Equity Return Expectations and Portfolios: Evidence from Large Asset Managers

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Abstract

Collecting large asset managers' capital market assumptions, we revisit the relationships between subjective equity premium expectations, equity valuations, and financial portfolios. In contrast to the well-documented extrapolative expectations of retail investors, asset managers' equity premium expectations are countercyclical: they are high (low) when valuations are low (high). We find that asset managers' portfolios reflect their heterogeneous expectations: allocation funds of asset managers with larger US equity premium expectations invest significantly more in US equities. The sensitivity of portfolios to expectations seems to be muted by investment mandates and is smaller than the one predicted by a standard portfolio choice model.

JEL: G00, G12, G23.

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1 Introduction

Existing research on subjective equity return expectations challenges standard finance theories. First, subjective equity return expectations have been found to be procyclical: they are high when equity valuations are high and low when equity valuations are low (see, e.g., De Bondt, 1993; Vissing-Jorgensen, 2003; Amromin and Sharpe, 2014; Greenwood and Shleifer, 2014). As such, they stand in contrast to the relationship between realized returns and valuations that rational expectations asset pricing models match (see, e.g., Campbell and Cochrane, 1999; Bansal and Yaron, 2004; Gabaix, 2012; Wachter, 2013). Second, the link between investors' expectations and their financial portfolios is statistically significant, but on average weak relative to standard portfolio choice models (see, e.g., Ameriks, Kézdi, Lee, and Shapiro, 2020; Giglio, Maggiori, Stroebel, and Utkus, 2021). While these challenges have been documented in multiple datasets covering retail investors, little evidence exists for institutional investors—the largest investors in today's equity markets.[1]

In this paper, we revisit the relationships between subjective equity premium expectations, equity valuations, and financial portfolios using data on large professional asset management firms. Large asset managers report their return expectations across various asset classes publicly on their websites in capital market assumptions. The asset managers in our sample manage a vast amount of capital and their publications are backed by their substantial business reputations. As asset managers are subject to regulatory filings and make voluntary disclosures, we can evaluate whether their portfolios reflect their expectations.

We find that asset managers' equity premium expectations are heterogeneous and countercyclical, being high when valuations are low and low when valuations are high. Being countercyclical, asset managers' subjective equity premium expectations mirror the objec-

[1]The fraction of the equity market directly held by households and individuals steadily declined from more than 90% just after the Second World War, through 50% in 1980, to 20% in 2010 (see, e.g., Stambaugh, 2014). Over the same period, the equity ownership of institutional investors has steadily increased.

tive equity premium expectations implied by predictive regressions of realized excess equity returns on valuation ratios (see, e.g., Cochrane, 2011). To study the pass-through of expectations to portfolios, we focus on allocation funds. These funds invest primarily in (US and international) equities and bonds, and to a lesser extent in cash and other assets. We find a greater slope coefficient estimate in a regression of portfolio shares on equity premium expectations than the one documented for retail investors. However, this sensitivity of portfolios to expectations appears to be muted by investment mandates and is smaller than the one implied by a standard portfolio choice model.

While asset managers' countercyclical equity premium expectations are in principle consistent with full-information rational expectations asset pricing models, heterogeneous subjective expectations that matter for portfolio demand are perhaps easier to reconcile with heterogeneous investor models. We emphasize that in full-information rational expectations models investors know the economy's model and the model parameters with certainty. Naturally then there is little room for heterogeneous expectations and, strictly speaking, subjective expectations are redundant (see, e.g., Section 1 in Brunnermeier, Farhi, Koijen, Krishnamurthy, Ludvigson, Lustig, Nagel, and Piazzesi, 2021). Apart from heterogeneous expectations, the low slope coefficient estimates in regressions of portfolio shares on expectations seem to be a puzzle for many asset pricing models (see, e.g., Gabaix and Koijen, 2021).

We view our analysis as an important step in studying institutional investors' expectations and portfolios, but there are data limitations which leave room for future research. First, not all asset managers publish their expectations publicly. We acknowledge that it is impossible to gauge how this selection affects the external validity of our results. Second, the expectations we collect are not necessarily granular. Large asset managers oversee multiple investment funds and, for each fund, the portfolio investment decision ultimately lies with the individuals managing that fund. We do not observe the expectations of individual fund managers, only the expectations of the firms they work for. Third, the allocation funds we focus on are perhaps the funds with the most flexible investment mandates. The asset managers in our sample managed more than USD 40 trillion as of 2021; the actual allocation funds in our sample managed USD 743 billion as of 2021.[2] In sum, the sensitivity of portfolios to expectations we find is presumably not representative of all funds.

The first part of the paper investigates the cross-sectional heterogeneity of asset managers' subjective expectations and their time-series correlations with measures of objective expectations.

First, we begin our analysis by documenting substantial heterogeneity in subjective expectations across asset managers. The average cross-sectional standard deviation of the subjective US equity premium expectation is 73% larger than the average time-series standard deviation. Moreover, similar to Giglio et al. (2021), manager fixed effects explain most of the variation—78% in our case—in subjective expectations. Such persistent heterogeneity in expectations mirrors the heterogeneity that has been documented for retail investors (see, e.g., Giglio et al., 2021; Laudenbach, Weber, Weber, and Wohlfart, 2022) and naturally casts doubt on the common assumption of homogeneous expectations.

Second, we find that asset managers' subjective equity premium expectations mirror the relationship between realized excess equity returns and equity valuation ratios documented in the return predictability literature. A ten-percent-increase in Shiller's cyclically adjusted price-earnings ratio (CAPE), the inverse of which is a common measure of the objective equity return an investor can expect, is associated with a 59-basis-point decrease in asset managers' long-term equity premium expectations. In contrast to subjective expectations from other sources (see, e.g., Nagel and Xu, 2023, and our results below), the magnitude

[2] To put USD 743 billion into perspective, combined global equity and fixed income market capitalization was about USD 250 trillion at the end of 2021. The actual respondents to the survey of Vanguard investors of Giglio et al. (2021) managed around USD 1 billion and their sample of individuals who could potentially be contacted represents about USD 2 trillion (their sample consists of around 2,000 respondents in each wave with an average wealth of USD 500,000 in Vanguard accounts).

of the coefficient estimate is essentially the same when we regress realized ten-year excess returns on the CAPE (we refer to this as our objective regression-based benchmark).

Third, as opposed to building objective equity premium measures from valuation ratios, Martin (2017) and Knox and Vissing-Jorgensen (2022) argue that the one-year objective equity premium can be inferred from option prices. The advantage of the option-implied measure is that it does not require assumptions on the specific valuation ratio or the sample period used to estimate the objective equity premium. Asset managers' long-term equity premium expectations correlative positively with this measure. However, assuming an AR(1) process for the one-year option-implied equity premium, asset managers' long-term expectations are more volatile than what is implied by the option-implied benchmark. Instead, the subjective volatilities of asset managers' expectations are more aligned with the objective volatility from the regression-based benchmark.

Fourth, while the modal capital market assumption has a horizon of ten years, there is variation. Some managers also provide a term structure of subjective equity return expectations. For instance, BlackRock—the largest asset manager in the world with around USD ten trillion in assets under management—in September 2020 expected annualized US equity returns of 4.1%, 4.4%, 5.0%, 5.8%, 6.3%, 6.6%, 6.8%, 7.1%, and 7.3% over horizons of 5, 7, 10, 15, 20, 25, 30, 40, and 50 years, respectively. We use variation in forecast horizons to estimate the subjective term structure of the aggregate equity market. This subjective term structure is procyclical, being upward sloping when valuations are high and downward sloping when valuations are low. A procyclical term structure can be rationalized in models that feature mean reversion in the valuation ratio (see, e.g., Campbell and Viceira, 2005).

Fifth, while our paper focuses on equities, we also construct asset managers' subjective term premia for US Treasury bonds. These subjective risk premia again co-move with other measures of term premia (see Kim and Wright, 2005; Adrian, Crump, and Moench, 2013). In particular, asset managers' subjective term premia have trended downwards over the last decade and have increased after March 2020.

The second part of the paper evaluates whether asset managers' portfolios reflect their expectations using asset managers' allocation funds. According to the asset managers, capital market assumptions are used to assess portfolio risk as well as assist in portfolio construction. Indeed, we provide evidence that they are. We find that a one-percentage-point increase in the long-term US equity premium expectation is associated with a two- to four-percentage-point larger allocation to US equities in the cross-section of funds. A conservative interpretation of our estimates is that they represent correlation estimates rather than cleanly identified causal effect estimates. Our coefficient estimates can be compared with a 0.69 coefficient estimate presented by Giglio et al. (2021), who study retail investors. While larger than in many existing studies, the coefficient estimates are still considerably smaller than the one implied by a standard portfolio choice model.

Throughout our analysis, we find evidence that the sensitivity of portfolios to expectations appears to be muted by preset investment mandates (e.g., a preset 60% equity allocation). The slope coefficient estimates in regressions of portfolio shares on equity premium expectations tend to be lower when we add fund fixed effects to our specifications. Such fund fixed effects absorb any unobserved variable that remains constant over time for a given fund, including any investment mandate. Moreover, the coefficient estimate tends to be larger for tactical allocation funds, funds that are arguably less restricted by their investment mandates. Finally, many of the funds in our sample invest in both US and international equities. Once we focus on the substitution between equities and bonds, the coefficient estimate tends to decline as well. This suggests that some substitution takes place within the equity part of a fund's portfolio, again consistent with the notion that the typical allocation fund may be constrained by a preset allocation to equities overall. The smaller slope coefficient estimate relative to a standard portfolio choice model is particularly obvious when we focus on the substitution between equities and bonds: The coefficient estimate in a regression of log equity shares on equity premium expectations is 4.5, whereas a standard portfolio choice model implies a corresponding semi-elasticity of 25 assuming an equity premium of 4% (see Gabaix and Koijen, 2021).

The third and final part of the paper compares asset managers' equity premium expectations to the one- and ten-year equity premium expectations of chief financial officers (CFOs) and professional forecasters. Asset managers' expectations represent the expectations of a new set of investors, but they are also primarily long-term return expectations as opposed to the commonly studied short-term return expectations (see, e.g., Greenwood and Shleifer, 2014). We conclude that our results differ from existing work mostly because of the former dimension. While we find no evidence of equity premium expectations that correlate positively with equity valuations on the part of professional forecasters and CFOs, asset managers' expectations are the only expectations in consideration that consistently correlate negatively with equity valuations.

Related literature We relate to the literature on subjective equity return expectations, which typically documents extrapolative expectations (see, e.g., De Bondt, 1993; Vissing-Jorgensen, 2003; Bacchetta, Mertens, and van Wincoop, 2009; Amromin and Sharpe, 2014; Greenwood and Shleifer, 2014; Da, Huang, and Jin, 2021; Nagel and Xu, 2023; Beutel and Weber, 2022). While this literature has predominantly focused on retail investors, whether return expectations are extrapolative does not appear to be a matter of retail investing versus institutional investing alone: Andonov and Rauh (2022) find that public pension funds extrapolate from past performance. They identify the effect of past returns on return expectations from the cross-section of pension plans (as each pension plan has a different realized return), whereas we use time-series variation.[3] Somewhat surprisingly, we are among

[3] Using German microdata, Timmer (2018) finds that pension funds and insurance companies invest countercyclically. The results in the Internet Appendix of Andonov and Rauh (2022) suggest that US pension plans' expectations may be countercyclical in the time series as well.

the few to show that some subjective expectations vary negatively with equity valuations (see also Welch, 2000; Glaser and Weber, 2005; Ghosh and Roussellet, 2020). In contemporaneous work, Wang (2020) shows that Wall Street analysts' return expectations are countercyclical.

As a corollary, asset managers' expectations are consistent with the conventional wisdom that equity prices move primarily because of discount rate variation and not because of expected cash-flow variation. In contrast, recent research on subjective expectations has challenged the conventional wisdom. For instance, De la O and Myers (2021) and Bordalo, Gennaioli, La Porta, and Shleifer (2020) argue that variation in analysts' subjective cash-flow growth expectations can explain most of the variation in equity prices and that subjective equity return expectations have low volatility.

We also relate to the literature that connects subjective expectations with financial portfolios. This literature typically finds a statistically significant relationship between respondents' expectations and equity shares (see, e.g., Vissing-Jorgensen, 2003). However, this relationship is found to be economically small in multiple studies and datasets (Fisher and Statman, 2000; Kézdi and Willis, 2011; Amromin and Sharpe, 2014; Merkle and Weber, 2014; Ameriks et al., 2020; Andonov and Rauh, 2022). Giglio et al. (2021) find that the sensitivity of portfolios to return expectations is small on average, but that it varies significantly in the cross-section of investors. We find a larger sensitivity of portfolios to expectations than the ones documented in most existing studies, but this sensitivity is still considerably smaller than the one implied by a standard portfolio choice model.

We finally relate to the literature on asset pricing models. Standard full-information rational expectations asset pricing models that generate countercyclical risk premia based on habit formation, long-run risks, or rare disasters (see, e.g., Campbell and Cochrane, 1999; Bansal and Yaron, 2004; Gabaix, 2012; Wachter, 2013) have been challenged by the literature on subjective equity return expectations. To match existing evidence on both subjective expectations and asset prices, researchers have developed new models in which some or all agents have non-rational extrapolative expectations (see, e.g., Barberis, Greenwood, Jin, and Shleifer, 2015; Adam, Marcet, and Beutel, 2017; Barberis, Greenwood, Jin, and Shleifer, 2018; Jin and Sui, 2019; Nagel and Xu, 2022). Whether rational or not, Gabaix and Koijen (2021) show that many existing asset pricing models imply a large sensitivity of portfolios to expectations. They reconcile the frequently documented low sensitivity with large asset price fluctuations when markets are inelastic.

2 Data

2.1 Expectations from capital market assumptions

We manually collect asset managers' return expectations for different asset classes from public reports on their websites (sometimes using archive.org) or obtain them directly from asset managers after requesting them. Our approach to data collection is simple: we extensively search for reports and initially include any report we find. We collect capital market assumptions from 43 providers, but focus on the 22 providers that manage allocation funds and, thus, for which we can connect expectations with portfolios. We discuss the full sample of providers in the Internet Appendix, including extensions of some of our key regressions to this sample. The point estimates for this larger sample are similar while the standard errors are lower, yielding even more statistically significant results.

The capital market assumptions are fairly standardized across asset managers, but display some heterogeneity. Most asset managers provide their expectations as geometric averages for several asset classes (e.g., US equities). Sometimes the stated asset classes are not exactly the same. For instance, one manager may forecast the S&P 500 return, another may forecast the return on broad US equities, while a third may forecast the return on large-cap US equities. We focus on forecasts for large-cap US equities and generally assume that minor differences in asset classes are negligible (e.g., a forecast for broad US equities is equivalent to an unobserved forecast for the S&P 500, that is, large-cap US equities). We group asset managers' expectations into the following asset classes: US (large-cap) equities, international developed markets (DM) equities, emerging markets (EM) equities, and US cash.

The stated forecast horizons in our data take the following values: 1, 3, 3–5, 5, 5–10, 7, 10, 10–15, 10–20, 10+, 15, 20, 25, 30, 40, and 50 years. However, most asset managers provide one forecast close to a ten-year horizon. Specifically, 28% of forecasts are reported for a horizon of exactly ten years and most other forecasts are close to ten years as well (e.g., 7-year forecasts make up 19% of the sample). The very short- and long-term forecast horizons are from managers that provide a term structure of return expectations. We convert expectations stated for a horizon range to a real number using the midpoint of the range; for example, a horizon of 10–20 years becomes 15 years.

Asset managers report their expectations as of a specific day at least once a year and sometimes more frequently. The highest frequency of reports is quarterly and many asset managers updated their expectations after the decline in equity valuations in March 2020. The earliest report we collect is from 1997, the latest is from April 2021. Unfortunately, we do not have access to all reports for a given manager, particularly before 2010. Moreover, many asset managers have started publishing capital market assumptions only recently (e.g., BlackRock started in 2018). For these two reasons, the data have some gaps for given managers and are sparse in the cross-section in earlier years. Appendix A and the Internet Appendix contain additional details on the data. Figure A1 plots the number of observations over time.

2.2 Portfolio data

Data on asset managers' US-domiciled allocation funds are from Morningstar. We focus on these funds as they invest in a mix of equities and bonds, potentially related to equity and bond return expectations. The common feature of funds in these data is that they are actively-managed open-end investment companies registered under the Investment Company Act of 1940. Such funds are commonly referred to simply as mutual funds.

We identify the allocation funds of asset managers using Morningstar's *GlobalBroad-CategoryGroup* and *BrandingName* variables. Note that a given asset manager typically manages multiple funds. We drop target-date funds as we believe that the asset allocations of target-date funds are driven primarily by the target date and not by return expectations across asset classes. Of particular interest is a variable that states the percentage of the fund's assets invested in US equities (*AssetAllocUSEquityNet*). This variable is constructed by Morningstar based on the underlying holdings of the fund and we have no discretion over it. Some funds make their holdings available to Morningstar at the end of each month, while other funds report their holdings only at the end of each quarter. The latter is the mandated reporting frequency of the Securities and Exchange Commission.

While all 186 funds in the sample are allocation funds, they are still heterogeneous and likely have different investment mandates. Morningstar's latest category assignments for these funds are: US Fund Allocation 15% to 30% Equity (16 funds), US Fund Allocation 30% to 50% Equity (36), US Fund Allocation 50% to 70% Equity (46), US Fund Allocation 70% to 85% Equity (19), US Fund Allocation 85%+ Equity (10), US Fund Tactical Allocation (12), and US Fund World Allocation (47). Together, the funds managed USD 743 billion as of 2021. Out of these, the twelve tactical allocation funds managed USD 33 billion.

As asset managers report their expectations at best quarterly, it seems reasonable to assume that these expectations are valid for a certain time period when matching the data on subjective expectations with the portfolio data. Moreover, if funds react to expectations, they may need some time to adjust their portfolios. We assume that expectations are valid for three months after they have been published. If a manager provides a term structure of expectations, we select the expectation that is closest to ten years to match it with the portfolio data.

2.3 Other data

We retrieve the CAPE from Robert Shiller's webpage. Since the CAPE is available monthly, we match expectations (reported on a given day) with the CAPE from the previous month to ensure that it enters the asset manager's information set at the time of the forecast. Benjamin Knox and Annette Vissing-Jorgensen kindly shared their data on option-implied equity premia. Nominal Treasury yields from Gürkaynak, Sack, and Wright (2007), real Treasury yields, as well as term premia from Kim and Wright (2005) and Adrian et al. (2013) are all from the Federal Reserve's website.

We construct the equity premium expectation by subtracting the horizon-matched (log) nominal Treasury yield from the (geometric) nominal equity return expectation. Since there are no Treasury bonds with maturities longer than 30 years, we do not construct equity premia for the (few) 40- and 50-year equity return expectations in our data.

Alternatively, we construct the equity premium expectation by subtracting the return expectation on cash over the same horizon (e.g., the expected annualized return on cash over the next ten years) from the equity return expectation. The advantage of this measure is that the equity premium expectation is then entirely constructed from subjective expectations; the disadvantage is that the return on cash for a given horizon is not the risk-free asset as reinvestment rates are uncertain.

3 Asset managers' return expectations

3.1 Heterogeneity in expectations

Table 1 shows summary statistics. The total number of nominal US equity return expectations is 383. Out of these 383 forecasts, 181 are for a horizon of less than ten years, 179 are for a horizon of ten or more years but less than or equal to 30 years, and 23 are for horizons longer than 30 years. Equity premium expectations are markedly heterogeneous. For instance, the minimum equity premium expectation is -6.50%, whereas the maximum expectation is 11.52%. This is because of systematic differences across asset managers, systematic differences across forecast horizons, and differences in equity valuations over time. Some asset managers are generally more pessimistic than others, leading to negative equity premium forecasts. Other managers are generally more optimistic, particularly for short-term horizons when valuations are low, leading to large equity premium expectations. For instance, the 11.52% forecast is from April 2020 for a three-year horizon, implicitly forecasting a quick recovery in equity valuations from the COVID-19-induced market sell-off.

To summarize the variation in the data due to the three dimensions (across managers, over time, and across forecast horizons), Table 1 also shows average standard deviations fixing two of the three dimensions. For instance, the average time-series standard deviation computes the standard deviation for a given manager and a given forecast horizon, then averages over all manager-horizon pairs. It is precisely this time-series variation that we will exploit in our regressions of US equity premium expectations on equity valuation ratios. Similarly, the average cross-sectional standard deviation summarizes variation in the cross-section of managers by fixing time (i.e., a quarter) and the forecast horizon.

Ultimately, we will argue that the time-series variation in US equity premium expectations is economically large: asset managers' US equity premium expectations are at least as volatile as are objective equity premia implied by a regression of realized excess equity returns on the CAPE. However, the average cross-sectional standard deviation of US equity premium expectations is more than 70% larger than the average time-series standard deviation (1.75% vs. 1.01%), indicating persistent heterogeneity in expectations across managers.

As in Giglio et al. (2021), the Internet Appendix shows panel regressions with fixed effects to summarize the variation in the data. To ease interpretation, we eliminate the forecast horizon dimension from the data by selecting, for a given manager and quarter, the expectation that is closest to a ten-year forecast horizon in case a manager provides a term structure of expectations. Consistent with the notion of persistent heterogeneity in expectations, specifications with manager fixed effects only have an adjusted R^2 value of 78%. In contrast, year-quarter effects only explain around 4% of the total variation.

The Internet Appendix also exemplifies how asset managers may arrive at heterogeneous expectations through the lens of a return decomposition (see, e.g., Ferreira and Santa-Clara, 2011). Moreover, with parameter and model uncertainty, initial expectations may persist in the long run (see, e.g., Farmer, Nakamura, and Steinsson, 2023).

3.2 Equity premium expectations and equity valuation ratios

Following the literature on equity return predictability, the literature on subjective equity return expectations typically estimates a time-series regression of equity return expectations on valuation ratios (see, e.g., Equation (2) in Greenwood and Shleifer, 2014). The key question these literatures try to answer is one of correlation, not causation: how do expected returns vary over time as valuation ratios change? We follow this literature, but modify our baseline specification in several ways.

We first estimate a regression of equity premium expectations, constructed as expected equity returns less horizon-matched Treasury yields, on the log CAPE:

$$\mathrm{F}_{i,t}[r^e_{t\to t+h}] = \alpha_{i,h} + \beta \ln(\mathrm{CAPE}_t) + \varepsilon_{i,t,h}, \tag{1}$$

where $\mathrm{F}_{i,t}[r^e_{t\to t+h}]$ is the subjective equity premium expectation (forecast) of asset manager i on day t over the period from t to $t+h$, and $\varepsilon_{i,t,h}$ is an error term for a forecast horizon, h.

Two comments are in order. First, our data capture expectations across different horizons and from different forecasters at different points in time. Since the key question is one of time-series correlation, we also include a manager-times-horizon fixed effect, $\alpha_{i,h}$. The β coefficient is then identified from time-series variation in expectations in response to variation in the CAPE for a given manager and a given forecast horizon. As most managers only forecast returns over one particular horizon, the manager-times-horizon fixed effect is similar to a simple manager fixed effect.

Second, we use the CAPE as the valuation ratio. We prefer the CAPE over the price-dividend ratio as share repurchases, which are not included in ordinary dividends, are a common way to return cash to shareholders. We prefer the CAPE over a price-earnings ratio without the cyclical adjustment as much of the variation in the unadjusted price-earnings ratio is driven by earnings as opposed to prices, a fact well known since the introduction of the CAPE (see Campbell and Shiller, 1988, 1998).[4] The CAPE averages the past ten years of earnings in the denominator to smooth out predictable variation in earnings.

Specification (1) in Panel A of Table 2 shows the results. We cluster standard errors by both year-month and manager.[5] The coefficient estimate on the log CAPE is –5.94, implying that a ten-percent increase in the price-earnings ratio is associated with an approximately 59-basis-point lower equity premium expectation. For instance, a ten-percent increase in the CAPE from 26, which is the CAPE's historical mean, to 28.6 is associated with a 59-basis-point lower equity premium expectation. This coefficient estimate is economically large and closely mirrors the coefficient estimate implied by standard predictive regressions using realized returns. In the Internet Appendix, we regress realized ten-year excess returns on the log CAPE and find a coefficient estimate of –6.06. In sum, asset managers' subjective equity premium expectations are countercyclical.

Before discussing the economic magnitude of the coefficient estimate in more detail, we first present various perturbations of the baseline specification. Specification (2) shows

[4] Campbell and Shiller (1998) write: "There are, however, various spikes in the price-earnings ratio that do no show up in the dividend-price ratio. These spikes occur when recessions temporarily depress corporate earnings."

[5] Clustering only by year-month yields lower standard errors.

similar results when we restrict the sample to expectations that are closest to a horizon of ten years for a given manager and date. Each manager then enters the sample only once for a given date and the manager-times-horizon fixed effect in specification (2) is a simple manager fixed effect.[6]

Specification (3) shows the results when we consider nominal equity return expectations. The coefficient estimate remains negative, but is slightly larger. We prefer to focus on equity premia, as they are the key objects in rational expectations asset pricing models and the return predictability literature. Constructing subjective equity premia as equity return expectations less Treasury yields is justified as long as Treasury yields enter investors' information sets, which we believe is a reasonable assumption for professional asset managers.

Specification (4) uses the equity premium constructed entirely from subjective expectations, the equity return expectation over the return expectation on cash over the same horizon. The coefficient estimate remains negative, with a slightly larger standard error.

As in Greenwood and Shleifer (2014), Panel B of Table 2 adds the past twelve-month return of the S&P 500 as an explanatory variable. The coefficient estimates on past returns are all close to zero: in contrast to retail investors, asset managers do not appear to pay attention to past returns beyond those that are incorporated in the CAPE. We also add the Treasury yield as an explanatory variable on the right hand side in these regressions. We reiterate that we are not interested in causality (nor in the best predictor of subjective equity premium expectations). The question is not whether a larger valuation ratio *leads* to lower return expectations. For instance, in standard asset pricing models the valuation ratio does not cause future expected returns, but is jointly determined with expected returns in equilibrium.

[6]There are four observations for which the distinction between manager-times-horizon fixed effects and manager fixed effects makes a difference, as some managers change the forecast horizon over time and the observations drop out as singletons with manager-times-horizon fixed effects. For the same reason, the regression in specification (1) has only 356 observations, whereas the summary statistics show 360.

In fact, perhaps the key economic question is not even whether subjective expectations co-vary negatively with valuation ratios per se, but whether subjective expectations move one-to-one with "rational" expectations. What a "rational" expectation is depends on a specific model and so tests of whether expectations are "rational" are generally joint hypothesis tests: any attempts to test for rationality must specify a rational benchmark.

Standard full-information rational expectations asset pricing models imply that subjective return expectations co-vary as much with valuation ratios as do realized equity returns (see, e.g., Campbell and Cochrane, 1999; Bansal and Yaron, 2004; Gabaix, 2012; Wachter, 2013). We have provided evidence for this above, but a more direct test is to build a model-implied expectation and then to regress the subjective expectation on the model-implied expectation. If subjective expectations are rational in the sense that they conform with the specific model, the coefficient estimate in this regression is one.[7]

We use two approaches to build "rational" equity premium expectations. In what follows we use the word "objective" instead of "rational" as we do not want to create the impression that rejecting the hypothesis that expectations follow a specific model implies that they are "irrational." The first approach builds an objective expectation based on a simple present value model using the CAPE as an input (see, e.g., Campbell and Thompson, 2008).[8] The second approach builds an objective expectation by using the fitted values of the full-sample predictive regression of realized ten-year excess returns on the log CAPE shown in the Internet Appendix. Since the objective equity premium expectations we construct are long-term objective equity premium expectations, we focus on the subjective expectations that are closest to a ten-year horizon.

Specifications (1) and (2) of Table 3 show that the coefficient estimates in regressions of subjective equity premium expectations on objective equity premium expectations are close

[7]Moreover, in theory the constant is zero and the R^2 value is 100%.

[8]Campbell (2018, Chapter 5) discusses the assumptions behind the use of valuation ratios as proxies for the expected return on equity; see specifically the discussion leading to his Equation (5.32).

to and not statistically different from one.[9] The one-to-one relationship between subjective expectations and objective expectations seems to be unique to asset managers. Existing research on subjective equity return expectations typically finds a negative correlation between subjective and objective expectations, see Table 5 in Greenwood and Shleifer (2014). In a broader context of a large literature on behavioral inattention, Gabaix (2019) reports coefficient estimates that are on average about 0.44 in similar specifications.

Lastly, building an objective expectation based on a full-sample regression is of course an unfair benchmark: real-time investors do not have access to the information contained in the full sample. Nagel and Xu (2023) build an objective equity premium expectation using only information that is available to investors in real time. As our regression using realized returns uses data since 1871 and as most of the subjective expectations are from post 2000, our results do not change materially when building a regression-based forecast available in real time.

3.3 Option-implied equity premia

Figure 1 plots the long-term equity premium expectations of six asset managers (Amundi, BlackRock, J.P. Morgan, Morningstar, State Street, and Vanguard) from 2010 to 2021, together with the CAPE. Consistent with the analysis from the previous subsection, the CAPE and asset managers' equity premium expectations are negatively correlated. The figure excludes expectations from J.P. Morgan from 1997 to 2009. The Internet Appendix includes a figure that shows the full time series for J.P. Morgan since 1997. The figure shows that equity premium expectations and the CAPE are negatively correlated in the earlier part of our sample as well.

[9] In constructing the objective equity premium expectations, we focus on simplicity. We note that if the objective expectations are measured with error, the coefficient estimates in these regressions are biased towards zero under standard statistical assumptions. Relatedly, there are well-known biases in predictive regressions of realized equity returns on valuation ratios (see, e.g., Stambaugh, 1999; Boudoukh, Israel, and Richardson, 2022).

Building models of objective equity premium expectations is challenging and prone to misspecification. For instance, it requires assumptions on the valuation ratio and the sample period used to estimate regressions of realized excess returns on the valuation ratio. Martin (2017) shows that a lower bound on the one-year equity premium can be obtained from option prices and argues that the bound is approximately tight. Importantly, the option-implied expectation is a short-term expectation as opposed to the long-term subjective expectations that we study, a feature that Knox and Vissing-Jorgensen (2022) exploit to study a decomposition of stock returns.

Figure 1 also adds the option-implied equity premium and shows that asset managers' equity premium expectations correlate positively with this objective measure. For instance, when the option-implied equity premium spiked in March 2020 and reversed quickly thereafter, so did Amundi's, BlackRock's, Morningstar's, State Street's, and Vanguard's return expectations.

However, Figure 1 indicates that asset managers' long-term expectations are almost as volatile as the short-term option-implied expectation. In the Internet Appendix, we compare the volatility of asset managers' expectations with an objective volatility obtained from coupling the option-implied equity premium with an assumed AR(1) process for the equity premium. Indeed, asset managers' expectations are more volatile than what the option-implied measure and an AR(1) imply. This is consistent with asset managers perceiving the equity premium to be more persistent than the objective persistence of the option-implied equity premium. That said, the Internet Appendix also shows that compared to the regression- and present-value-based benchmarks from the previous subsection, asset managers' expectations do not appear to be excessively volatile.

We conclude that asset managers' long-term equity premium expectations correlate positively with the one-year option-implied equity premium. Whether asset managers' expectations are excessively volatile is an open issue and, based on our results, rests in your conviction in the option-implied expectation.

3.4 Term structure of equity premium expectations

The capital market assumptions that we study are not standardized. One feature of our data is that there is variation in the forecast horizon. Most of this variation is across asset managers, that is cross-sectional, but five managers also provide a term structure of expectations.

We use variation in the forecast horizon to construct a subjective term structure for the aggregate equity market. This term structure is different from the equity term structure that a separate literature studies (see, e.g., van Binsbergen, Hueskes, Koijen, and Vrugt, 2013). This literature studies the expected return on "zero-coupon" equity (i.e., a dividend strip), whereas we study expected returns on the aggregate equity market across different horizons. The expected return on an n-year dividend strip need not necessarily be the same as the expected return on the aggregate equity market over n years.[10]

In the Internet Appendix, we find a subjective term structure for the aggregate equity market that is flat on average, but that varies over time. In particular, we find that the subjective term structure for the aggregate equity market is procyclical. That is, it is upward-sloping in expansions and downward-sloping in recessions.

To illustrate this result, Figure 2 plots fitted values from a regression of asset managers' subjective equity premium expectations on the forecast horizon, the CAPE, and an interaction between the CAPE and the forecast horizon for two different values of the CAPE. The first value of the CAPE is from January 2020 (the "expansion" scenario) and the other value of the CAPE is from March 2020 (the "recession" scenario). We note that with 24.82, the CAPE in March 2020 was still fairly high relative to its historical distribution (it is in the

[10] Relatedly, Gandhi, Gormsen, and Lazarus (2023) exploit variation across forecast horizons in the subjective expectations of CFOs and professional forecasters to study forward return expectations. We study spot return expectations.

44th percentile of its historical distribution), so naturally lower values of the CAPE produce a steeper term structure.

Is a procyclical term structure for the aggregate equity market consistent with standard asset pricing models? A procyclical term structure can be rationalized in models that feature return predictability and mean reversion in the valuation ratio. Campbell and Viceira (2005) consider the risk-return tradeoff in a VAR model with such features. When the valuation ratio is low (high), the expectations are that it will revert back to its long-run mean through an upward (downward) adjustment in the price. This leads to a procyclical term structure of expected returns and a downward-sloping term structure of unconditional variances.

3.5 Subjective term premia for US Treasury bonds

So far, we have focused on equity premium expectations. We now use asset managers' return expectations on cash over a given horizon to construct subjective term premia for US Treasury bonds. When asset managers forecast the return on "cash," they typically mean the return on a three-month Treasury bill, which is a common measure of the short rate. Using notation as in Cochrane and Piazzesi (2008), we define the term premium as

$$rpy_t^{(n)} = y_t^{(n)} - \frac{1}{n}\mathrm{E}_t[y_t^{(1)} + y_{t+1}^{(1)} + \cdots + y_{t+n-1}^{(1)}], \tag{2}$$

where $rpy_t^{(n)}$ is the risk premium on an n-period bond at time t, $y_t^{(n)}$ is the (log) yield on an n-period bond, and the last term in Equation (2) summarizes the expected path of future short rates.

The expected path of future short rates, the last term in Equation (2), cannot be directly observed from market prices. However, we directly observe it from asset managers' expectations: it is their expected return on cash over an n-period horizon. Thus, we can immediately construct the subjective term premium by subtracting the expected return on cash over an n-period horizon from the n-period Treasury yield (see also Piazessi, Salomao, and Schneider, 2015; Crump, Eusepi, and Moench, 2018).

Next, we study whether asset managers' subjective term premia co-move positively with "objective" term premia. Two well-known no-arbitrage term structure models that decompose observed zero-coupon yields into expected future short rates and term premia are the ones of Adrian et al. (2013) and Kim and Wright (2005). The Adrian et al. (2013) model is estimated solely based on the observed cross-section of yields, whereas the Kim and Wright (2005) combines observed yields with survey data from professional forecasters. Thus, in the Kim and Wright (2005) model the distinction between "objective" expectations—which we broadly understand to be an expectation that can be derived from market prices alone—and "subjective" expectations becomes blurry.

Figure 3 plots subjective ten-year term premia together with term premia from the Adrian et al. (2013) and Kim and Wright (2005) models for the same asset managers as in Figure 1. As is well known, term premia from these models have trended downwards over the last decade until 2020. We find that this pattern is mirrored in asset managers' subjective expectations.

Table 4 presents regressions of asset managers' subjective term premia using all forecast horizons on the horizon-matched Adrian et al. (2013) and Kim and Wright (2005) term premia. Analogous to our equity premium regressions, the regressions include asset manager-times-horizon fixed effects. The coefficient estimate is 0.56 for the Adrian et al. (2013) model and 0.89 for the Kim and Wright (2005) model, meaning that a one-percentage-point increase in the objective term premium is associated with a 0.56- and 0.89- percentage-point larger asset manager term premium. While the coefficient estimate is statistically different from one for the Adrian et al. (2013) term premium, indicating underreaction, we conclude that asset managers' subjective term premia are broadly consistent with the term premia from well-known models.

4 Asset managers' return expectations and portfolios

4.1 Cross-sectional regressions of portfolios on expectations

We now relate asset managers' subjective expectations to their portfolio allocations. In contrast to the first part of the paper, which was solely concerned with a correlation between subjective expectations and valuation ratios, we now want to mitigate the impact of potential confounders. We do so primarily by using fixed effects regressions. An optimal experiment would randomly assign subjective expectations across asset managers, but such exogenous variation is naturally difficult to obtain. A conservative interpretation of our estimates is, thus, that they represent correlation estimates as opposed to causal effect estimates. Beutel and Weber (2022) and Laudenbach et al. (2022) run experiments for retail investors to generate exogenous variation in subjective expectations. We leave it to future research to improve on our identification strategies.

What are possible confounders in our context? For one, consumption-based asset pricing models predict that aggregate consumption growth is a confounder, as it induces a spurious correlation between expectations, asset demand, and asset prices in equilibrium. More generally, unobserved economic state variables that could be proxied by GDP growth, inflation, the VIX, the CAPE, or other macro variables are potential confounders that could drive both subjective expectations and portfolio shares simultaneously.

We first absorb all these potential confounders that are constant for a given cross-section in a kitchen-sink approach by estimating specifications with time fixed effects. Specifically, we estimate a regression of allocation fund j's monthly share invested in US equities on the monthly long-term US equity premium expectation of asset manager i to which fund j belongs

$$\text{US Equity Share}_{j(i),t} = \theta_t + \delta\,\mathrm{F}_{i,t}[r^e_{t\to t+h}] + \eta_{j(i),t}, \tag{3}$$

where θ_t denotes a set of year-month fixed effects. Including such time fixed effects implies that the slope coefficient is identified purely from cross-sectional variation in expectations and equity shares, as is common in the literature (see, e.g., Giglio et al., 2021).

Two more comments are in order. First, we focus on the share invested in US equities. The summary statistics in Panel F of Table 1 show that this share is generally different from the overall equity share, as most funds also invest in international equities. The average fund invests 34.36% of its assets in US equities and 18.47% of its assets in international equities; the remaining assets are mostly invested in bonds (38.29%), with a smaller share in cash (4.37%) and other assets (4.43%).[11]

Second, we assume that expectations are valid for three months after they have been published. For instance, if a manager publishes expectations at the end of December, we assume that they are valid until the end of March in the next year. One concern with forward filling asset managers' expectations is that such a procedure artificially inflates the number of observations in our regressions as the independent variable is constant for a given manager. We cluster standard errors by asset manager to account for the correlation of errors for a given manager. We additionally cluster standard errors by year-month.[12]

Specification (1) in Panel A of Table 5 estimates Equation (3) and shows that a one-percentage-point increase in the US equity premium expectation is associated with a 2.05-percentage-points larger US equity share. The coefficient estimate is statistically significant.

We have shown in the previous section that, just as standard full-information ratio-

[11]The minimum cash and maximum bond shares in the summary statistics imply significantly leveraged positions in the bond part of the portfolio. There are three funds in the sample that, at some point in time, have bond shares larger than 200%. All three funds are managed by AQR and two of them have "risk parity" in their name. Risk-parity funds target equal volatilities across asset classes and, as short-term and intermediate-term bonds are less volatile than equities, may enter significantly levered bond positions.

[12]The standard errors are generally lower when we cluster by fund and year-month or just by year-month. Moreover, the Internet Appendix also presents robust results when we eliminate the fund dimension of the panel by averaging across funds for a given asset manager in a given year-month. When we do not forward fill expectations, the sample is further reduced whenever asset managers do not report expectations at the same time that they report portfolios.

nal expectations asset pricing models predict, asset managers' subjective equity premium expectations co-vary negatively with equity valuations in the time series. Are the results presented in this subsection consistent with standard asset pricing models as well? As mentioned before, in full-information rational expectations asset pricing models, there is no role for subjective expectations to affect portfolios: subjective expectations are implied by the model and perfectly co-linear with whatever variable summarizes objective expected returns (e.g., the price-to-earnings ratio). Since these variables are constant for a given cross-section, full-information rational expectations asset pricing models predict that the coefficient estimates on subjective expectations in a cross-sectional regression of portfolio allocations on subjective expectations are zero or, strictly speaking, not identified.

However, these models were designed to generate countercyclical equity premia in relatively simple settings, not to generate heterogeneous expectations. As such, specification (1) shows that subjective expectations matter and are not redundant, but we do not believe that it provides evidence that is fundamentally at odds with existing models. The next subsection shows deviations from standard finance models that are perhaps economically larger.

4.2 Predictions of standard portfolio choice models

We now put the magnitude of the slope coefficient estimate in context. What do standard portfolio choice models imply about the magnitude of the slope coefficient? In the standard mean-variance model with multiple risky assets, the portfolio weight vector is given by

$$w = \frac{1}{\gamma}\Sigma^{-1}\mu, \tag{4}$$

where γ is constant relative risk aversion, μ is a vector of equity premia, and Σ is the variance-covariance matrix. A simple calibration of this model implies a coefficient of around 18 in a regression of US equity shares on US equity premium expectations, far above the estimate of two in specification (1) of Panel A of Table 5.

To see this, consider the following calibration with two risky assets. With two risky assets, say US equities and international equities, the portfolio weight on the first risky asset is: $w_1 = \frac{1}{\gamma}\frac{1}{\sigma_1^2\sigma_2^2 - \sigma_1^2\sigma_2^2\rho^2}(\sigma_2^2\mu_1 - \sigma_1\sigma_2\rho\mu_2)$. We pick values guided by our data for all parameters except γ and then back out γ from the observed allocation to US equities. With $\sigma_1 = 0.16$ (volatility of US equity market), $\sigma_2 = 0.18$ (volatility of international equities), $\mu_1 = 0.03$ (US equity premium), $\mu_2 = 0.04$ (international equity premium), $\rho = 0.8$ (correlation between US and international equity returns), and $w_1 = 0.34$ (average US equity share in the data), the implied γ is 5.96. This γ in turn implies a coefficient of $\mathrm{d}w_1/\mathrm{d}\mu_1 = 18.21$.

However, Equation (4) also suggests to control for the variance-covariance matrix and all other risky asset return expectations when we want to identify the effect of subjective US equity premium expectations on US equity shares. Controlling for all these additional inputs is challenging as many asset managers do not provide their entire variance-covariance matrix expectations and return expectations on all risky asset classes. Thus, we are facing a trade-off between controlling for additional expectations and reducing the sample size. With this trade-off in mind, we additionally control for return expectations on developed markets equities and emerging markets equities. In this case, the sample of asset managers is reduced by six managers, but we cover expectations on worldwide equity returns. Variances and correlations are arguably easier to estimate than are expected returns and thus vary less across asset managers.

Specification (2) in Panel A of Table 5 shows the results. The coefficient estimate on US equity premium expectations increases to 3.98, but is still a magnitude lower than 18. The coefficient estimate on developed markets equity premium expectations is significantly negative, indicating a substitution effect within the equity part of a fund's portfolio. Funds of asset managers with higher developed markets equity premium expectations allocate less to US equities. The Internet Appendix investigates such a substitution within the equity part of a fund's portfolio more systematically by replacing the dependent variable with the share invested in non-US equities. For completeness, specification (3) shows the results of specification (1) for the reduced sample of managers in specification (2).

The coefficient estimate on US equity premium expectations is smaller than the one implied by a standard portfolio choice model, but larger than the ones reported in similar specifications of previous work. Compared to our estimates of two to four, Kézdi and Willis (2011) find a 0.30 estimate, Amromin and Sharpe (2014) a 0.33 estimate, Ameriks et al. (2020) a 0.45 estimate, and Giglio et al. (2021) a 0.69 estimate. An exception are Beutel and Weber (2022) who report a 1.35 coefficient estimate in a comparable specification and a 2.84 coefficient estimate in their instrumental variables specification.

In Panel B of Table 5 we report similar results as before, but the dependent variable is now the log US equity share. That is, we estimate the following specification

$$\ln(\text{US Equity Share}_{j(i),t}) = \theta_t + \delta \, \mathrm{F}_{i,t}[r^e_{t\to t+h}] + \eta_{j(i),t}. \tag{5}$$

Through the lens of the simple portfolio choice model of Equation (4), the specifications that log the dependent variable have the advantage that cross-sectional heterogeneity in risk aversion is absorbed in the constant. The disadvantage of specifications that log the dependent variable is that they exclude US equity shares that are negative. While only a few funds enter short positions, these observations could be particularly important for identification.

In these specifications, the coefficients relate to the semi-elasticity of US equity shares to US equity premium expectations (see Gabaix and Koijen, 2021). Bearing in mind our identification challenges using fixed effects rather than exogenous variation, our semi-elasticity estimates range from 9.56 to 14.89. This means that a one-percentage-point increase in the US equity premium expectation is associated with a 9.56 to 14.89 percent—not percentage point—larger US equity share.

We illustrate the results of this subsection in Figure 4. Analogous to Figure 2 of Giglio et al. (2021), Figure 4 shows a conditional binscatter plot of US equity shares and US equity premium expectations, conditional on year-month fixed effects and emerging as well as developed markets equity premium expectations.

4.3 Fund fixed effects and tactical allocation funds

Next, in addition to time fixed effects, we add fund fixed effects to our specifications to absorb unobserved variables that are constant over time for a given fund. Such variables could be potential confounders such as cross-sectional differences in risk-aversion (see Equation (4)), but fund fixed effects also absorb a fund's unobserved investment mandate.

Investment mandates could be correlated with expectations and portfolios, but they are not a confounder. The reason is that it seems unlikely that investment mandates drive both expectations and portfolio allocations. Instead, it seems more likely that the effect of expectations on portfolio allocations flows through the investment mandate. Specifically, perhaps an asset manager with low US equity return expectations offers funds with a low target allocation to US equities. In the language of Pearl (2009), investment mandates are a mediator rather than a confounder.[13] In this case, absorbing fund fixed effects could block some of the effect of expectations on portfolio demand. That said, we do see merit in specifications that add fund fixed effects as they isolate the effect of expectations on portfolio demand that is not driven by investment mandates, and as they absorb any potential confounder that is constant for a given fund.

Specifications (1) to (3) in Table 6 are analogous to (1) to (3) in Table 5, but add fund fixed effects. In Panel A—the specifications with the level of the US equity share as the

[13] Angrist and Pischke (2009) call this "bad control." Relatedly, Cochrane (2018) cautions against "over-differencing."

dependent variable—the magnitudes of the coefficient estimates are about halved relative to Table 6, consistent with the notion that unobserved investment mandates mute the effect of expectations on portfolios. For instance, in specification (2) the coefficient estimate drops to 2.04, meaning that a one-percentage-point increase in US equity premium expectations is associated with a 2.04-percentage-points larger US equity share. That said, the coefficient estimates remain statistically significant. In Panel B—the specifications with the log US equity share as the dependent variable—the coefficient estimates are, on balance, unchanged compared to the specifications without fund fixed effects. Through the lens of Equation (4), one reason could be that specifications with the log US equity share as the dependent variable absorb heterogeneity in risk aversion in the constant regardless of whether these specifications include fund fixed effects or not.

The specifications with both time and fund fixed effects identify the coefficients using a mix of cross-sectional and time-series variation. One way to obtain these coefficient estimates is to first cross-sectionally demean the data, second to run a series of time-series regressions fund-by-fund using the cross-sectionally demeaned data, and third to take a weighted average of the slope coefficient estimates. We also identify the coefficients using just times-series variation in specifications with just fund fixed effects, while explicitly controlling for variables that could capture the current state of the economy. These specifications are slightly less general than the specifications with both time and fund fixed effects, as they control only for selected variables that are constant for a given cross-section. The Internet Appendix shows these results; they are similar to Table 6.

To further gauge the effect of investment mandates, we study tactical allocation funds. These funds are less restricted by their investment mandates, as the purpose of tactical allocation funds is to time entry and exit into different asset classes to generate abnormal returns. We expect the coefficient estimates on expectations to be larger for tactical allocation funds. The caveat is that there are only twelve such funds in the sample.

Table 7 confirms that the coefficient estimates on US equity premium expectations in regressions of US equity shares on expectations are larger for tactical allocation funds. In specification (1), which includes both time fixed effects as well as return expectations on international equities, a one-percentage-point increase in US equity premium expectations is associated with a $3.87 + 5.43 = 9.30$ larger US equity share for a tactical fund. This estimate is more than ten times larger than some of the estimates for individual investors in the literature, more than double the estimate for a non-tactical fund in specification (1), and consistent with the notion that investment mandates mute the sensitivity of portfolios to expectations.

4.4 Aggregation of equity share

So far, we have focused on the coefficients in regressions of US equity shares on US equity premium expectations. In this subsection, we add up a fund's investment in US equities and international equities to focus on the substitution between equities and bonds. The caveat is that we do not directly observe asset managers' global equity return expectations. Instead, we construct a global equity premium expectation for each asset manager by taking a weighted average of US, developed markets, and emerging markets equity premium expectations. The weights at a given point in time are market-capitalization weights from the MSCI All Country World Index. The sample is again reduced to those asset managers that report US, developed markets, and emerging markets equity return expectations.

Specification (1) in Panel A of Table 8 shows that a one-percentage-point increase in equity premium expectations is associated with a 1.45-percentage-points larger equity share, which is a slightly smaller estimate than the estimates for the corresponding sample in Table 6. In specification (1) of Panel B, the coefficient estimate is more than halved relative to the corresponding estimate in Table 6. As mentioned before, these lower coefficient estimates relative to the previous results indicate that some substitution in response to expectations happens within the equity part of a fund's portfolio.

That the coefficient estimates are small relative to a standard portfolio choice model is particularly obvious in Panel B. Assuming return expectations of non-equity investments are uncorrelated with equity return expectations, the portfolio weight on equities in the standard model is $w = 1/\gamma \times \mu/\sigma^2$. In this case, the semi-elasticity of portfolios to expectations is $\mathrm{dln}(w)/\mathrm{d}\mu = 1/\mu$. For a reasonable equity premium expectation of, say 4%, the semi-elasticity should thus be 25. Instead, the slope coefficient estimate is 4.54 in specification (1) of Table 8, meaning that a one-percentage-point increase in the equity premium expectation is associated with only a 4.54 percent larger equity share.

In specification (2) of Table 8 we again focus on tactical allocation funds. In both Panels A and B, the interactions between equity premium expectations and the tactical fund dummy are positive. The coefficient estimate for a tactical fund in specification (2) of Panel B is 18.27 and, as such, closer to the one implied by the standard portfolio choice model, but we cannot reject that the coefficient is zero. Gabaix and Koijen (2021) calibrate the most flexible funds with a semi-elasticity of eight, which is in between our point estimates of 4.12 (for non-tactical funds) and 18.27 (for tactical funds).

4.5 Bond shares and term premium expectations

We next investigate whether subjective term premium expectations are reflected in the allocation funds' bond shares (excluding cash shares). We expect bond shares to increase with subjective term premia. Table 9 presents regressions of bond portfolio shares on US term premium expectations. Specification (1) includes year-month fixed effects and is analogous to the specifications in Table 5; specification (2) includes both year-month and fund fixed effects and is analogous to the specifications in Table 6. There seems to be no apparent relationship between overall bond shares and term premium expectations.

We speculate that a reason for the lack of a consistent relationship between term premium expectations and bond shares could be that the allocation funds in our sample allocate to US as well as international corporate bonds in addition to US Treasury bonds. Thus, their bond shares could be driven by credit risk premium expectations as opposed to term premium expectations, a hypothesis that future research could investigate.

We instead investigate whether term premium expectations are reflected in allocation funds' durations and maturities of fixed income (i.e., bond and cash) investments. We expect durations and maturities to increase with term premium expectations, as term premium expectations measure the expected excess returns on long-term bonds over cash. Specifications (3)–(6) provide evidence that term premium expectations relate to the asset-weighted durations and maturities of fixed income portfolios. Specifications (3) and (5) include year-month fixed effects only; specifications (4) and (6) include both year-month and fund fixed effects. To interpret the estimates, consider specification (3) of Panel A: a one-percentage-point increase in the term premium expectation is associated with a 1.26 years larger effective duration. However, specifications (3)–(6) are hampered by a reduced sample size, as fixed income durations and maturities from Morningstar are only available since 2017 and often missing. Still, our results are again consistent with the notion that the sensitivity of portfolios to expectations is larger within asset classes than across asset classes.

5 CFOs' and professional forecasters' return expectations

The expectations considered here so far differ from the subjective expectations typically studied in the literature in two important ways. First, asset managers' expectations represent the expectations of market participants that have not been studied previously. Second, asset managers forecast returns predominantly over long-term horizons (e.g., ten years) as opposed to the short-term (e.g., one-year) forecasts typically studied in the literature (see

Sias, Starks, and Turtle, 2022, for a recent exception). In addition, we focus on equity premium expectations—the key objects in standard rational expectations asset pricing models and the return predictability literature—as opposed to nominal equity return expectations.

To investigate why our results differ, we contrast asset managers' return expectations to the expectations of CFOs and professional forecasters, two surveys for which long-term expectations are available. Quarterly S&P 500 return expectations of CFOs are from a survey administered by John Graham and Campbell Harvey (see, e.g., Ben-David, Graham, and Harvey, 2013), annual S&P 500 ten-year return expectations of professional forecasters are from the Survey of Professional Forecasters conducted by the Philadelphia Fed, and semi-annual one-year forecasts of the level of the S&P 500 are from the Livingston Survey, which is also administered by the Philadelphia Fed. We note that the one- and ten-year forecasts of professional forecasters correspond to different sets of professional forecasters. The Internet Appendix contains additional details on the surveys of CFOs and professional forecasters.

5.1 CFOs

To begin with, the top panel of Figure 5 plots the time series of average CFO equity premium expectations for one- and ten-year horizons together with the CAPE. Somewhat surprisingly, CFOs' one-year equity premium expectations appear countercyclical, spiking after the dot-com bubble burst in the early 2000s and after the great financial crisis in 2008. For CFOs' ten-year equity premium expectations, the pattern is less clear.

Specifications (1) and (2) of Table 10 show regressions of CFOs' expectations on the lagged log CAPE and confirm the visual evidence. One-year equity premium expectations are negatively correlated with the CAPE (the coefficient estimate is -2.09), whereas the coefficient estimate on the CAPE is statistically zero for the ten-year expectations.

Greenwood and Shleifer (2014) document *procyclical* one-year return expectations for the same survey. How can the results be so different? The reason seems to be their focus on nominal equity return expectations. Specification (3) has nominal one-year equity return expectations as the dependent variable and the coefficient estimate on the log CAPE from the previous month is significantly positive. This specification is similar to specification (9) in Table 3 of Greenwood and Shleifer (2014). Using a slightly different sample period and specification, their coefficient estimate on the valuation ratio (the price-dividend ratio in their case) of 3.40 is close to our estimate of 3.47. Specification (4) shows the same pattern for CFOs' nominal ten-year equity return expectations.

Of course, procyclical interest rates drive some of the results in Table 10. That is, Treasury yields are low in recessions and high in expansions, contributing to variation in equity premia. Table 10 implies that, for instance, in recessions Treasury yields move more than do CFOs' one-year subjective nominal equity return expectations: as valuations decline, CFOs' nominal equity return expectations decline in specification (3), but Treasury yields decline more, such that CFOs' equity premium expectations increase in specification (1). As we have mentioned before, we prefer to focus on equity premia. That Treasury yields drive variation in subjective equity premium expectations does not lead to a mismeasurement of subjective equity premium expectations as long as Treasury yields are in CFOs' information sets.

5.2 Professional forecasters

The bottom panel of Figure 5 plots the average equity premium expectation of professional forecasters. Similar to CFOs' expectations, professional forecasters' one-year equity premium expectations appear to be countercyclical, spiking enormously after the great financial crisis. This time, however, variation in Treasury yields can hardly explain the observed countercyclicality: one-year equity premium expectations of above 30% after the financial crisis are too large to be explained by declining Treasury yields alone. As with CFOs, there is no obvious correlation between the ten-year equity premium expectations of professional forecasters and the CAPE.

Table 11 shows regressions of professional forecasters' expectations on the log CAPE from the previous month. In contrast to CFOs' expectations, for the professional forecasters we have access to the underlying panel of forecasts. We include forecaster fixed effects in these regressions to identify the slope coefficients using time-series variation. Panel A of Table 11 confirms the visual evidence shown in the bottom panel of Figure 5. Both one-year equity premium and one-year nominal equity return expectations are countercyclical. In fact, professional forecasters' one-year equity premium expectations appear *too* countercyclical relative to the simple (long-term) objective benchmark introduced earlier. Panel B of Table 11 shows the results for professional forecasters' ten-year expectations. The coefficient estimates on the CAPE are statistically zero in all specifications, consistent with the bottom panel of Figure 5.

Using the same Livingston survey, De la O and Myers (2021) find that one-year equity return expectations of professional forecasters are uncorrelated with the price-dividend and price-earnings ratios. How can the results be so different? Apart from differences in the sample period, the exact construction of the valuation ratio seems to matter, see, e.g, the discussion in Hillenbrand and McCarthy (2021).[14] If anything, this discussion highlights again that it is challenging to model expected returns, for investors and researchers alike. The CAPE is readily available from Shiller's website and a widely accepted measure of equity valuations. From the bottom panel of Figure 5 it is obvious that professional forecasters' one-year equity premium expectations from the Livingston survey are countercyclical in the

[14] De la O and Myers (2021) use a sample from 1952 to 2016. We use a sample from 1990 to 2020. The Philadelphia Fed no longer maintains the series before 1990 and "advises researchers to use these series with caution" as the survey was conducted differently before 1990. Nagel and Xu (2023) report a 1.01 coefficient estimate on their log repurchase-adjusted dividend-price ratio using the sample since 1952. Note that their left-hand-side variable is constructed slightly differently, as they scale the S&P 500 forecast by the "zero-month" forecast, whereas we scale by the actual S&P 500 level on the day the forecast was reported.

sense that they co-vary negatively with the CAPE.

What can we conclude? Both CFOs' and professional forecasters' one-year equity premium expectations co-vary negatively with the CAPE, but their ten-year expectations do not. Thus, one conclusion is that asset managers' equity premium expectations are the only expectations in consideration that consistently co-vary negatively with the CAPE. Another conclusion is that our focus on equity premium expectations and the CAPE as opposed to nominal equity return expectations and other predictors leads us to find no evidence that subjective expectations co-vary positively with equity valuation ratios, a result that was emphasized in previous work.

6 Concluding remarks

Understanding the expectations and portfolios of the largest investors is central to understanding asset prices (see, e.g., Heyerdahl-Larsen and Illeditsch, 2021). Professional asset management firms are among the largest investors in today's financial markets.

Large asset managers' expectations, in contrast to the commonly studied subjective expectations of retail investors, are countercyclical: they are high when equity valuations are low and low when valuations are high, consistent with the relationship between realized equity returns and valuations. Asset managers' expectations are reflected in the portfolios of their allocation funds. The slope coefficient estimate in a regressions of portfolio shares on equity premium expectations is greater than estimates in the literature based on retail investors. However, this sensitivity of portfolios expectations is muted by investment mandates and still smaller than in a standard portfolio choice model.

Of course, this sensitivity of portfolios to expectations is not easily generalized to all the assets that asset managers manage, as we focus on funds with presumably the most flexible investment mandates. A significant fraction of assets are managed passively or in funds with tight investment mandates. In such cases, there is little room for a fund to change its allocations away from the target allocations. That said, asset managers' decisions to offer funds across asset classes with various investment mandates are not exogenous, but presumably precisely driven by their long-run return expectations across asset classes. For instance, a manager who is bullish on equities may launch more equity funds and less bond funds than a manager who is bearish on equities. Understanding the origins of investment mandates and their relation to expectations seems central to understanding long-run asset prices.

In cases of tight investment mandates, understanding flows in and out of investment funds seems central to understanding high-frequency asset prices. Asset managers' expectations could matter beyond their own portfolios, for instance by driving such flows of sophisticated retail investors or other institutional investors.

Beyond the scope of this paper is a theory that reconciles the wealth-weighted expectations and portfolios of different types of investors to assess whose marginal expectations are reflected in equity prices. Perhaps such a theory could extend the work of Koijen and Yogo (2019) to incorporate subjective expectations. Central components could be retail investors' expectations and how retail investors allocate money to asset managers, asset managers' investment mandates and incentives, and the sensitivity of portfolios to expectations. Developing a theory that incorporates expectations and portfolio holdings from an array of different types of retail and institutional investors appears to be a promising area for future research.

A Data appendix

A.1 Capital market assumptions

Grouping expectations into asset classes Asset managers use different names and indices to refer to the asset classes they forecast. We group asset managers' return expectations into the following asset classes: US all-cap equities, US large-cap equities, international developed markets equities, emerging markets equities, US cash, and US inflation.

We initially make a distinction between US all-cap equities (e.g., the Russell 3000 Index) and US large-cap equities (e.g., the S&P 500 or the Russell 1000 Index) as some asset managers forecast both. However, the vast majority forecast only one of the two, so that in our analysis we combine the two asset classes and simply refer to them as "US equities." When managers forecast both, we take the forecast for US large-cap equities. The typical indices for international developed markets equities and emerging markets equities are the MSCI EAFE Index and the MSCI Emerging Markets Index. US cash typically stands for the three-month Treasury bill.

Geometric versus arithmetic average returns Expected returns are typically stated as geometric averages. We assume that returns are geometric averages opposed to arithmetic averages in the few cases when not specified. Two managers provide expectations expressed only as arithmetic averages, but these managers also provide standard deviation forecasts. We convert arithmetic averages to geometric averages using a first-order approximation. In that case, the geometric mean is the arithmetic mean less half of the squared standard deviation forecast.

Real versus nominal returns We assume that returns are stated in nominal terms unless otherwise specified. Two managers (AQR and GMO) provide only real return forecasts, but then also provide an inflation forecast. We construct implied nominal equity return forecasts by adding expected inflation to the expected real return. Sometimes the forecast for inflation is stated over a different horizon from the forecast for, say, US equities. We still subtract the inflation forecast in such cases, implicitly assuming that the term structure of inflation expectations is flat.

US dollar versus other currencies We assume that expectations are stated in US dollars (USD) unless otherwise specified. When expectations are stated in multiple currencies, we collect the USD expectations.

Dates If no exact date for the report and only a year-month is specified, we use the last day of the previous month as the data date. If no exact date for the report and only a year is specified, we use the last day of December of the previous year as the data date.

Forecast horizons We convert expectations stated for a horizon range to a number using the midpoint of the range. One asset manager stated a forecast for a "10+"-year horizon, which we take to mean exactly ten years.

Vanguard Vanguard reports a range between two values. We take the average of these two values to obtain a point estimate.

A.2 Portfolio data

Acquisitions We identify asset managers in Morningstar using Morningstar's *BrandingName* variable. There is no time series available for this variable; only the latest value is stored in the Morningstar data. Sometimes, one asset manager acquires another asset manager. We manually identify three acquisitions in the sample: the acquisition of One Group by J.P. Morgan in July 2004, the acquisition of Pioneer by Amundi, which was completed by 2018, and the acquisition of Legg Mason by Franklin Templeton in July 2020. In such cases, going forward only the acquirer's *BrandingName* is stored in Morningstar for both the acquirer's and the target's funds. To avoid assigning the wrong expectations to the target manager's funds before the acquisition date, we manually correct the target manager funds' *BrandingName* before the acquisition date.

Index funds and exchange-traded funds We drop index funds identified by the *IndexFund* variable. We also drop any exchange-traded fund, which we identify by searching for the string "ETF" in a fund's name.

Target-date funds and tactical allocation funds We identify a target-date fund by searching for the string "Target-Date" in a fund's *MorningstarCategory*. Funds' assignments to categories may change over time and we generally work with the version of the category variable that has a time series available, but fill in the latest value if the fund is in existence and the historical category assignment is missing.

We identify a tactical allocation fund whenever it belongs to the *MorningstarCategory* US Fund Tactical Allocation. As the *MorningstarCategory* varies over time, so does our dummy variable for whether a fund is a tactical allocation fund or not.

Duration and maturity of fixed income portfolios We use the *Fixd-IncEffDur-Avgyrs(Calc)(Long)(FI%)* and *Fixd-IncEffMty-Avgyrs(Calc)(Long)(FI%)* variables from Morningstar to measure the asset-weighted durations and maturities of the fixed income (i.e., bond and cash) part of allocation funds' portfolios. These variables are populated since 2017.

A.3 List of asset managers and sample composition

Figure A1 shows the number of return forecasts for the sample of all providers and for the sample of asset managers that we can match to portfolio data over time. As mentioned in the main text, most of the observations are from the last decade and the sample is sparse in earlier years, in particular before 2010. Our data collection ends in April 2021, so naturally there are few return forecasts for the year 2021.

Table A1 lists the asset managers in our sample and decomposes the number of observations in our main regressions by asset manager.

Columns (1) and (2) refer to specifications (1) and (2) of Table 2. These specifications relate asset managers' US equity premium expectations to the CAPE. The number of observations per asset manager in specification (1) is determined by i) the first date a manager started publishing expectations, ii) the frequency with which these expectations are published), and iii) whether for a given date the asset manager provides expectations over several horizons (a term structure).

To understand these components, we consider three examples. First, GMO started publishing expectations as early as 2005 on a quarterly basis (at least we think their reports could have been published quarterly initially). Since 2005, around 64 quarters have passed, so we are likely missing around 17 reports. In particular, we are missing most reports before 2008.

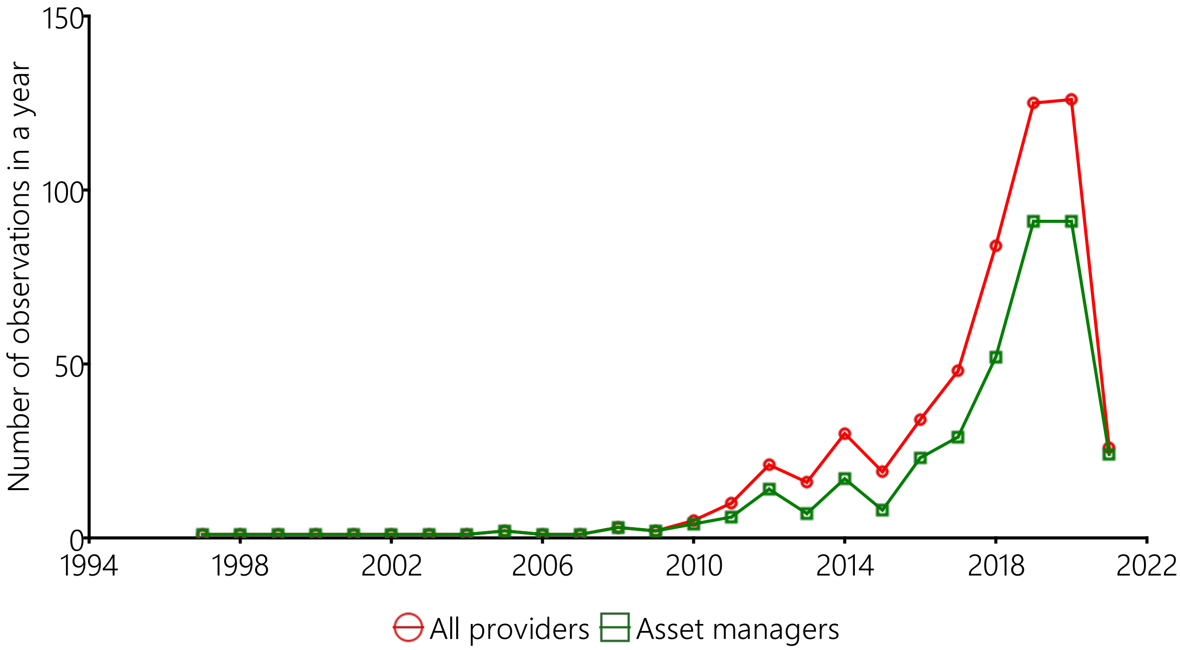
Second, J.P. Morgan started publishing capital market assumptions in 1997. We have access to the complete time series since 1997, but in column (1) J.P. Morgan contributes only 24 observations as J.P. Morgan provides expectations only once a year.

Third, following correspondence, BlackRock told us that they started publishing capital market assumptions only in 2018.[15] Nonetheless, in column (1) they contribute a relatively

[15] We did find one capital market assumptions report from the BlackRock Investment Institute from 2016,

Figure A1: Number of observations per year

The figure shows the number of return forecasts per year for the sample of all providers of return forecasts (red circles) and sample of asset managers that we can match to portfolio data (green squares). The sample period ends in April 2021.



large number of 78 observations as BlackRock publishes expectations quarterly and over several horizons for a given quarter.

In Column (2), the sample is restricted to one equity premium forecast per asset manager per date. By comparing Columns (1) and (2) it is apparent which managers provide a term structure of expectations.

Columns (3) and (4) refer to specifications (1) and (2) in Table 5. The number of observations per asset manager in column (3) is determined by i) the first date a manager started publishing capital market assumptions, ii) the number of allocation funds a manager manages, iii) how long these funds exist, iv) whether these funds report their holdings only quarterly or every month, and v) how frequent an asset manager reports their expectations (e.g., quarterly versus annually).

In Column (4) the sample is restricted to observations for which expectations on international developed and emerging market equities are available. By comparing Columns (3) and (4) of Table A1 it is apparent which managers do not provide both international developed and emerging markets equity forecasts. The managers who do not provide these additional forecasts often provide some other forecasts of international equities. For instance, DWS forecasts emerging markets equity returns, but provides separate forecasts for different countries/regions in the MSCI EAFE Index (e.g., Europe, the United Kingdom, and Japan) as opposed to forecasting the MSCI EAFE Index itself. We believe that these forecasts are potentially too different from the other forecasts stated for international developed equities (as proxied by the MSCI EAFE Index), so we drop them. A similar logic applies to managers that forecast equity returns of individual emerging market economies (as opposed to overall emerging market equities as proxied by the MSCI Emerging Markets Index).

which we include in the sample.

Table A1: List of asset managers

Asset manager	Number of observations (1)	(2)	(3)	(4)	(5)
Amundi	37	13	152	0	2.89
AQR	9	9	71	47	0.19
BlackRock	78	11	297	205	53.41
BMO	3	3	60	60	0.69
BNY Mellon	5	5	68	68	4.45
Columbia Threadneedle	2	2	106	106	25.45
DWS	8	8	148	0	4.29
Franklin Templeton	5	5	214	49	101.04
GMO	47	47	276	276	15.92
Graystone Consulting / Morgan Stanley	7	5	21	9	0.55
Invesco	10	10	202	202	26.99
J.P. Morgan	24	24	558	558	39.48
Morningstar	16	16	50	50	0.50
Northern Trust	10	10	16	0	0.13
PIMCO	3	3	19	19	23.66
Pioneer Investments	6	2	48	0	0.00
State Street	65	19	82	68	0.21
T. Rowe Price	3	3	48	0	69.48
UBS	3	3	12	12	0.53
Vanguard	6	6	160	0	345.66
Voya	6	6	372	372	18.48
Wells Fargo Investment Institute	3	3	141	141	9.46
Total	356	213	3121	2242	743.39

The table lists the asset managers in the sample and decomposes the number of observations in key regressions by asset manager. Column (1) refers to specification (1) in Table 2. Column (2) refers to specification (2) in Table 2. Column (3) refers to specification (2) in Panel A of Table 5. Column (4) refers to specification (1) in Panel A of Table 5. Column (5) shows the 2021 assets under management (AUM) for funds in the sample in column (3) in billions of USD. BMO refers to Bank of Montreal Global Asset Management, GMO to Grantham, Mayo, & van Otterloo, and PIMCO to Pacific Investment Management Company.

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Table 1: Summary statistics

	N	Mean	Median	Min	Max	Standard deviations across		
						Manager/fund	Horizon	Time
Panel A: Manager equity expectations								
US equity premium (over yield)								
All horizons	360	3.02	3.79	−6.50	11.52	1.75	0.88	1.01
<10-year horizon	181	2.33	3.40	−6.50	11.52			
≥10-year horizon	179	3.72	4.02	−1.25	7.32			
US equity return (nominal level)								
All horizons	383	5.12	5.69	−5.10	11.80	1.63	0.88	0.70
<10-year horizon	181	3.96	5.08	−5.10	11.80			
≥10-year horizon	202	6.16	6.53	−0.10	9.30			
US equity premium (over cash)								
All horizons	343	3.11	3.90	−6.50	11.50	1.70	0.83	0.91
<10-year horizon	164	2.18	3.21	−6.50	11.50			
≥10-year horizon	179	3.97	4.40	−0.70	6.25			
DM equity premium (over yield)								
All horizons	234	3.73	3.81	−1.50	9.20	1.09	0.73	1.15
<10-year horizon	111	3.06	3.20	−1.50	9.20			
≥10-year horizon	123	4.33	4.38	0.15	8.71			
EM equity premium (over yield)								
All horizons	318	5.27	5.50	−1.55	13.22	1.22	0.94	1.24
<10-year horizon	168	5.11	5.27	−1.55	13.22			
≥10-year horizon	150	5.46	5.66	1.45	13.02			
Panel B: Fund shares								
US equity	3139	34.36	32.47	−16.22	99.73	17.39		4.99
Non-US equity	3139	18.47	16.41	−22.95	99.49	10.56		4.00
Bonds	3139	38.29	34.61	0.00	266.49	17.93		7.49
Cash	3139	4.37	4.67	−290.04	100.00	9.93		7.58
Other assets	3139	4.43	1.30	−2.80	77.28	5.02		2.87

The table shows number of observations and summary statistics (mean, median, minimum, and maximum) for asset managers' expectations of US equity premia (over a matched yield), US equity returns (nominal level), US equity returns over the subjective returns on cash over the same horizon, developed markets equity premia (DM, over a matched yield), and emerging markets equity premia (EM, over a matched yield) in Panel A, as well as fund shares invested in US equities, non-US equities, bonds, cash, and other assets for asset managers' allocation funds in Panel B. The table also shows in Panel A average standard deviations across one dimension (manager, horizon, or time) while fixing the other two dimensions; for example, to compute the average standard deviation of equity premium expectations across managers, we fix a horizon and a quarter (time), compute the standard deviation across managers, repeat the same process for all horizon-quarter pairs, and then average across all horizon-quarter pairs. The corresponding standard deviations for fund shares in Panel B are only across fund or over time. The manager equity expectations and fund shares are expressed in % per year and %, respectively.

Table 2: Subjective equity return expectations and CAPE

	Equity premium (over yield)		Equity return (nominal level)	Equity premium (over cash)
	All horizons (1)	Closest to 10 years (2)	(3)	(4)
Panel A: CAPE				
ln(CAPE)	-5.942^{***}	-6.526^{**}	-4.831^{*}	-5.372^{*}
	(2.052)	(2.411)	(2.377)	(2.639)
N	356	213	379	338
Adjusted R^2	0.776	0.864	0.810	0.780
Manager$\times$Horizon FE	Yes	Yes	Yes	Yes
Panel B: CAPE, past return, and risk-free rate				
ln(CAPE)	-5.252^{**}	-6.102^{**}	-5.252^{**}	-5.671^{*}
	(2.502)	(2.756)	(2.502)	(2.911)
Past 12-month return	-0.001	-0.007	-0.001	0.012
	(0.008)	(0.007)	(0.008)	(0.010)
Risk-free rate	-0.692^{***}	-0.489^{***}	0.308	-0.409^{*}
	(0.185)	(0.140)	(0.185)	(0.234)
N	356	213	356	315
Adjusted R^2	0.824	0.885	0.812	0.796
Manager$\times$Horizon FE	Yes	Yes	Yes	Yes

The table shows panel regressions of asset managers' US equity return expectations on the log of the cyclically adjusted price-earnings ratio (CAPE). Panel A shows regressions with the CAPE only; Panel B shows regressions with the CAPE, the past twelve-month return of the S&P 500 index, and the matched yield as the risk-free rate. Specifications (1) and (2) are for equity premia over yield (nominal equity forecast minus a matched nominal yield), specification (3) for the nominal level of equity returns, and specification (4) for equity premia over cash (nominal equity forecast minus nominal cash forecast over the same horizon). Specification (1) includes equity premium expectations for all horizons; specification (2) includes, for a given date, only one equity premium expectation per asset manager (the one closest to a horizon of ten years). All specifications include a manager-times-horizon fixed effect, but the fixed effect coefficient estimates are not reported. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 3: Subjective and objective equity return expectations

	Equity premium	
	(1)	(2)
Valuation-based equity premium	1.074***	
	(0.222)	
Regression-based equity premium		1.077**
		(0.398)
N	207	213
Adjusted R^2	0.856	0.864
Manager×Horizon FE	Yes	Yes

The table shows panel regressions of asset managers' US equity premium expectations (nominal equity forecast minus a matched nominal yield) on measures of objective equity premium expectations. Specification (1) uses a valuation-based measure of objective equity premium expectations, constructed as $\mu = \ln(1 + 1/\text{CAPE}) - \ln(1 + y)$ where y is the real ten-year Treasury yield. Specification (2) uses fitted values from specification (1) in Table C1 in the Internet Appendix. The specification in the Internet Appendix regresses realized ten-year excess returns on the log CAPE using data from 1871 to 2021. The sample includes, for a given date, only one equity premium expectation per asset manager (the one closest to a horizon of ten years). All specifications include a manager-times-horizon fixed effect, but the fixed effect coefficient estimates are not reported. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 4: Subjective and objective term premia

	Term premium	
	(1)	(2)
ACM-based term premium	0.559***	
	(0.082)	
KW-based term premium		0.886***
		(0.202)
N	239	239
Adjusted R^2	0.562	0.525
Manager×Horizon FE	Yes	Yes

The table shows panel regressions of asset managers' US term premium expectations (Treasury yield minus an expected return on cash over the same horizon as the Treasury yield) on measures of objective term premium expectations. Specification (1) uses term premium estimates from the Adrian et al. (2013) model. Specification (2) uses term premium estimates from the Kim and Wright (2005) model. All specifications include a manager-times-horizon fixed effect, but the fixed effect coefficient estimates are not reported. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 5: US equity share and subjective equity return expectations

	US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	2.051***	3.983***	2.287***
	(0.298)	(0.292)	(0.270)
DM expectations		−4.615***	
		(1.189)	
EM expectations		1.818*	
		(0.923)	
N	3121	2242	2242
Adjusted R^2	0.074	0.134	0.093
Year-month FE	Yes	Yes	Yes
Panel B: Log specification			
US expectations	9.602***	15.011***	10.760***
	(1.533)	(2.449)	(1.358)
DM expectations		−18.214**	
		(7.118)	
EM expectations		13.379	
		(8.116)	
N	3066	2192	2192
Adjusted R^2	0.084	0.117	0.097
Year-month FE	Yes	Yes	Yes

Panel A shows regressions of the US equity shares of asset managers' allocation funds on US, developed markets (DM), and emerging markets (EM) equity return expectations. Return expectations are equity premia (nominal equity forecast minus a matched nominal yield). Panel B shows regressions of the log US equity shares of asset managers' allocation funds on the same return expectations. All specifications include a year-month fixed effect. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 6: US equity share and subjective equity return expectations (fund fixed effects)

	US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	1.070**	2.081***	1.738***
	(0.448)	(0.607)	(0.337)
DM expectations		−0.751	
		(0.554)	
EM expectations		0.309	
		(0.422)	
N	3118	2240	2240
Adjusted R^2	0.888	0.893	0.893
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes
Panel B: Log specification			
US expectations	9.806**	11.872**	16.724***
	(3.507)	(4.355)	(3.224)
DM expectations		−1.083	
		(7.512)	
EM expectations		6.081	
		(5.735)	
N	3063	2190	2190
Adjusted R^2	0.536	0.542	0.541
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes

Panel A shows regressions of the US equity shares of asset managers' allocation funds on US, developed markets (DM), and emerging markets (EM) equity return expectations. Return expectations are equity premia (nominal equity forecast minus a matched nominal yield). Panel B shows regressions of the log US equity shares of asset managers' allocation funds on the same return expectations. All specifications include a fund fixed effect and a year-month fixed effect. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 7: US equity share and subjective equity return expectations (tactical funds)

	US equity share	
	(1)	(2)
Panel A: Level specification		
US expectations	3.867***	1.686**
	(0.206)	(0.611)
Tactical fund	−0.488***	−0.252***
	(0.071)	(0.067)
US expectations×Tactical fund	5.425**	6.144***
	(1.608)	(1.269)
DM expectations	−3.282***	−0.430
	(0.404)	(0.542)
EM expectations	0.936*	0.138
	(0.460)	(0.412)
N	2242	2240
Adjusted R^2	0.211	0.896
Fund FE	No	Yes
Year-month FE	Yes	Yes
Panel B: Log specification		
US expectations	14.614***	9.396*
	(2.082)	(4.323)
Tactical fund	−2.310***	−1.693***
	(0.447)	(0.317)
US expectations×Tactical fund	29.191**	36.300***
	(9.318)	(6.445)
DM expectations	−13.524**	0.760
	(5.281)	(8.038)
EM expectations	10.151	5.241
	(7.434)	(5.945)
N	2192	2190
Adjusted R^2	0.160	0.546
Fund FE	No	Yes
Year-month FE	Yes	Yes

Panel A shows regressions of US equity shares of asset managers' allocation funds on US, developed markets (DM), and emerging markets (EM) equity return expectations, allowing for specific sensitivity to tactical funds. Return expectations are equity premia (nominal equity forecast minus a matched nominal yield). The variable "Tactical fund" is a dummy variable that takes a value of one if the US equity share is for a tactical allocation fund. Panel B shows regressions of the log US equity shares of asset managers' allocation funds on the same variables. The specifications allow for a year-month fixed effect. Specification (2) also includes a fund fixed effect. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 8: Aggregate equity share and subjective equity return expectations

	Aggregate equity share	
	(1)	(2)
Panel A: Level specification		
Equity expectations	1.424***	1.343***
	(0.334)	(0.342)
Tactical fund		−0.155
		(0.169)
Equity expectations×Tactical fund		2.837
		(3.989)
N	2240	2240
Adjusted R^2	0.897	0.898
Fund FE	Yes	Yes
Year-month FE	Yes	Yes
Panel B: Log specification		
Equity expectations	4.545**	4.119**
	(1.659)	(1.599)
Tactical fund		−0.701
		(0.610)
Equity expectations×Tactical fund		14.148
		(14.720)
N	2209	2209
Adjusted R^2	0.767	0.769
Fund FE	Yes	Yes
Year-month FE	Yes	Yes

Panel A shows regressions of equity shares of asset managers' allocation funds on global equity premium expectations. The global equity premium expectation at a given point in time is constructed as a weighted average of US equity premium, developed markets equity premium expectations, and emerging markets equity premium expectations with market-capitalization weights from the MSCI ACWI index. The variable "Tactical fund" is a dummy variable that takes a value of one if the equity share is for a tactical allocation fund. Panel B shows regressions of the log equity shares of asset managers' allocation funds on global equity premium expectations. The specifications allow for a year-month fixed effect and a fund fixed effect. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 9: Bond share, duration, maturity, and subjective term premium expectations

	Bond share		Duration		Maturity	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Level specification						
US expectations	0.933	0.066	1.264*	0.587**	2.358**	1.047**
	(2.420)	(0.940)	(0.694)	(0.236)	(1.020)	(0.418)
N	2490	2482	504	480	440	418
Adjusted R^2	0.022	0.828	0.151	0.845	0.176	0.871
Fund FE	No	Yes	No	Yes	No	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: Log specification						
US expectations	−14.075	4.870	0.360	0.071*	0.412	0.076*
	(21.339)	(3.332)	(0.300)	(0.039)	(0.299)	(0.036)
N	2475	2468	503	479	440	418
Adjusted R^2	−0.009	0.870	0.053	0.896	0.069	0.959
Fund FE	No	Yes	No	Yes	No	Yes
Year-month FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel A shows regressions of the bond shares, asset-weighted fixed income durations, and asset-weighted fixed income maturities of asset managers' allocation funds on US term premium expectations (Treasury yield minus an expected return on cash over the same horizon as the Treasury yield). Panel B shows regressions of the log of the variables in Panel A on the same term premium expectations. The specifications allow for a year-month fixed effect. Specifications (2), (4), and (6) also include a fund fixed effect. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 10: CFOs' expectations and CAPE

	Equity premium (1)	Equity return (2)
Panel A: 1-year horizon		
ln(CAPE)	-2.089^{**}	3.468^{***}
	(0.976)	(0.875)
Constant	10.525^{***}	-5.603^{*}
	(3.169)	(5.891)
N	75	75
Adjusted R^2	0.208	0.277
Panel B: 10-year horizon		
ln(CAPE)	0.506	3.014^{**}
	(0.548)	(1.488)
Constant	2.006	-2.658
	(1.783)	(4.766)
N	75	75
Adjusted R^2	0.043	0.017

The table shows time-series regressions of chief financial officers' (CFOs') US equity return expectations on the log of the cyclically adjusted price-earnings ratio (CAPE). Specifications (1) and (3) are for one-year horizons; specifications (2) and (4) are for ten-year horizons. Specifications (1) and (2) are for equity premia (equity return minus either a one- or ten-year yield); specifications (3) and (4) are for equity returns. Standard errors (in parentheses) are Newey and West (1987) standard errors with four lags. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table 11: Professional forecasters' expectations and CAPE

	Equity premium (1)	Equity return (2)
Panel A: 1-year horizon		
ln(CAPE)	-13.740^{***}	-11.029^{***}
	(4.680)	(4.487)
N	1318	1318
Adjusted R^2	0.298	0.246
Forecaster FE	Yes	Yes
Panel B: 10-year horizon		
ln(CAPE)	-0.248	0.377
	(0.524)	(0.579)
N	681	681
Adjusted R^2	0.229	0.284
Forecaster FE	Yes	Yes

The table shows panel regressions of professional forecasters' US equity return expectations on the log of the cyclically adjusted price-earnings ratio (CAPE). Panel A shows expectations over one-year horizons; Panel B shows expectations over ten-year horizons. Specification (1) is for equity premia (equity return minus either a one- or ten-year yield); specification (2) is for equity returns. All specifications include a forecaster fixed effect, but the fixed effect coefficient estimates are not reported. Standard errors (in parentheses) in Panel A are clustered by semi-year and forecaster, and in Panel B by year and forecaster. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Figure 1: Equity premium expectations

The figure shows ten-year US equity premium expectations for six asset managers (red filled circles, left axis) and, matched by date, Martin's (2017) one-year option implied lower bound of the equity premium (green filled squares, left axis). One observation (8.2% per year for the option-implied equity premium) is outside the plotted ranges. The six asset managers are Amundi, BlackRock, J.P. Morgan, Morningstar, State Street, and Vanguard. These managers have i) the most data points available for a ten-year horizon, and ii) provide both equity return and cash return forecasts. J.P. Morgan provides forecasts with a horizon interval of 10-15 years. The figure excludes expectations from J.P. Morgan from 1997 to 2009. The figure also shows Shiller's cyclically adjusted price-earnings ratio (CAPE; solid blue line; right axis).

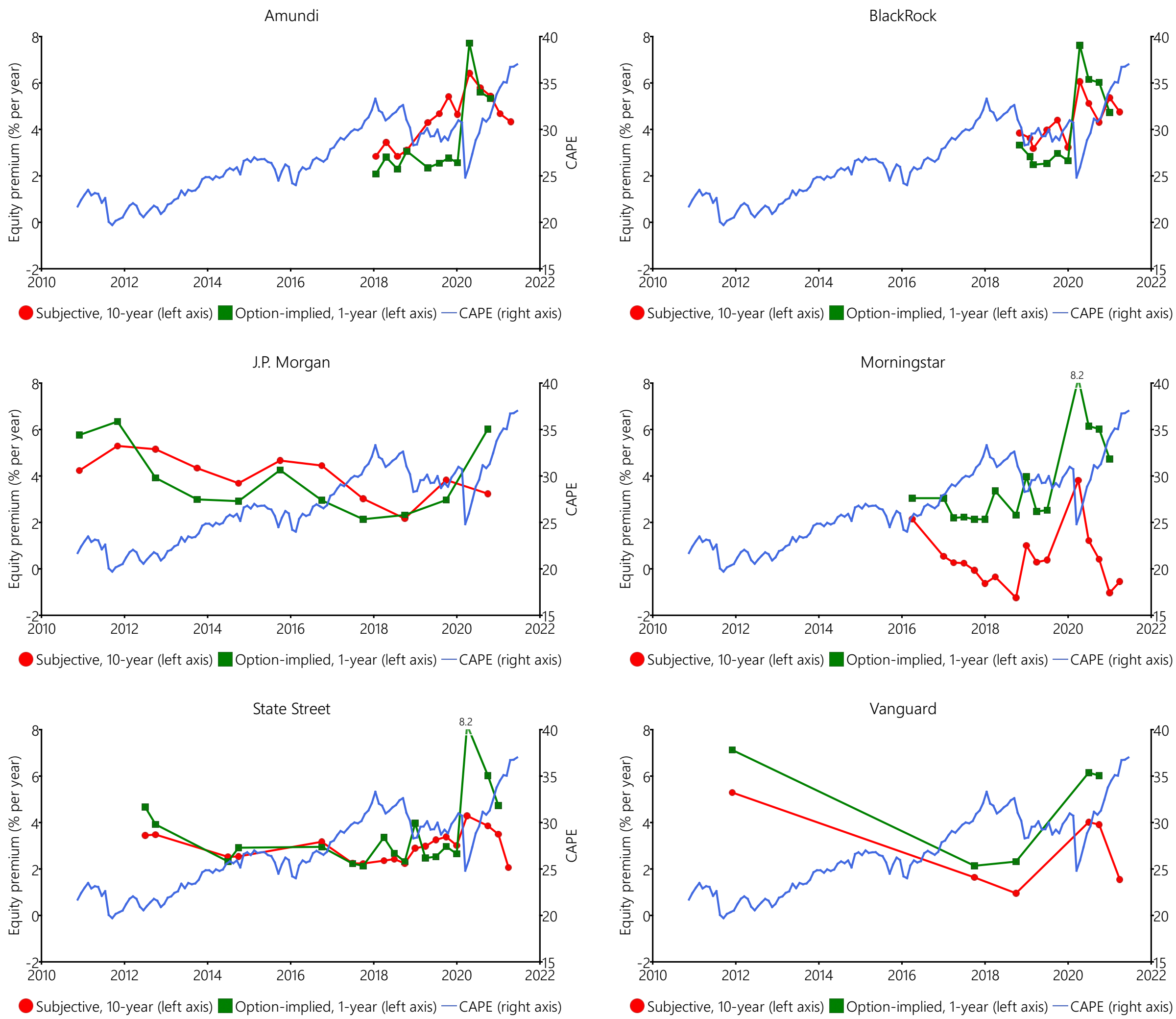


Figure 2: Fitted US equity premium expectations against forecast horizons
The figure shows fitted lines of US equity premium expectations over horizons based on estimates in specification (3) of Table F1 in the Internet Appendix. The blue solid line with filled squares and the red solid line with filled diamonds are conditional on a cyclically adjusted price-earnings ratio (CAPE) of 24.82 (in March 2020) and 30.99 (in January 2020), respectively. The shaded areas are two standard deviation confidence bands.

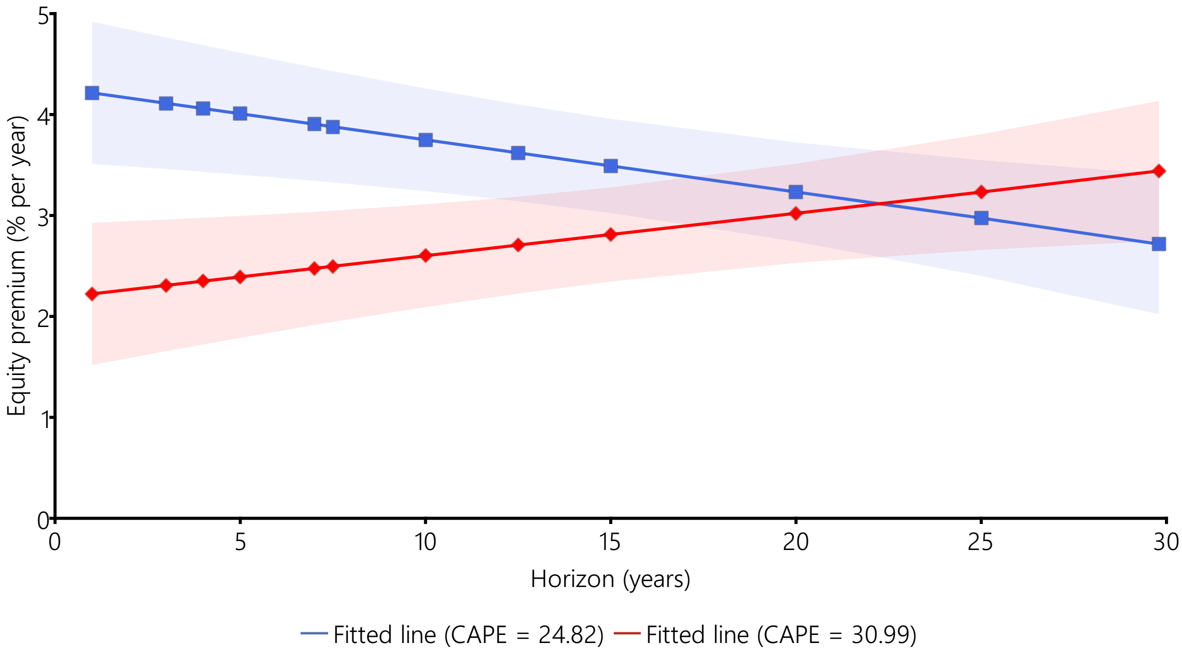


Figure 3: Term premium expectations

The figure shows ten-year term premia for six asset managers (red filled circles) and, matched by date, term premia from the Adrian et al. (2013) (ACM; green filled squares) and Kim and Wright (2005) (KW; purple filled diamonds) models. The six asset managers are Amundi, BlackRock, J.P. Morgan, Morningstar, State Street, and Vanguard. These managers have i) the most data points available for a ten-year horizon, and ii) provide both equity return and cash return forecasts. J.P. Morgan provides forecasts with a horizon interval of 10-15 years. The figure excludes expectations from J.P. Morgan from 1997 to 2009.

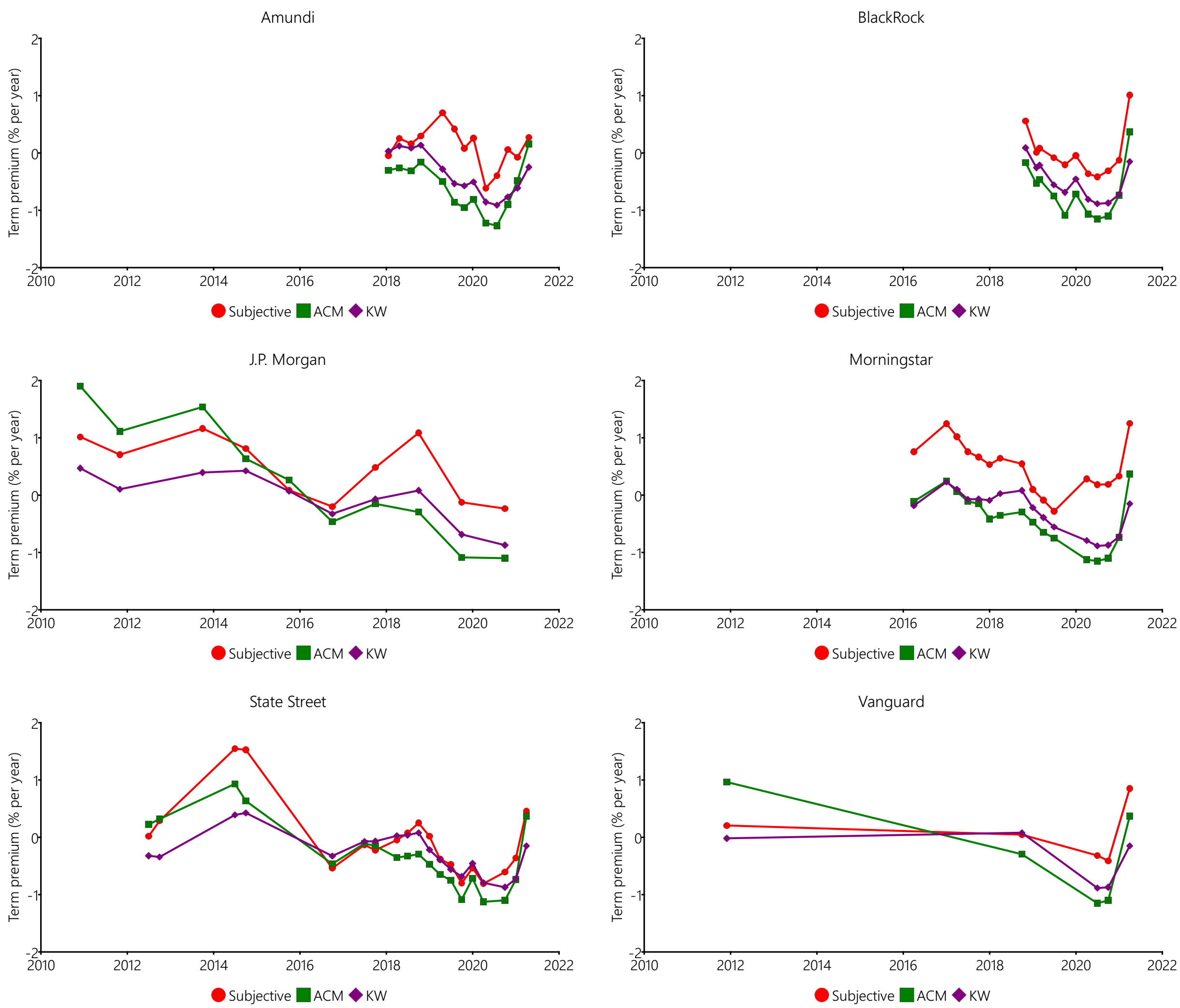


Figure 4: US equity shares and equity return expectations
The figure shows a conditional binscatter plot of US equity shares (the fraction of US equity in a fund's portfolio) and asset managers' US equity premium expectations, conditional on year-month fixed effects and developed as well as emerging market equity premium expectations (the controls). Before binning and plotting, we compute residuals from a regression of US equity shares and US equity premium expectations on the fixed effects and the controls. We add back the sample means of the US equity share and the US equity premium expectation. We then group the residualized US equity shares and US equity premium expectations into 18 equal-sized bins, compute the mean within each bin, and create a scatterplot of the resulting data points.

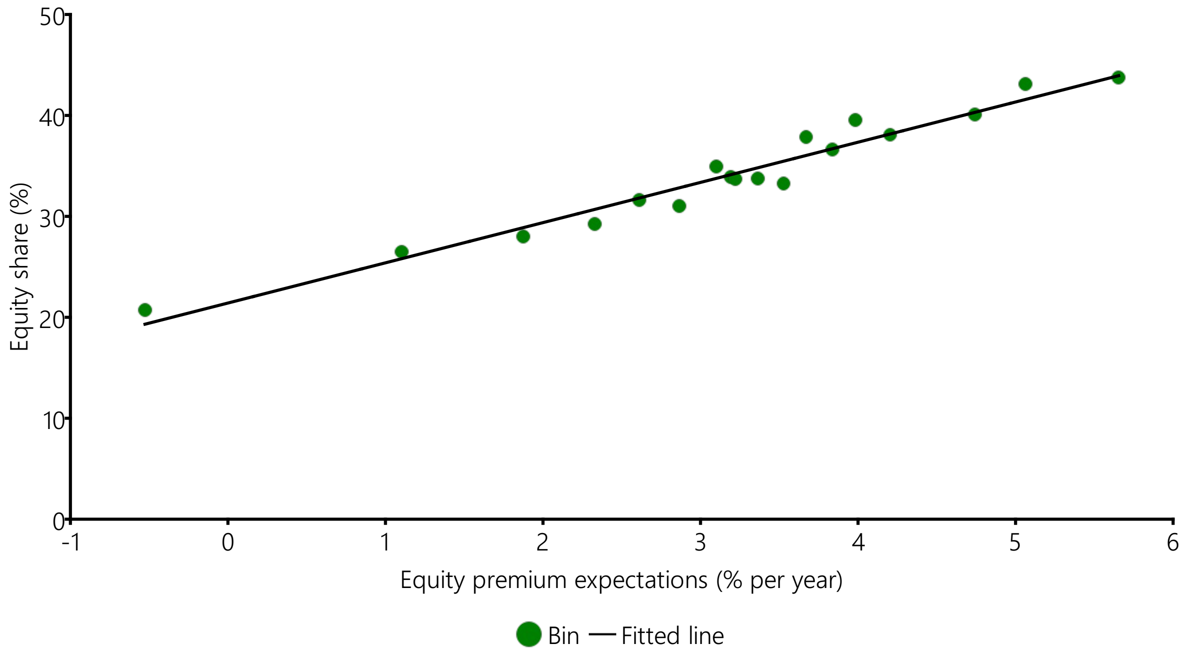
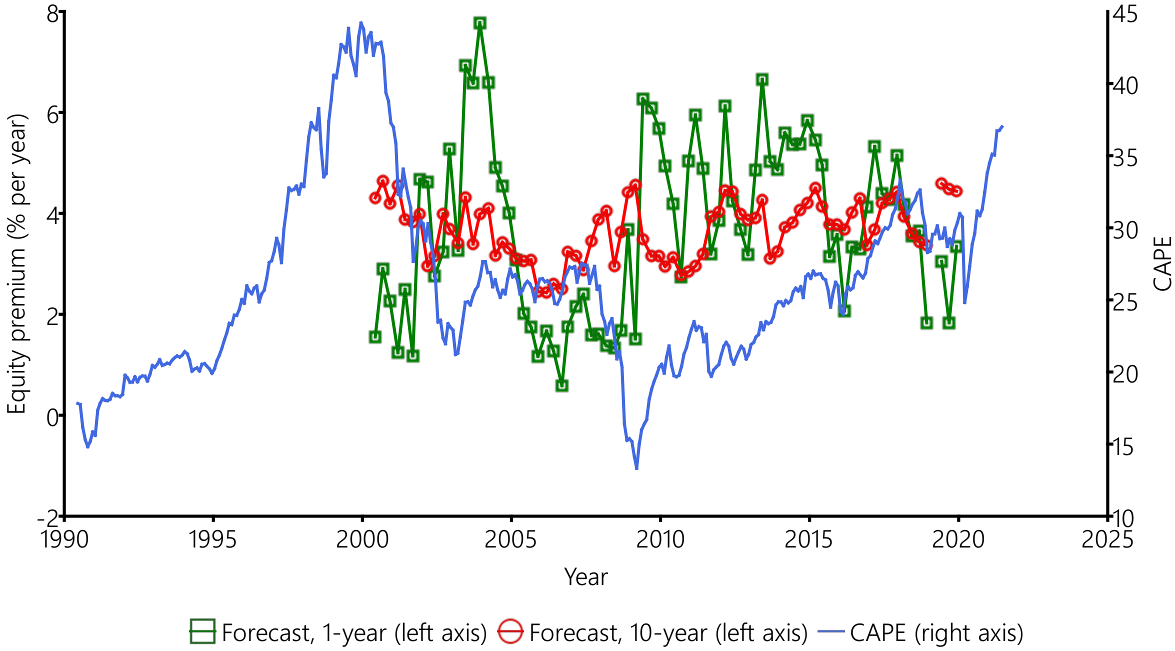
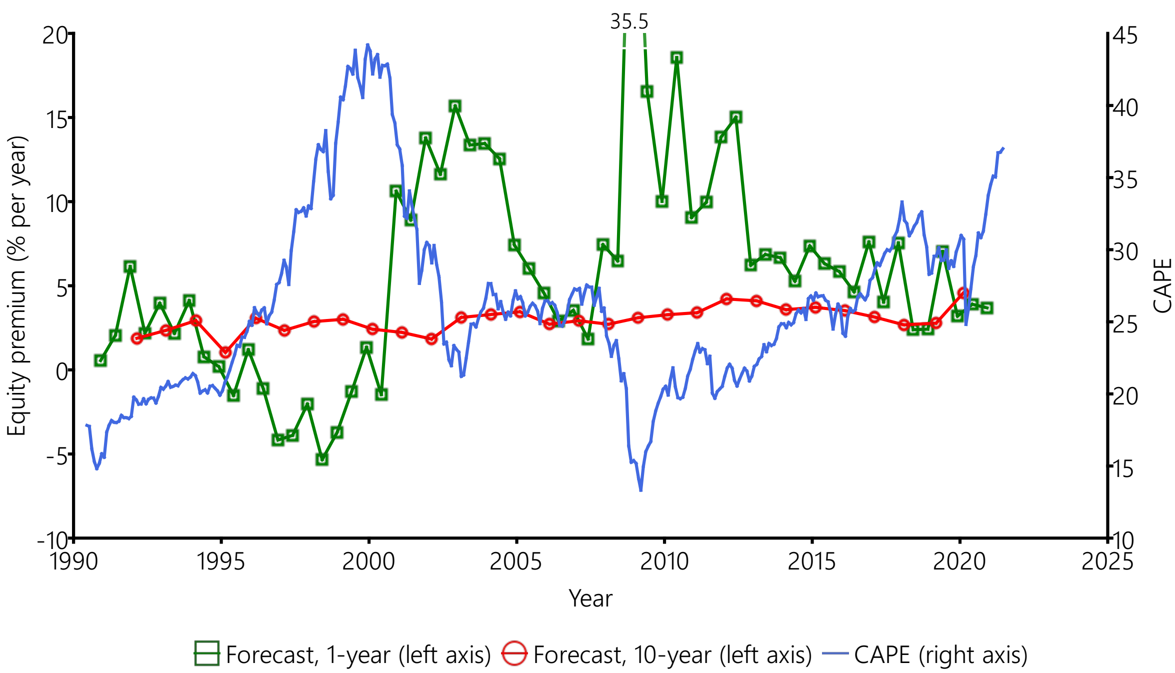


Figure 5: CFOs' and professional forecasters' expectations and CAPE
The top panel shows chief financial officers' (CFOs') average one- and ten-year US equity premium expectations (green squares and red circles; left axis) and Shiller's cyclically adjusted price-earnings ratio (CAPE; solid blue line; right axis). The bottom panel shows the average one- and ten-year US equity premium expectations of professional forecasters (green squares and red circles; left axis) and the CAPE (solid blue line; right axis). The sample period for CFOs' expectations is from Q2:2000 to Q4:2018. The sample period for professional forecasters' expectations is from Q4:1990 to Q4:2020. One observation (35.5 for one-year professional forecasters) is outside the plotted ranges.





Internet Appendix for

"Equity Return Expectations and Portfolios: Evidence from Large Asset Managers"

Magnus Dahlquist and Markus Ibert

December 2023

Contents

A Capital market assumptions from additional providers

Tables A1–A4 extend Tables 1–4 in the main text, adding capital market assumptions from additional providers. These additional providers, however, do not manage any US allocation funds, so we cannot easily link their expectations to their portfolios. Nonetheless, their impact on portfolios may be large, as many of the additional providers are also asset managers or investment consultants. For instance, the sample includes Schroders (asset manager) and the top five general investment consultants (AonHewitt, Callan, Verus, RVKuhns, and NEPC) that are often hired by public pension funds (see Andonov and Rauh, 2022). The results from the main text are robust.

Table A5 shows adjusted R^2 values in panel fixed-effects regressions of US equity premium expectations closest to a 10-year forecast horizon on the fixed effects, for both the sample of asset managers and the sample of all providers of return forecasts. Specification (1) uses manager fixed effects only, specification (2) uses year-quarter fixed effects only, and specification (3) uses both manager and year-quarter fixed effects.

Table A1: Summary statistics (all providers)

						Standard deviations across		
	N	Mean	Median	Min	Max	Manager	Horizon	Time
US equity premium (over yield)								
All horizons	538	3.08	3.71	−6.50	11.52	1.58	0.71	0.92
<10-year horizon	199	2.50	3.52	−6.50	11.52			
≥10-year horizon	339	3.42	3.84	−1.25	7.32			
US equity return (nominal level)								
All horizons	561	5.17	5.70	−5.10	11.80	1.48	0.70	0.62
<10-year horizon	199	4.15	5.20	−5.10	11.80			
≥10-year horizon	362	5.74	6.20	−0.10	9.30			
US equity premium (over cash)								
All horizons	479	3.15	3.80	−6.50	11.50	1.56	0.67	0.88
<10-year horizon	180	2.34	3.30	−6.50	11.50			
≥10-year horizon	299	3.64	4.02	−0.70	6.60			
DM equity premium (over yield)								
All horizons	384	4.22	4.42	−1.50	9.20	0.99	0.58	0.96
<10-year horizon	125	3.35	3.51	−1.50	9.20			
≥10-year horizon	259	4.63	4.57	0.15	8.71			
EM equity premium (over yield)								
All horizons	485	5.58	5.63	−1.55	13.22	1.25	0.80	1.14
<10-year horizon	183	5.30	5.39	−1.55	13.22			
≥10-year horizon	302	5.75	5.75	1.45	13.02			

The table shows summary statistics similar to those of Panel A in Table 1 in the main text, but expanded to all providers of return expectations. See the caption of Table 1 for more detailed information.

Table A2: Subjective equity return expectations and CAPE (all providers)

	Equity premium (over yield)		Equity return (nominal level)	Equity premium (over cash)
	All horizons (1)	Closest to 10 years (2)	(3)	(4)
Panel A: CAPE				
ln(CAPE)	-5.295^{***}	-5.622^{***}	-4.425^{**}	-4.981^{**}
	(1.677)	(1.869)	(1.820)	(2.184)
N	531	377	554	472
Adjusted R^2	0.776	0.851	0.828	0.787
Provider×Horizon FE	Yes	Yes	Yes	Yes
Panel B: CAPE, past return, and risk-free rate				
ln(CAPE)	-4.554^{**}	-5.104^{**}	-4.554^{**}	-5.025^{**}
	(1.911)	(2.092)	(1.911)	(2.365)
Past 12-month return	-0.004	-0.010^{*}	-0.004	0.007
	(0.007)	(0.006)	(0.007)	(0.009)
Risk-free rate	-0.753^{***}	-0.624^{***}	0.247^{*}	-0.415^{**}
	(0.140)	(0.125)	(0.140)	(0.183)
N	531	377	531	449
Adjusted R^2	0.842	0.893	0.830	0.803
Provider×Horizon FE	Yes	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 2 in the main text, but expanded to all providers of return expectations. See the caption of Table 2 for more detailed information.

Table A3: Subjective and objective equity return expectations (all providers)

	Equity premium	
	(1)	(2)
Valuation-based equity premium	1.044***	
	(0.138)	
Regression-based equity premium		0.928***
		(0.308)
N	525	377
Adjusted R^2	0.822	0.851
Manager×Horizon FE	Yes	Yes

The table shows panel regressions similar to those of Table 3 in the main text, but expanded to all providers of return expectations. See the caption of Table 3 for more detailed information.

Table A4: Subjective and objective term premia (all providers)

	Term premium	
	(1)	(2)
ACM-based term premium	0.578***	
	(0.084)	
KW-based term premium		0.999***
		(0.162)
N	367	367
Adjusted R^2	0.560	0.598
Manager×Horizon FE	Yes	Yes

The table shows panel regressions similar to those of Table 4 in the main text, but expanded to all providers of return expectations. See the caption of Table 4 for more detailed information.

Table A5: Adjusted R^2 values in panel regressions with fixed effects

	Equity premium		
	Manager (1)	Year-quarter (2)	Manager and year-quarter (3)
Asset managers	0.781	0.369	0.921
All providers	0.781	0.117	0.917

The table shows shows adjusted R^2 values in panel fixed-effects regressions of US equity premium expectations closest to a 10-year forecast horizon on the fixed effects, for both the sample of asset managers and the sample of all providers of return forecasts. Specification (1) uses manager fixed effects only, specification (2) uses year-quarter fixed effects only, and specification (3) uses both manager and year-quarter fixed effects.

B Return decomposition and heterogeneity in expectations

The formation of some asset managers' return expectations is not entirely a black box. In their capital market assumptions, some asset managers discuss their expectations in terms of three components: i) earnings yield times payout ratio, ii) repricing, and iii) earnings growth. We can understand these labels from the following accounting identity of a log return (see Ferreira and Santa-Clara, 2011, for a derivation):

$$r_{t+1} = dp_{t+1} + \Delta pe_{t+1} + \Delta e_{t+1}, \tag{IA1}$$

where $dp_{t+1} = \ln(1 + D_{t+1}/P_{t+1})$ is the log of one plus the dividend-price ratio, $\Delta pe_{t+1} = \ln(P_{t+1}/E_{t+1}) - \ln(P_t/E_t)$ is the change in the log price-earnings ratio, and $\Delta e_{t+1} = \ln(E_{t+1}) - \ln(E_t)$ is the change in log earnings. Similarly, the expected return can be decomposed into the expectations of the three terms and we note that all components are unobserved as of time t.

One way to understand the challenge of building an objective return expectation and to understand the heterogeneity in subjective return expectations is through the lens of Equation (IA1). Differences in the expected future dividend yield, the expected change in the price-earnings ratio, as well as expected future earnings growth could all contribute to the observed differences in subjective return expectations.

As a particular example, consider the case of Grantham, Mayo, & van Otterloo (GMO) and BlackRock in December 2020. In December 2020, GMO's seven-year nominal equity forecast was –2.2% per year, whereas BlackRock's corresponding nominal equity forecast was 5.9% per year.[1] How can these forecasts be so different? While neither GMO nor BlackRock reveal their exact methodologies and implementations, the reason that GMO is more pessimistic appears to be primarily because of lower long-run price-earnings ratio expectations. Specifically, GMO expects the price-earnings ratio to mean-revert to "equilibrium levels" (see the GMO white paper from August 2017) that are far below the CAPE's value of 33.73 in December 2020 .

[1] GMO provided a real equity forecast of –4.4% per year over the next seven years and a long-term inflation forecast of 2.2% per year.

C Predictability regressions

Table C1 shows regressions of realized equity premia on the log CAPE. Specification (1), analogous to our baseline specifications in the main text, uses the realized ten-year equity return minus the ten-year US Treasury yield as the dependent variable. In contrast, specification (2) uses the ten-year equity return minus the cumulative return of one-month returns on a constant-maturity ten-year US Treasury bond. The standard errors allow for serial correlation up to 120 lags in the errors, as in Hansen and Hodrick (1980), as well as for heteroskedasticity in the errors. These standard errors are larger than Newey and West (1987) standard errors with 120 lags.

The coefficient estimates on the log CAPE are negative, as has been shown in the predictability literature (see, e.g., Cochrane, 2011). The magnitudes of the coefficient estimates are close to the magnitudes of the coefficient estimates in the main text when we regress expectations of excess returns (i.e., equity premia) on the log CAPE.

Table C1: Predictability regressions

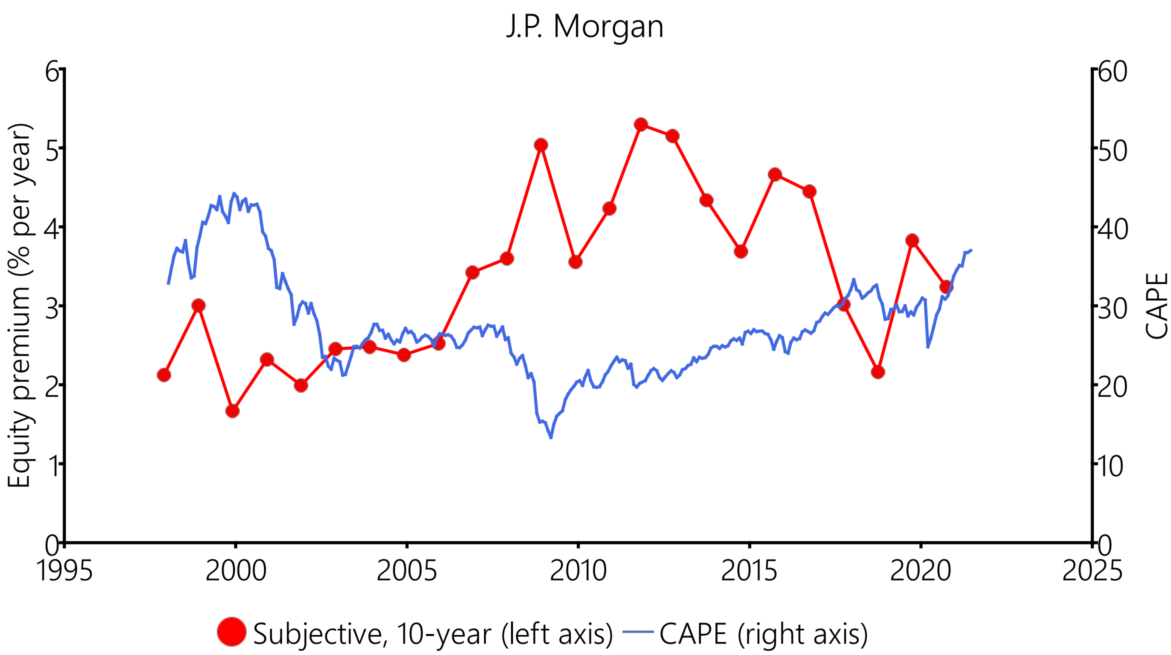
	Excess return (over yield)	Excess return (over bond return)
	(1)	(2)
ln(CAPE)	-6.059^{***}	-5.966^{***}
	(1.520)	(1.922)
Constant	20.905^{***}	20.661^{***}
	(4.281)	(6.226)
N	1572	1572
Adjusted R^2	0.229	0.218

The table shows predictability regressions of ten-year excess returns on the cyclically adjusted price-earnings ratio (CAPE). In specification (1), the excess return is the ten-year equity return minus the yield on a long-term bond; in specification (2), the excess return is the ten-year equity return minus the cumulative return of one-month returns on a long-term bond. Standard errors (in parentheses) allow for serial correlation up to 120 lags as in Hansen and Hodrick (1980), as well as for heteroskedasticity. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations. The sample period is January 1871 to December 2021.

D J.P. Morgan's equity premium expectations and CAPE from 1997–2021

Figure D1 shows the time series of J.P. Morgan's equity premium expectations together with the CAPE from 1997 to 2021, the longest time series in our data. Consistent with one of our main conclusions, J.P. Morgan's equity premium expectations correlate negatively with the CAPE.

Figure D1: Equity premium expectations for J.P. Morgan
The figure shows US equity premium expectations for J.P. Morgan (red filled circles, left axis). The figure also shows Shiller's cyclically adjusted price-earnings ratio (CAPE; solid blue line; right axis).



E Volatility of expectations

To quantify the persistence of the one-year option-implied lower bound of the equity premium and its implication for the volatility of the long-term equity premium, we follow a common assumption in the literature (see, e.g., van Binsbergen and Koijen, 2010) and let the one-period equity premium $x_t = \mathrm{E}_t[r_{t+1}]$ follow a stationary AR(1) process: $x_{t+1} = a + bx_t + \epsilon_{t+1}, |b| < 1$. It is straightforward to show that the standard deviation of the multi-period equity premium per period then is:

$$\mathrm{Std}\left(\mathrm{E}_t[r_{t,t+k}/k]\right) = \frac{\mathrm{Std}(\mathrm{E}_t[r_{t+1}])}{k}\frac{1-b^k}{1-b}, \tag{IA2}$$

where $\mathrm{Std}(\mathrm{E}_t[r_{t+1}])$ is the standard deviation of the one-period equity premium and k is the number of periods.

We can estimate $\mathrm{Std}(\mathrm{E}_t[r_{t+1}])$ and b from the option-implied measure and, thus, can approximate the objective volatility of the k-year expectation. We estimate an AR(1) for the option-implied measure using either daily, monthly, or annual data. The resulting annualized estimated persistence parameters are 0.13, 0.30, and 0.29. We pick a persistence parameter of 0.30 to form objective volatility estimates according to Equation (IA2), as lower persistence parameters result in even lower objective volatilities. We estimate a volatility of 2.14% per year for the option-implied measure.

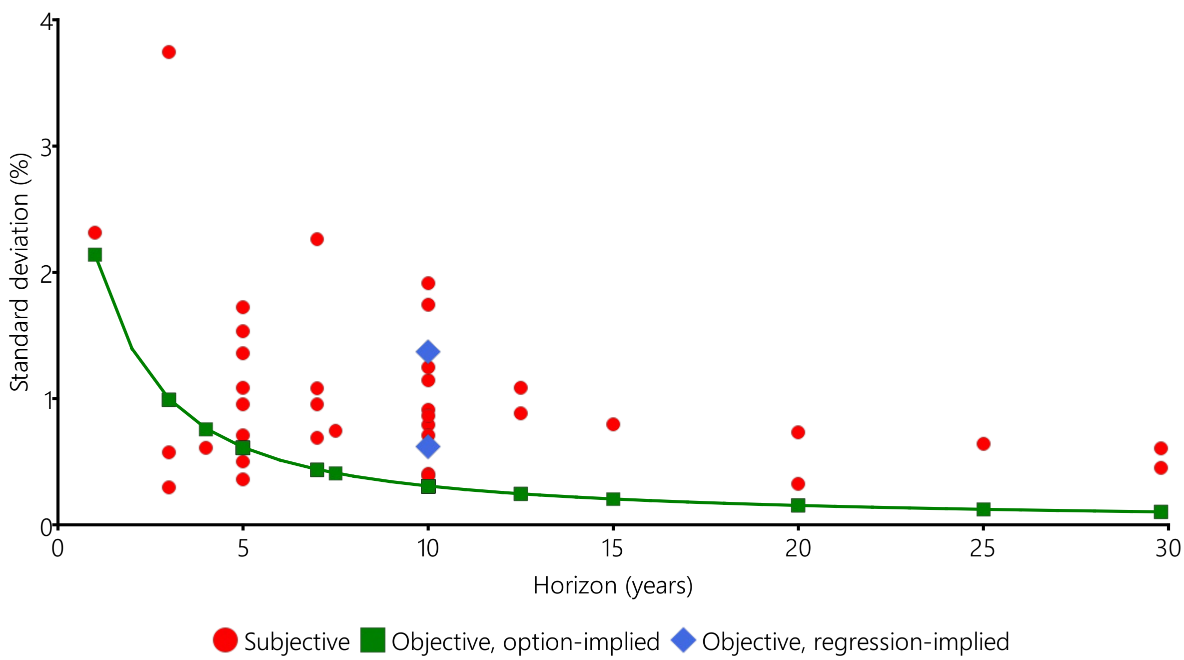
Figure E1 plots the objective volatility estimates from Equation (IA2) against the forecast horizon, together with the time-series standard deviations of asset managers' equity premium expectations. The latter are simply the standard deviations of equity premium expectations for a given manager-horizon pair. As suggested by Figure 1, asset managers' subjective expectations are more volatile than the option-implied benchmark. The standard deviations of asset managers' equity premium expectations are typically larger than the standard deviation implied by the option-implied benchmark coupled with the AR(1) assumption. An alternative way to phrase this result is to recover the persistence parameter perceived by asset managers from Equation (IA2). We recover a perceived persistence parameter for every manager-horizon pair separately. The mean perceived persistence parameter is 0.68, larger than and statistically different at the 5% level from its objective counterpart of 0.30.

Figure E1 also adds two data points for the regression-based benchmark from the previous subsection (the results are similar when we use the present-value benchmark). Using this benchmark, asset managers' expectations do not necessarily appear that volatile and the conclusion about whether asset managers' expectations are too volatile depends on how exactly the standard deviation of the regression-based benchmark is computed.

Finally, we note that the option-implied equity premium studied in this appendix represents a lower bound and not necessarily a point estimate. Tetlock (2023) provides an alternative measure of the equity premium from option prices. His point estimates deviate from the Martin (2017) lower bound. Thus, the lower bound we use may mismeasure both the level and the volatility of the equity premium.

We conclude that asset managers' long-term equity premium expectations correlate positively with the one-year option-implied equity premium, but that asset managers' expectations are more volatile than the option-implied benchmark. With a conviction in the option-implied equity premium coupled with the AR(1) assumption you can, thus, conclude that asset managers' expectations are excessively volatile. However, with less conviction, preference for the regression-based benchmark, or belief that the objective equity premium is highly persistent, you do not necessarily need to reach the same conclusion (for evidence on persistent expected returns, see, e.g., Fama and French, 1988; Pástor and Stambaugh, 2009; van Binsbergen and Koijen, 2010).

Figure E1: Standard deviations of US equity premium expectations
The figure shows standard deviations of US equity premium expectations. The red filled circles are time-series standard deviations for managers' subjective expectations at a specific horizon. The green filled squares are objective option-implied standard deviations based on the time-series standard deviation of Martin's (2017) one-year option implied lower bound of the equity premium and a fitted AR(1)-process (used to extrapolate to longer horizons). The two blue filled diamonds are objective regression-implied standard deviations. One, 0.62%, is the average standard deviation of the fitted regression benchmark for data points when subjective expectations are available. It is computed akin to the average time-series standard deviation of asset managers' expectations, which is 1.01% (see Table 1). The other one, 1.37%, is the standard deviation of the monthly fitted regression benchmark from December 1997 to April 2021.



F Term structure of equity premium expectations

Table F1 shows regressions asset managers' US equity premium expectations on the forecast horizon as well as interactions of the forecast horizon with the CAPE. Specifications (1) and (2) show that the term structure of equity premium expectations is flat on average. In specification (2), the effect is entirely identified from those managers that provide a term structure of expectations on a given date. Specification (3) shows that the term structure of equity premium expectations is procyclical. To determine the level of equity premium forecasts in Figure 2 in the main text, we use the fixed effect estimate corresponding to AQR.

Table F1: Equity return expectations, price-earnings ratio, and forecast horizon

	Equity premium		
	(1)	(2)	(3)
Horizon	0.009	-0.002	-1.407^{***}
	(0.028)	(0.037)	(0.423)
ln(CAPE)			-9.391^{***}
			(2.947)
ln(CAPE)×Horizon			0.422^{***}
			(0.129)
N	360	191	360
Adjusted R^2	0.700	0.526	0.775
Manager FE	Yes	No	Yes
Manager×Date FE	No	Yes	No

The table shows panel regressions of asset managers' US equity premium expectations (nominal equity forecast minus a matched nominal yield) on the log of the cyclically adjusted price-earnings ratio (CAPE) and the forecast horizon, and their interactions. Specifications (1) and (3) include a manager fixed effect; specification (2) includes a manager-times-date fixed effect. Fixed effect coefficient estimates are not reported. Standard errors (in parentheses) are clustered by year-month and manager. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

G Additional regressions of portfolios on expectations

G.1 Koijen and Yogo (2019) dependent variable

In the main text, we regress log portfolio weights on asset manager characteristics (expectations). In this appendix, we instead follow Koijen and Yogo (2019) who theoretically motivate a specification of log porfolio weights *less log portfolio weights in an outside asset* on (stock) characteristics. In Table G1, the dependent variable subtracts the log portfolio weight in the outside asset from the log US equity share. We assume the outside asset to be a fund's non-equity investment (i.e., mostly bonds and cash). The results are similar to the results shown in the main text.

G.2 Non-US equity shares and asset manager expectations

Table G2 investigates substitution effects within the equity part of a fund's portfolio by replacing the dependent variable with the share invested in non-US equities (as opposed to US equities). The table corresponds to Table 5 in the main text. Morningstar does not provide detailed fund allocations to developed market equities or emerging market equities—Morningstar only provides the total allocation to non-US equities.

As hypothesized in the main text, specification (1) in Table G2 provides evidence for a substitution effect in the cross-section of funds, both for the level and the log specification. Specification (1) in Panel A of Table G2 shows that a one-percentage-point in US equity premium expectations is associated with a 1.97-percentage-point lower allocation to non-US equities.

Specification (2) of Table G2 also provide some evidence that the non-US equity shares increase as international equity premium expectations increase, with a coefficient estimate of 1.84 in Panel A. However, the caveat of this analysis is that we do not actually observe asset managers' non-US equity premium expectations. For the purpose of Table G2, we construct an international equity premium expectation by taking a weighted average of asset managers' developed market equity premium expectations and emerging market equity premium expectations, with market-capitalization weights.

Table G3 is similar to Table 6 in the main text and adds fund fixed effects to the specifications of Table G2. The dependent variable is again the share an allocation fund invests in non-US equities. There is considerably less evidence that non-US equity shares decrease as US equity premium expectations increase and less evidence that non-US equity shares increase as non-US equity premium expectations increase—most of the coefficient estimates in Table G3 are not statistically different from zero. Thus, the relation between non-US equity shares and US/international equity premium expectations appears to be mainly a cross-sectional result that does not survive the inclusion of fund fixed effects. Consistent with our conclusion in the main text, this could be due to unobserved investment mandates. As we have emphasized in the main text, a specification with fund fixed effects eliminates interesting variation, for instance variation in portfolio allocations and equity premium expectations that is the result of managers that are more optimistic (pessimistic) about international equities offering funds with a higher (lower) target allocation to international equities.

G.3 Time-series regressions of portfolios on expectations

Our baseline analysis includes year-month fixed effects to absorb any potential confounder that is constant for a given cross-section. We want to investigate whether asset managers' portfolios relate to their expectations and make sure that this relationship is not driven by time-variation in economic state variables. Examples of such time-varying economic state variables are measures of objective expected returns (e.g., the CAPE) and measures of aggregate risk (e.g., the VIX). These are classic confounders, the exclusion of which could lead to biased coefficient estimates. A powerful tool to control for all these variables are year-month fixed effects.

As opposed to using year-month fixed effects, we also identify the coefficient on expectations in a regression of portfolio shares on expectations using just time-series variation, while explicitly controlling for variables that could summarize risk, objective measures of expected returns, and, more generally, the economic state. We do so in in Tables G4 and G5. The specifications in Table G4 use only fund fixed effects, i.e., identify the coefficients using just time-series variation, but control for aggregate risk via the following proxies: one-year GDP growth, one-year inflation, the VIX, one- and five-year consumption growth, and the Chicago Fed's National Financial Conditions Index. The specifications in Table G5 add the log CAPE, a measure of objective expected returns.

Overall, the results in these tables are similar to the ones reported in the main text that use both year-month and fund fixed effects. The advantage of year-month fixed effects is that they are more general than the specifications in this subsection, as they absorb any confounder that is constant for a given cross-section, not just the selected variables in Tables G4 and G5.

G.4 Aggregating from fund level to asset manager level

In our baseline analysis, asset managers with more allocation funds constitute a larger share of the total number of observations. Alternatively, we average an asset managers' share invested in US equities across funds for a given year-month. We take an average weighted by a fund's assets under management (AUM). Then, asset managers that manage more funds do not constitute a larger share of the sample and the fund dimension of the panel is eliminated such that one observation is identified by asset manager and year-month. Table G6 estimates level and log specifications with year-month fixed effects; Table G7 adds asset manager fixed effects. We cluster standard errors by both year-month and asset manager. Clustering by only year-month yields significantly lower standard errors. The results are similar to those presented in the main text.

Table G1: US equity share and subjective equity return expectations (alternative dependent variable construction)

	US equity share		
	(1)	(2)	(3)
Panel A: Without fund fixed effects			
US expectations	9.155***	15.585***	9.364***
	(1.896)	(3.802)	(2.044)
DM expectations		−24.983**	
		(10.316)	
EM expectations		17.353*	
		(9.588)	
N	3058	2184	2184
Adjusted R^2	0.041	0.064	0.045
Fund FE	No	No	No
Year-month FE	Yes	Yes	Yes
Panel B: With fund fixed effects			
US expectations	11.655**	12.821**	19.671***
	(4.379)	(4.962)	(3.832)
DM expectations		1.157	
		(7.667)	
EM expectations		6.186	
		(5.680)	
N	3056	2183	2183
Adjusted R^2	0.708	0.707	0.706
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes

The table shows specifications similar to Panel B in Table 5 and Panel B in Table 6 of the main text. However, the dependent variable is not the log US equity share, but the log US equity share less the log share that is invested in all non-equity assets.

Table G2: Non-US equity share and subjective equity return expectations

	Non-US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	-1.965^{***}	-3.501^{***}	-2.596^{***}
	(0.462)	(0.729)	(0.442)
International expectations		1.836^{**}	
		(0.773)	
N	3121	2242	2242
Adjusted R^2	0.119	0.223	0.203
Year-month FE	Yes	Yes	Yes
Panel B: Log specification			
US expectations	-11.679^{***}	-17.788^{***}	-16.441^{***}
	(2.969)	(3.787)	(2.494)
International expectations		2.713	
		(4.851)	
N	3083	2204	2204
Adjusted R^2	0.058	0.124	0.124
Year-month FE	Yes	Yes	Yes

The table shows specifications similar to Table 5 in the main text, but the dependent variable is the level (Panel A) or log share (Panel B) invested in non-US equities. The international (non-US) equity premium expectation in specification (2) is constructed as a weighted average of developed market and emerging equity premium expectations, with market-capitalization weights.

Table G3: Non-US equity share and subjective equity return expectations (fund fixed effect)

	Non-US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	−0.172	−1.485	−0.417
	(0.456)	(0.851)	(0.509)
International expectations		1.242**	
		(0.516)	
N	3118	2240	2240
Adjusted R^2	0.812	0.797	0.796
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes
Panel B: Log specification			
US expectations	1.571	−4.109	1.040
	(2.431)	(5.669)	(3.149)
International expectations		5.979	
		(4.580)	
N	3080	2202	2202
Adjusted R^2	0.806	0.772	0.772
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes

The table shows specifications similar to Table 6 in the main text, but the dependent variable is the level (Panel A) or log share (Panel B) invested in non-US equities. The international (non-US) equity premium expectation in specification (2) is constructed as a weighted average of developed market and emerging equity premium expectations, with market-capitalization weights.

Table G4: US equity share and equity return expectations (risk and economic state variables)

	US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	1.243**	2.655***	1.560***
	(0.509)	(0.468)	(0.509)
DM expectations		−0.123	
		(0.508)	
EM expectations		−1.014**	
		(0.433)	
GDP growth	−0.185	−0.140	−0.137
	(0.167)	(0.277)	(0.251)
Inflation	0.815	0.679	0.805
	(0.492)	(0.584)	(0.574)
VIX	0.086*	0.044	0.068
	(0.044)	(0.043)	(0.050)
Consumption growth, 1-year	0.037	−0.033	−0.056
	(0.091)	(0.121)	(0.111)
Consumption growth, 5-year	0.981	1.517	1.779
	(1.253)	(1.217)	(1.186)
NFCI	−0.032***	−0.033***	−0.034***
	(0.008)	(0.009)	(0.009)
N	3136	2257	2257
Adjusted R^2	0.868	0.867	0.864
Fund FE	Yes	Yes	Yes

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	US equity share		
	(1)	(2)	(3)
Panel B: Log specification			
US expectations	7.121**	9.781*	9.115***
	(2.998)	(5.193)	(2.901)
DM expectations		2.805	
		(5.684)	
EM expectations		−3.475**	
		(3.017)	
GDP growth	0.481	1.866	1.755
	(1.911)	(3.143)	(3.094)
Inflation	0.390	−1.035	−0.322
	(4.740)	(5.789)	(5.323)
VIX	0.055	−0.069	0.018
	(0.224)	(0.160)	(0.156)
Consumption growth, 1-year	−0.079	−0.246	−0.469
	(0.354)	(0.958)	(0.757)
Consumption growth, 5-year	7.157	10.568	11.737
	(7.055)	(6.069)	(6.752)
NFCI	−0.103*	−0.092	−0.102
	(0.053)	(0.063)	(0.065)
N	3081	2207	2207
Adjusted R^2	0.499	0.493	0.492
Fund FE	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 6, but without year-month fixed effects. Instead of year-month fixed effects, the specifications include past one-year realized GDP growth, one-year realized inflation, the VIX, one- and (annualized) five-year realized real consumption growth, and the Chicago Fed's National Financial Conditions Index. See the caption of Table 6 for more detailed information.

Table G5: US equity share and equity return expectations (risk and economic state variables as well as CAPE)

	US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	1.203**	2.524***	1.520***
	(0.449)	(0.532)	(0.441)
DM expectations		0.038	
		(0.697)	
EM expectations		−1.081**	
		(0.492)	
GDP growth	−0.236	−0.225	−0.228
	(0.149)	(0.246)	(0.217)
Inflation	0.859	0.726	0.874
	(0.510)	(0.612)	(0.596)
VIX	0.103	0.079	0.104
	(0.065)	(0.062)	(0.074)
Consumption growth, 1-year	0.042	−0.045	−0.077
	(0.097)	(0.133)	(0.132)
Consumption growth, 5-year	1.281	2.258	2.542
	(1.753)	(1.667)	(1.845)
NFCI	−0.041**	−0.050**	−0.051***
	(0.019)	(0.017)	(0.020)
ln(CAPE)	−0.032	−0.064	−0.064
	(0.062)	(0.056)	(0.070)
N	3136	2257	2257
Adjusted R^2	0.868	0.868	0.865
Fund FE	Yes	Yes	Yes

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	US equity share		
	(1)	(2)	(3)
Panel B: Log specification			
US expectations	7.206**	9.686*	9.101***
	(2.730)	(5.063)	(2.738)
DM expectations		2.924	
		(6.029)	
EM expectations		−3.525	
		(3.272)	
GDP growth	0.595	1.802	1.718
	(1.509)	(2.780)	(2.711)
Inflation	0.293	−1.000	−0.294
	(4.807)	(5.831)	(5.411)
VIX	0.016	−0.043	0.033
	(0.222)	(0.185)	(0.212)
Consumption growth, 1-year	−0.091	−0.254	−0.477
	(0.393)	(0.922)	(0.717)
Consumption growth, 5-year	6.492	11.117*	12.050
	(7.400)	(5.826)	(6.984)
NFCI	−0.085	−0.105	−0.109
	(0.069)	(0.061)	(0.065)
ln(CAPE)	0.071	−0.048	−0.026
	(0.325)	(0.349)	(0.341)
N	3081	2207	2207
Adjusted R^2	0.499	0.492	0.492
Fund FE	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 6, but without year-month fixed effects. Instead of year-month fixed effects, the specifications include past one-year realized GDP growth, one-year realized inflation, the VIX, one- and (annualized) five-year realized real consumption growth, the Chicago Fed's National Financial Conditions Index, and the log of the cyclically adjusted price-earnings ratio (CAPE). See the caption of Table 6 for more detailed information.

Table G6: US equity share and equity return expectations (AUM weighted)

	US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	2.286***	4.309***	2.805***
	(0.436)	(0.951)	(0.361)
DM expectations		−4.941**	
		(2.308)	
EM expectations		1.932	
		(1.544)	
N	447	278	278
Adjusted R^2	0.078	0.318	0.157
Year-month FE	Yes	Yes	Yes
Panel B: Log specification			
US expectations	11.938***	14.894***	13.354***
	(1.604)	(4.490)	(1.572)
DM expectations		−17.227	
		(9.931)	
EM expectations		16.521	
		(10.127)	
N	443	275	275
Adjusted R^2	0.254	0.331	0.292
Year-month FE	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 5, but the fund dimension of the panel is eliminated by taking a weighted average by AUM of US equity shares across funds for a given manager-year-month. See the caption of Table 5 for more detailed information.

Table G7: US equity share and equity return expectations (AUM weighted, manager fixed effects)

	US equity share		
	(1)	(2)	(3)
Panel A: Level specification			
US expectations	2.082***	3.047***	2.158***
	(0.472)	(0.807)	(0.449)
DM expectations		−2.320***	
		(0.773)	
EM expectations		1.216*	
		(0.636)	
N	447	278	278
Adjusted R^2	0.763	0.792	0.787
Manager FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes
Panel B: Log specification			
US expectations	16.538***	22.084***	19.383***
	(4.256)	(6.239)	(4.797)
DM expectations		−21.006*	
		(10.677)	
EM expectations		16.927*	
		(8.873)	
N	443	275	275
Adjusted R^2	0.439	0.438	0.424
Manager FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 6, but the fund dimension of the panel is eliminated by taking a weighted average by AUM of US equity shares across funds for a given manager-year-month. Accordingly, the specifications include asset manager fixed effects as opposed to fund fixed effects. A given asset manager typically manages multiple funds. See the caption of Table 6 for more detailed information.

H CFOs' and professional forecasters' one-year forecast errors

H.1 Data

Quarterly S&P 500 return expectations of CFOs are from a survey administered by John Graham and Campbell Harvey and date back to June 2000 (see, e.g., Ben-David, Graham, and Harvey, 2013). For a given survey date, the data made available to us contain averages and medians of one- and ten-year return expectations.

We obtain annual S&P 500 ten-year return expectations of professional forecasters since Q1:1992 from the Survey of Professional Forecasters (SPF) conducted by the Philadelphia Fed. The survey of ten-year S&P 500 return forecasts is conducted in the first quarter of each year and has 29–53 respondents each year. We obtain deadline dates for each survey wave from the Philadelphia Fed.

We obtain one-year forecasts for the level of the S&P 500 since Q4:1990 from the Livingston Survey, which is also administered by the Philadelphia Fed. The Livingston Survey contains the forecasts of economists from industry, government, banking, and academia. There are two caveats with the survey. First, the identities of the professional forecasters in the SPF and in the Livingston Survey are not the same. Second, the Livingston Survey only asks about the level of the S&P 500. Hence, the imputed S&P 500 return expectations, which we obtain by adding the expected dividend yield of the S&P 500 on a given survey date to the capital gain component, contain measurement error. We approximate the expected dividend yield on a given day as the sum of realized dividends over the last twelve months multiplied by realized average annual dividend growth of the S&P 500 from 1946–2020 (1.064, see Adam, Marcet, and Beutel, 2017) divided by the level of the index on that day.

H.2 Forecast errors

Table H1 shows regressions of CFOs' one-year forecast errors for the S&P 500 on a constant, and on a constant and the log CAPE. Specification (1) shows that CFOs' expectations are on average unbiased. The average forecast error is minus 5.5 basis points. Specification (2) shows that forecast errors are predictable by the CAPE. A one percent increase in the price-earnings ratio is associated with a 0.46-percentage-points lower forecast error.

Table H2 shows regressions of professional forecasters' one-year forecast errors for the

S&P 500 on a constant, and on a constant and the log CAPE. Specification (1) shows that professional forecasters' expectations are on average unbiased. The average forecast error is 2 percentage points but not statistically different from zero. Specification (2) shows that we cannot reject the null hypothesis that forecast errors are unpredictable by the log CAPE.

Table H1: CFOs' forecast errors

	Forecast error	
	(1)	(2)
ln(CAPE)		-46.296^{***}
		(8.021)
Constant	-0.055	149.471^{***}
	(3.284)	(25.658)
N	75	75
Adjusted R^2		0.278

The table shows quarterly time-series regressions of average chief financial officers' (CFOs') one-year forecast errors for the S&P 500 on the cyclically adjusted price-earnings ratio (CAPE). Specification (1) includes only a constant and thus measures the average forecast error. Specification (2) includes the CAPE. Standard errors (in parentheses) are Newey and West (1987) standard errors with four lags. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

Table H2: Professional forecasters' forecast errors

	Forecast error	
	(1)	(2)
ln(CAPE)		−7.220
		(7.688)
Constant	2.425	
	(2.216)	
N	1357	1318
Adjusted R^2		0.098
Forecaster FE	No	Yes

The table shows panel regressions of the professional forecasters' one-year forecast errors for the S&P 500 on the cyclically adjusted price-earnings ratio (CAPE). Specification (1) includes only a constant and thus measures the average forecast error. Specification (2) includes the CAPE and a forecaster fixed effect. Fixed effect coefficients are not reported. Standard errors (in parentheses) are clustered by semi-year and forecaster. *, **, and *** denote 10%, 5%, and 1% significance levels, respectively, for the null hypothesis of a zero coefficient. N refers to the total number of observations.

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