasury bonds was 5.3%. Please complete the following:*  
a) Best Guess: Over the next 10 years, I expect the S&P 500 will average a ______% annual return  
b) Best Guess: During the next year, I expect the S&P to return ______%  
c) High range: During the next year, there is a 1-in-10 chance the S&P 500 return will be higher than _____%  
d) Low range: During the next year, there is a 1-in-10 chance the S&P 500 return will be lower than _____%  

*Drawn from the survey of June 7, 2001. The rate on the 10-year Treasury bond changes in each survey.
FEI/Duke CFO Outlook Survey

All information will be used only in aggregate form. No individual data is recorded or made public. Please respond by midnight ET, Jan 6th. If you have any questions about the survey, please contact us.

Over the next 11 years, I expect the average annual S&P 500 return will be:

<table>
<thead>
<tr>
<th>Worst Case</th>
<th>Expected</th>
<th>Best Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

During the next 11 years, I expect the S&P 500 return will be:

<table>
<thead>
<tr>
<th>Worst Case</th>
<th>Expected</th>
<th>Best Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

Please check one from each category that best describes your company:

**a. Industry**

- Natural Resources
- Mining/Construction
- Manufacturing
- Transportation/Energy
- Communications/Media
- Tech/Software/Robotics
- Banking/Finance/Insurance
- Services/Consulting
- Other

**b. Sales Revenue**

- Less than $25 million
- $25-50 million
- $50-100 million
- $100-500 million
- $500-1 billion
- Over $1 billion

**c. Market Capitalization**

- Under $1B
- $1-5B
- $5-10B
- $10-50B
- $50-100B
- Over $100B

**d. Headquarters**

- Northeast
- Midwest
- South Central
- South Atlantic
- Pacific

**e. Ownership**

- Public: NYSE
- Public: NASDAQ
- Private

**f. Foreign Sales**

- None
- 1-25%
- 26-50%
- Over 50%

Click to print
The characteristics of the survey respondents' firms

A. Industry

B. Revenue ($ million)

C. Employment

Fig. 1
The distribution of survey respondents' assessment of the one-year and 10-year risk premium

Fig. 2

A. One-year premium, March 12, 2001

- Average expected premium = 0.87%
- Median expected premium = 0.57%
- Risk free = 4.43%
- Std. dev. = 5.25%
- Skewness = -0.86%
- Responses = 133

B. One-year premium, March 11, 2002

- Average expected premium = 5.17%
- Median expected premium = 4.0%
- Risk free = 2.0%
- Std. dev. = 3.19%
- Skewness = 0.72%
- Responses = 227

C. Ten-year premium, March 12, 2001

- Average expected premium = 4.41%
- Median expected premium = 4.1%
- Risk free = 4.9%
- Std. dev. = 2.52%
- Skewness = 0.28%
- Responses = 136

D. Ten-year premium, March 12, 2001

- Average expected premium = 2.96%
- Median expected premium = 2.7%
- Risk free = 5.3%
- Std. dev. = 2.02%
- Skewness = 0.19%
- Responses = 232

Fig. 2
Past returns and the ex-ante risk premium

A. One-year risk premium forecast vs. past market return

\[ y = 3.0165 + 0.1298x \]
\[ R^2 = 0.5378 \]

B. Ten-year forecast vs. market return

\[ y = 3.9002 - 0.0008x \]
\[ R^2 = 0.0001 \]
The distribution of survey respondents' assessment of volatility and skewness of the one-year risk premium

A. One-year volatility: March 12, 2001

B. One-year volatility: March 14, 2002

C. One-year asymmetry: March 12, 2001

D. One-year asymmetry: March 14, 2002

Fig. 4
Past returns and ex-ante volatility

A. Average of individual volatilities of one-year forecast vs. market return

\[ y = 6.2258 - 0.0054x \]
\[ R^2 = 0.0018 \]

B. Disagreement (std. dev. of one-year forecasts) vs. market return

\[ y = -0.0599x + 3.717 \]
\[ R^2 = 0.1702 \]

C. Disagreement (std. dev. of 10-year forecast) vs. market return

\[ y = 2.2625 - 0.014x \]
\[ R^2 = 0.1436 \]
Past returns and ex-ante skewness

\[ y = -1.7802 + 0.0653x \]
\[ R^2 = 0.167 \]

Excess market return for previous quarter

Fig. 6
Ex-ante risk premium and ex-ante volatility

A. One-year premium vs. average volatility

\[ y = 6.1308 - 0.556x \]
\[ R^2 = 0.1592 \]

B. One-year premium vs. standard deviation (disagreement)

\[ y = 4.8994 - 0.5767x \]
\[ R^2 = 0.224 \]

C. Ten-year premium vs. standard deviation (disagreement)

\[ y = 2.1436 + 0.7644x \]
\[ R^2 = 0.1726 \]
Table 1
The impact of past returns on the ex-ante risk premium

<table>
<thead>
<tr>
<th></th>
<th>One-year premium</th>
<th></th>
<th>ten-year premium</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Previous return</td>
<td>Previous month's return</td>
<td>Previous return</td>
<td>Previous month's return</td>
</tr>
<tr>
<td><strong>Intercept</strong></td>
<td>3.41</td>
<td>2.98</td>
<td>3.78</td>
<td>3.81</td>
</tr>
<tr>
<td><strong>T ratio</strong></td>
<td>36.94</td>
<td>33.78</td>
<td>70.30</td>
<td>72.70</td>
</tr>
<tr>
<td>Previous return</td>
<td>0.11</td>
<td>0.281</td>
<td>-0.012</td>
<td>-0.036</td>
</tr>
<tr>
<td><strong>T ratio</strong></td>
<td>8.36</td>
<td>11.72</td>
<td>-1.85</td>
<td>-3.26</td>
</tr>
<tr>
<td>Adj. R²</td>
<td>0.035</td>
<td>0.067</td>
<td>0.001</td>
<td>0.005</td>
</tr>
<tr>
<td>Observations</td>
<td>1911</td>
<td>1911</td>
<td>1926</td>
<td>1926</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>One-year premium</th>
<th></th>
<th>ten-year premium</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Previous return</td>
<td>Previous month's return</td>
<td>Previous return</td>
<td>Previous month's return</td>
</tr>
<tr>
<td><strong>Intercept</strong></td>
<td>3.44</td>
<td>2.96</td>
<td>3.77</td>
<td>3.80</td>
</tr>
<tr>
<td><strong>T ratio</strong></td>
<td>35.73</td>
<td>32.77</td>
<td>69.20</td>
<td>71.85</td>
</tr>
<tr>
<td>Previous return</td>
<td>0.111</td>
<td>0.281</td>
<td>-0.013</td>
<td>-0.036</td>
</tr>
<tr>
<td><strong>T ratio</strong></td>
<td>8.42</td>
<td>11.68</td>
<td>-1.98</td>
<td>-3.27</td>
</tr>
<tr>
<td>Adj. R²</td>
<td>0.036</td>
<td>0.067</td>
<td>0.002</td>
<td>0.005</td>
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<tr>
<td>Observations</td>
<td>1880</td>
<td>1880</td>
<td>1892</td>
<td>1892</td>
</tr>
</tbody>
</table>
Table 2
The impact of past returns on ex-ante volatility

<table>
<thead>
<tr>
<th></th>
<th>A. Including CFO symposium</th>
<th>B. Excluding CFO symposium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One-year forecast volatility</td>
<td>One-year forecast volatility</td>
</tr>
<tr>
<td></td>
<td>Previous quarter's return</td>
<td>Previous month's return</td>
</tr>
<tr>
<td>Intercept</td>
<td>6.07</td>
<td>5.98</td>
</tr>
<tr>
<td>T ratio</td>
<td>54.13</td>
<td>58.64</td>
</tr>
<tr>
<td>Previous return</td>
<td>0.027</td>
<td>-0.042</td>
</tr>
<tr>
<td>T ratio</td>
<td>1.87</td>
<td>-1.60</td>
</tr>
<tr>
<td>Adj. R²</td>
<td>0.002</td>
<td>0.001</td>
</tr>
<tr>
<td>Observations</td>
<td>1534</td>
<td>1534</td>
</tr>
</tbody>
</table>

|                     | Previous quarter's return  | Previous month's return     |
| Intercept           | 6.16                        | 6.04                        |
| T ratio             | 53.25                       | 58.25                       |
| Previous return     | 0.038                       | -0.040                      |
| T ratio             | 2.56                        | -1.53                       |
| Adj. R²             | 0.004                       | 0.001                       |
| Observations        | 1506                        | 1506                        |
Table 3
The impact of past returns on ex-ante skewness

<table>
<thead>
<tr>
<th></th>
<th>A. Including CFO symposium</th>
<th></th>
<th>B. Excluding CFO symposium</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>One-year forecast asymmetry</td>
<td></td>
<td>One-year forecast asymmetry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Previous quarter's return</td>
<td>Previous month's return</td>
<td>Previous quarter's return</td>
<td>Previous month's return</td>
</tr>
<tr>
<td>Intercept</td>
<td>-2.02</td>
<td>-2.27</td>
<td>-2.21</td>
<td>-2.41</td>
</tr>
<tr>
<td>$T$ ratio</td>
<td>-11.09</td>
<td>-13.94</td>
<td>-11.43</td>
<td>-14.46</td>
</tr>
<tr>
<td>Previous return</td>
<td>0.073</td>
<td>0.085</td>
<td>0.053</td>
<td>0.078</td>
</tr>
<tr>
<td>$T$ ratio</td>
<td>3.30</td>
<td>2.31</td>
<td>2.31</td>
<td>2.11</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.006</td>
<td>0.003</td>
<td>0.003</td>
<td>23.000</td>
</tr>
<tr>
<td>Observations</td>
<td>1534</td>
<td>1534</td>
<td>1506</td>
<td>1506</td>
</tr>
</tbody>
</table>
Table 4
The impact of the September 11, 2001 crisis on expectations

<table>
<thead>
<tr>
<th></th>
<th>Pre-September 11</th>
<th>Post-September 11*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>One-year risk premium</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean premium</td>
<td>0.05</td>
<td>-0.70</td>
</tr>
<tr>
<td>Std. dev. (disagreement)</td>
<td>6.61</td>
<td>7.86</td>
</tr>
<tr>
<td>Std. dev. (average of individual volatilities)</td>
<td>6.79</td>
<td>9.76</td>
</tr>
<tr>
<td>Asymmetry (disagreement)</td>
<td>-2.24</td>
<td>1.96</td>
</tr>
<tr>
<td>Asymmetry (average of individual asymmetries)</td>
<td>-0.82</td>
<td>-0.57</td>
</tr>
<tr>
<td>Observations</td>
<td>125</td>
<td>33</td>
</tr>
</tbody>
</table>

| **Ten-year risk premium** |                  |                    |
| Mean premium             | 3.63             | 4.82               |
| Std. dev. (disagreement) | 2.36             | 3.03               |
| Asymmetry (disagreement) | -0.36            | 0.14               |
| Observations             | 127              | 33                 |

*SURVEYS FAXED ON SEPTEMBER 11 WERE EXCLUDED FROM BOTH SAMPLES.*