Expectations of equity risk premia, volatility and asymmetry from a corporate finance perspective

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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 of U.S. corporations. Currently, we have responses from five surveys conducted over the second quarter of 2000 through the first quarter of 2001. The results in this working paper will be augmented as future surveys become available. We find direct evidence that the one and 10-year expected risk premia change through time. In particular, CFOs significantly reduce their market forecasts after periods of negative market returns. We find that the variance implicit in the CFO’s responses increases as ex ante market returns decrease. We also document that the negative asymmetry in returns distributions increases after negative market returns. We test whether the expectation of the market premium differs depending on the characteristics of the CFOs’ firms.

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1. Introduction

The current market capitalization of U.S. equities is approximately $15 trillion. A shift in the equity risk premium by just one percent could add or subtract at least $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. 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 new 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 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.

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 historical average is the method with the longest history. However, there are other time-series methods that use measures like dividend yields to forecast and short-horizon premia. These models are difficult to estimate and potentially 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 could 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 much lower than the historical average, between 2.55% and 4.32% for 1951-2000.

The final approach to estimate the equity risk premium category directly measures investor’s expectations using survey methods. However, one problem with previous surveys is that they do not survey investors. For example, Welch (2000) analyzes the views of financial economists. Fraser (2001) and Harris and Marston (2001) consider the evidence from financial analysts.
Instead, we 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.

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. More to the point, Brav and Lehavy (2001) show that analysts’ target stock prices are also biased upward. On average, Brav and Lehavy find that analysts’ target prices predict a 22% annual increase in stock prices, while realized returns average only 15% from 1997-1999. In contrast, there is no particular reason to think that CFOs are biased in their view of the market equity premium.

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) andLintner (1965) to establish their cost of capital. The equity risk premium is a critical input into the CAPM.

Our paper offers much more than a survey of CFO’s expectations for the market. Our multiyear survey is 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 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 equity 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 survey is anonymous, we have information on each respondent’s industry, size by revenue, size by 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 five surveys, representing approximately 820 total responses, from the second quarter of 2000 through the first quarter of 2001. We plan to update this working paper as new surveys are conducted.

The results indicate that the average one-year risk premium averages between 0.4 and 3.0 percent depending on the quarter surveyed. The 10-year premium is much less variable and ranges between 4.2 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. Finally, 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.

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 the 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 the 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. Table 1 details the exact questions that were asked regarding the equity premium. [Table 1 to be completed.]

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. We feel that anonymity is important to obtain frank answers to some of the questions. Although we do not know the identity of the survey respondents, as mentioned previously, we do know a number of firm-specific characteristics, as discussed below.

The surveys analyzed in this paper were distributed on the following days: June 6, 2000; September 7, 2000; December 4, 2000; March 12, 2001. 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. Two-thirds of the surveys are usually returned within two business days.

We also surveyed a group of North Carolina bank CFOs 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 faxed 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
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 each 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. We also ask “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 response.

While the survey is anonymous, we ask questions about the firms' characteristics. Fig. 1 presents summary information about the firms in our sample. We examine six characteristics: industry, size by revenue, size by number of employees, headquarters location, ownership and percentage of foreign sales. [Fig. 1 – to be completed.]

3. The market risk premium and volatility

3.1 Risk premium

Fig. 2 and 3 present histograms of the ex ante one-year and 10-year risk premia. In Fig 2., the average one-year risk premium ranges from 0.4% (March 12, 2001 survey) to 3.0% (December 4, 2000). Each of the graphs contains the previous week and previous month's S&P 500 return. Note that the market return was negative preceding the March 12, 2001 survey, and that the average risk premium is the lowest for this survey, 0.4%.

In Fig. 3, the 10-year risk premium is much more stable ranging from 4.2% (December 4, 2001) to 4.7% (September 7, 2001). Even after the large negative returns in the first quarter of 2001, the survey for the March 12, 2001 shows a 4.5% risk premium.

Fig. 4 and 5 examine whether the past month or past quarter's market performance affects the average one-year and ten-year risk premium. In panel A of Fig. 4, there is a significant relation between the average risk premium and the previous quarter's return. In panel B, the relation is robust to including the fifth survey - the special survey of bankers. Panels C and D shows that the evidence appears stronger if the previous month, rather than quarter is used. However, any correlation analysis would be strongly influenced by the large negative return preceding the second quarter 2001 survey.

Fig. 5 shows that there is a weaker relation between recent quarterly and monthly returns and the 10-year risk premium. There is a positive but insignificant relation between the last quarter's return and the 10-year risk premium. However, the relation for the previous month's return goes the other way. Again, this evidence is consistent with the CFOs’ assessment of the one-year risk
premium being strongly influenced by recent returns. Recent stock market performance appears to have little impact on the 10-year premium.\(^1\)

Table 1 presents regressions that use all of the data (rather than the means of the surveys which are presented in Fig. 4 and 5). Consistent with the figures recent realized returns significantly impact the respondents’ forecasts of the one-year premium. There is no significant relation between the previous return and the 10-year premium. Our one-year results might be capturing a type of momentum effect. Momentum occurs when future returns are related to past returns. We find that expected future returns are related to past returns.

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 90\(^{th}\) and 10\(^{th}\) 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 10\(^{th}\) and 90\(^{th}\) percentiles. Note that this method imputes an estimate of market variance for each individual survey response.

The distribution of the individual volatilities is presented in Fig. 6. In all cases, the mean volatility is less than seven percent on an annual basis. This is sharply lower than other benchmark measures of volatility, such as the implied volatility on S&P100 index options (VIX).\(^2\) During this time period, the VIX trades between 21 and 35%. The difference between the well-known benchmark and the individual responses suggest that there is a large difference between the individual and market’s assessments of volatility.

Fig. 7 shows a negative relation between the average of the ex ante volatilities and both the previous month and quarter’s returns. The negative relation is robust to including the special survey (panels B and D) as well as using the lagged quarter return (panels A and B) or lagged monthly (panels C and D). While many studies have econometrically documented a relation between the mean return and volatility, to the best of our knowledge this is the first survey evidence to support this notion. Our evidence indicates that negative returns are associated with higher ex ante volatility.

However, the regression evidence in Table 2 that uses over 800 observations is much weaker. While there is a negative relation between the ex ante volatility and past returns, the slope coefficient is not significant.

Market volatility is not the average of individual volatilities. To see this, consider the extreme situation where everybody has highly confident forecasts (low individual volatility) but considerable disagreement exists across individuals (high cross-sectional dispersion in the risk premium forecasts). Figure 8 explores this second component of market volatility -- the notion of disagreement.

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1 Given that we know the day that the survey was returned, we also investigated whether the past day’s return impacted the forecasted risk premium. We find evidence that the past day’s return has an impact on the one-year forecast and a smaller impact on the 10-year forecast. These results are available on request.

2 The VIX measures one-month ahead volatility whereas we are trying to recover longer term volatility.
In Panel A, we present the standard deviation of the risk premium forecast in any given quarter versus the excess return for the previous quarter. Though it is hard to detect with so few time-series observations, we test whether there is a quadratic relation between disagreement and previous returns. That is, recent market returns that are large in absolute magnitude lead to more uncertainty about the expected market risk premium. The preliminary evidence needs to be interpreted with caution because the realized negative returns have been fairly large. With the additions of future surveys, we expect to test this notion.

The evidence is suggestive of a negative relation between disagreement and recent returns. That is, large negative returns are associated with a lot of disagreement. We see this in the analysis with and without the special survey. The effect is robust to using the previous month or quarter's return.

Figure 9 repeats this analysis on the 10-year risk premium forecasts. There is no particular relation between disagreement and the 10-year premium in these graphs.

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%.

Figure 10 presents histograms of this asymmetry measure for the four surveys. There is substantial asymmetry in the expectations of the risk premium. Indeed, asymmetric distributions are the rule not the exception. In the early surveys the average asymmetry is positive (e.g., panels A and B). In fact, in the March 12, 2001 survey, ex ante asymmetry is negative. This is the quarter where the previous month's stock market return is very negative.

Fig. 10 is suggestive of a relation between recent return performance and expected asymmetry in the returns distribution. Fig. 11 combines the information in all the surveys. Consistent with Fig. 10, there appears to be a significant positive relation between recent returns (one quarter and one month) and the asymmetry. Large negative returns are associated with negative asymmetry in the respondents' distribution of the ex ante risk premium.

Table 3 confirms the positive relation. Both the lagged one-month and one-quarter returns, significantly positively influence the measure of asymmetry. All the coefficients are more than three standard errors from zero.

3.3 The relation between mean and volatility

Our results offer some new insights on the modeling of volatility. We have already demonstrated that low or negative recent 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. We offer corroboration by linking past returns to a survey-based ex ante measure of volatility.

Moreover, we think our work may be important for asset pricing research. Indeed, asset pricing relates expected returns to expected risk. While the usual practice is to statistically model the expected values based on past returns, we offer an alternative way to represent expectations.

For example, our research offers some insight on the relation between the expected return and volatility. That is, we have new measures of the expected (rather than realized) return and the ex ante volatility. There is a considerable research on this topic which exclusively relies on statistical measures of both the mean and volatility. Indeed, the literature is evenly split on whether there is a positive relation or a negative relation between the mean and volatility.


While our sample is extremely limited in size, we are able to document the relation between a survey-based ex ante mean and volatility over our five surveys. Fig. 12 presents the evidence for three different measures of volatility: the average the respondents’ volatilities, disagreement (standard deviation of risk premium forecasts) and a combined measure.

The combined measure considers the variation in the location of the individual distributions (in addition to considering the volatility of each distribution). If the individual distributions are normally distributed, the appropriate method to aggregate volatility is the mean of the variances plus the variance of the means. However, the individual distributions are not normally distributed (for example, see Fig. 10), and, as such, this is best considered an approximation of market volatility.3

The relation between the mean and the volatility is negative for the one-year analysis. The negative relation is significant but weak for the average volatilities (panels A and B in Figure 12). In comparison, the negative relation between the mean and disagreement is surprisingly strong. Although considerable caution needs to be exercised in interpreting such small samples, the R-square is 99% in panel C and 93% when the banker’s survey is added in panel D. The combined measure of volatility also shows a negative relation albeit weaker than the components (panels E and F in Figure 12).

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 (we do not ask respondents about their distributions for the 10-year forecast), our preliminary evidence suggests a weak positive relation between the mean and volatility. That is, the ex ante relation between mean and volatility appears to be influenced by the time horizon.

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3 We appreciate the insights of Bob Winkler on this particular point.
4. Firm characteristics and the risk premium

[Future research.]

5. 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 give their view on the risk premium given that they routinely need to 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 10-year) and, most importantly, to recover the distribution of the risk premium through time. Our survey evidence finds that one-year premium varies between 0.4 and 3.0% and the 10-year premium falls in the 4.2 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 10-year premium.

We find that past returns significantly impact volatility as well as the degree of asymmetry in the respondents’ distributions. Indeed, we find convincing 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 have also attempted to shed some light on the relation between the mean and volatility. All previous research has relied on historic 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 preliminary evidence suggests that at the one-year horizon there is a negative relation between the mean and the variance. At the 10-year horizon, the evidence is suggestive of a positive relation.

Finally, let us emphasize that this is work in progress. While we have over 800 survey responses, much of the analysis presented relies on four or five aggregated observations. Indeed, this is the reason that we have mainly presented the data graphically. By viewing the data, one can judge the influence of particular observations. Our goal is to continue the survey and dynamically augment this research as new results arrive.
References


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Harris, R. S. And F. C. Marston, The market risk premium: Expectational estimates using analysts’ forecasts, Unpublished working paper, University of Virginia, Charlottesville, VA


Table 1
The impact of past returns on risk premium forecasts

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The impact of past returns on forecast volatility

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The impact of past returns on forecast asymmetry

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The distribution of the expected one-year risk premium

**A. June 6, 2000**
- S&P500 one-year risk premium
- Average expected premium = 1.95%
- Median expected premium = 1.90%
- Risk free = 6.1%
- Std. dev. = 5.22%
- Skewness = 0.33%
- Responses = 209

**B. September 7, 2000**
- S&P500 one-year risk premium
- Average expected premium = 3.02%
- Median expected premium = 3.80%
- Risk free = 5.7%
- Std. dev. = 4.10%
- Skewness = -1.42%
- Responses = 188

**C. December 4, 2000**
- S&P500 one-year risk premium
- Average expected premium = 2.31%
- Median expected premium = 2.50%
- Risk free = 5.5%
- Std. dev. = 4.99%
- Skewness = -1.44%
- Responses = 244

**D. March 12, 2001**
- S&P500 one-year risk premium
- Average expected premium = 0.41%
- Median expected premium = 0.10%
- Risk free = 4.9%
- Std. dev. = 6.91%
- Skewness = -0.36%
- Responses = 138

Fig. 2
The distribution of the expected 10-year risk premium

**A. June 6, 2000**

- Average expected premium = 4.35%
- Median expected premium = 3.90%
- Risk free = 6.1%
- Std. dev. = 3.21%
- Skewness = 0.96%
- Responses = 209

**B. September 7, 2000**

- Average expected premium = 4.70%
- Median expected premium = 4.3%
- Risk free = 5.7%
- Std. dev. = 3.03%
- Skewness = 0.84%
- Responses = 188

**C. December 4, 2000**

- Average expected premium = 4.22%
- Median expected premium = 4.5%
- Risk free = 5.5%
- Std. dev. = 2.52%
- Skewness = 0.53%
- Responses = 243

**D. March 12, 2001**

- Average expected premium = 4.5%
- Median expected premium = 4.1%
- Risk free = 4.9%
- Std. dev. = 3.01%
- Skewness = 0.55%
- Responses = 141

Fig. 3
Recent returns and the one year ex-ante risk premium

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

$y = 0.0879x + 2.3752$
$R^2 = 0.4448$

B. One-year risk premium forecast vs. past market return (including banker's survey)

$y = 0.1059x + 2.57$
$R^2 = 0.5752$

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

$y = 0.1518x + 2.3016$
$R^2 = 0.7327$

D. One-year risk premium forecast vs. past market return (including banker's survey)

$y = 0.1726x + 2.5392$
$R^2 = 0.6835$

Excess market return for previous quarter

Average one-year forecast of risk premium

Excess market return for previous month

Average one-year forecast of risk premium

Fig. 4
Recent returns and the 10-year ex-ante risk premium

A. Ten-year forecast vs. market return

\[ y = 0.0011x + 4.4505 \]

\[ R^2 = 0.002 \]

B. Ten-year forecast vs. market return (including banker's survey)

\[ y = 0.0044x + 4.4865 \]

\[ R^2 = 0.039 \]

C. Ten-year forecast vs. market return

\[ y = -0.0109x + 4.4179 \]

\[ R^2 = 0.1109 \]

D. Ten-year forecast vs. market return (including banker's survey)

\[ y = -0.0073x + 4.4585 \]

\[ R^2 = 0.0482 \]

Fig. 5
The distribution of ex ante volatility for one-year return forecasts

A. June 6, 2000

S&P 500 one-year volatility

Average = 6.73%  Median = 5.85%  Std. dev. = 4.79%  One month prior VIX = 30.39

B. September 7, 2000

S&P 500 one-year volatility

Average = 6.88%  Median = 5.66%  Std. dev. = 5.58%  One month prior VIX = 21.55

C. December 4, 2000

S&P 500 one-year volatility

Average = 6.51%  Median = 5.66%  Std. dev. = 4.58%  One month prior VIX = 32.50

D. March 12, 2001

S&P 500 one-year volatility

Average = 6.94%  Median = 5.66%  Std. dev. = 5.10%  One month prior VIX = 35.11

Fig. 6
Recent excess returns and ex-ante volatility

A. Average volatility of one-year forecast vs. market return

\[ y = -0.004x + 6.7444 \]

\[ R^2 = 0.0306 \]

B. Average volatility of one-year forecast vs. market return (including banker's survey)

\[ y = -0.0632x + 6.1031 \]

\[ R^2 = 0.2633 \]

C. Average volatility of one-year forecast vs. market return

\[ y = -0.0223x + 6.7093 \]

\[ R^2 = 0.524 \]

D. Average volatility of one-year forecast vs. market return (including banker's survey)

\[ y = -0.0681x + 6.1861 \]

\[ R^2 = 0.1365 \]
Recent excess returns and disagreement

A. Std. dev. of one-year forecast vs. market return

\[ y = -0.0979x + 4.8008 \]

\[ R^2 = 0.4861 \]

B. Std. dev. of one-year forecast vs. market return (including banker's survey)

\[ y = -0.1439x + 4.3023 \]

\[ R^2 = 0.5937 \]

C. Std. dev. of one-year forecast vs. market return

\[ y = -0.1598x + 4.9059 \]

\[ R^2 = 0.7154 \]

D. Std. dev. of one-year forecast vs. market return (including banker's survey)

\[ y = -0.204x + 4.4008 \]

\[ R^2 = 0.5334 \]

Fig. 8
Recent excess returns and disagreement

A. Std. dev. of 10-year forecast vs. market return

\[ y = 0.0164x + 3.0269 \]

\[ R^2 = 0.2148 \]

B. Std. dev. of 10-year forecast vs. market return (including banker’s survey)

\[ y = 0.0136x + 2.9971 \]

\[ R^2 = 0.1956 \]

C. Std. dev. of 10-year forecast vs. market return

\[ y = -0.0118x + 2.9131 \]

\[ R^2 = 0.0614 \]

D. Std. dev. of 10-year forecast vs. market return (including banker’s survey)

\[ y = -0.01x + 2.9335 \]

\[ R^2 = 0.047 \]
The distribution of ex-ante asymmetry for one year risk premium forecasts

A. June 6, 2000

Average = 1.32%   Median = 2.90%   Std. Dev. = 14.57%

B. September 7, 2000

Average = 1.62%   Median = 2.56%   Std. Dev. = 12.31%

C. December 4, 2001

Average = 0.59%   Median = -0.61%   Std. Dev. = 11.96%

D. March 12, 2001

Average = -3.53%   Median = -3.62%   Std. Dev. = 12.65%

Fig. 10
Recent returns and asymmetry

A. Asymmetry vs. market return

\[ y = 0.2476x + 1.2755 \]

\[ R^2 = 0.7488 \]

B. Asymmetry vs. market return (including banker's survey)

\[ y = 0.1965x + 0.7216 \]

\[ R^2 = 0.6209 \]

C. Asymmetry vs. market return

\[ y = 0.3636x + 0.9079 \]

\[ R^2 = 0.8915 \]

D. Asymmetry vs. market return (including banker's survey)

\[ y = 0.3466x + 0.7129 \]

\[ R^2 = 0.8633 \]

Fig. 11
The relation between the risk premium and ex ante volatility

A. One-year forecast vs. average volatility

\[ y = -2.1639x + 16.562 \]
\[ R^2 = 0.1415 \]

B. One-year forecast vs. average volatility (including bankers' survey)

\[ y = -0.6961x + 6.6138 \]
\[ R^2 = 0.3772 \]

C. One-year forecast vs. standard deviation (disagreement)

\[ y = -0.9371x + 6.8938 \]
\[ R^2 = 0.9966 \]

D. One-year forecast vs. standard deviation (disagreement) (including bankers' survey)

\[ y = -0.7235x + 5.6769 \]
\[ R^2 = 0.9369 \]

Fig. 12a
The relation between the risk premium and ex ante volatility

E. One-year forecast vs. combined volatility
\[ y = -0.3301x + 5.4254 \]
\[ R^2 = 0.019 \]

F. One-year forecast vs. combined volatility (including banker’s survey)
\[ y = -0.3376x + 5.5052 \]
\[ R^2 = 0.3398 \]

G. 10-year forecast vs. standard deviation (disagreement)
\[ y = 0.3648x + 3.3691 \]
\[ R^2 = 0.2734 \]

H. 10-year forecast vs. standard deviation (disagreement) (including banker’s survey)
\[ y = 0.3821x + 3.3421 \]
\[ R^2 = 0.27 \]