Return Expectations and Portfolios: Evidence from Large Asset Managers

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Abstract

The largest asset managers in the world report their expectations publicly in so-called capital market assumptions. We collect these expectations and revisit the relationship between equity premium expectations and equity valuation ratios. Asset managers' equity premium expectations are high when valuations are low and low when valuations are high (countercyclical), and the term structure of equity premium expectations is downward sloping when valuations are low and upward sloping when valuations are high (procyclical). Studying mutual funds that invest in both equities and bonds, we find that the sensitivity of portfolios to expectations is large on average and even larger for funds that are less constrained by their investment mandates. Overall, the results support rational expectations asset pricing models.

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1 Introduction

Expectations are central to understanding asset prices. For some time academic research has neglected the study of expectations: under the rational expectations paradigm expectations can be recovered from empirical moments. Following Manski (2004), recent years have seen a surge in surveys that attempt to recover subjective expectations in order to confront model-implied expectations with subjective expectations. Common critiques of survey data are that they are based on i) small and unrepresentative samples, ii) that responses are prone to measurement error, and iii) that it is difficult to link expectations with choices to evaluate whether survey participants actually act on their expectations.

Large asset managers report their expectations about future inflation, gross domestic products, equity returns, and various other asset classes publicly on their websites. These so-called "capital market assumptions" address the three concerns about survey data: i) large asset managers are representative of a vast amount of capital and manage more than USD 40 trillion as of 2021, ii) their publications are backed by their substantial business reputation and not prone to measurement error, and iii) since asset managers are subject to regulatory filings and make voluntary disclosures, we can link their expectations to their portfolios.[1]

In this paper, we use capital market assumptions to revisit the relationship between equity market return expectations and equity valuation ratios. Consistent with rational expectations, asset managers' return expectations are countercyclical: they are high when valuations are low and low when valuations are high. To evaluate whether asset managers act on their expectations, we study the allocation funds they manage. These funds invest primarily in equities and bonds, and a smaller share in cash and other assets. The sensitivity of portfolios to expectations is large and even larger for funds that are less constrained by

[1] As reference points, global equity market capitalization and bond market capitalization were about USD 95 trillion and USD 106 trillion as of 2020.

their investment mandates.

In contrast, previous research—primarily based on individual investor and household survey data—shows that equity return expectations are high when valuations are high and low when valuations are low (De Bondt, 1993; Vissing-Jorgensen, 2003; Amromin and Sharpe, 2014; Greenwood and Shleifer, 2014). Such procyclical and extrapolative expectations are inconsistent with the relationship between actual returns and valuation ratios in the data (see, e.g., Cochrane, 2011) and, thus, hard to reconcile with rational expectations. Evidence on procyclical expectations has spurred a literature that seeks to explain both the survey data and equity prices by modifying investors' expectation formation (Barberis, Greenwood, Jin, and Shleifer, 2015, 2018; Adam, Marcet, and Beutel, 2017; Nagel and Xu, 2019).[2] Moreover, in contrast to the strong link between asset managers' expectations and portfolios, existing evidence suggests that the link between individuals' expectations and financial portfolios is statistically significant, but on average economically weak (see, e.g., Kézdi and Willis, 2011; Amromin and Sharpe, 2014; Ameriks, Kézdi, Lee, and Shapiro, 2020; Giglio, Maggiori, Stroebel, and Utkus, 2021).

As an illustration of our main results, Figure 1 plots the annualized seven-year US equity premium expectations of the asset manager Grantham, May, & van Otterloo (GMO), Robert Shiller's cyclically adjusted price-earnings ratio (CAPE), as well as the actual allocation to US equities of GMO's Benchmark-Free Allocation Fund. This fund had USD 6.5 billion in assets under management (AUM) as of 2021. First, GMO's return expectations are countercyclical: they are high when the CAPE (a common measure of equity valuations) is low and low when the CAPE is high. Second, GMO puts their money where their mouth is. GMO are notoriously pessimistic about U.S equities and, consistent with this view, their

[2]We use the term "procyclical" ("countercyclical") to refer to a positive (negative) correlation of subjectations expectations and valuation ratios. We use the term "extrapolative" to refer to a positive correlation of subjective expectations and past realized returns. We focus on the correlation of expectations and valuation ratios, the latter being a main object in standard rational expectations asset pricing models and in the return predictability literature.

fund sometimes even shorts US equities.[3] The fund also allocates more to US equities when GMO expects a larger return. For instance, when equity valuations plummeted in March 2020 as a result of the COVID-19 pandemic, GMO's equity premium expectations increased and so did the fund's allocation to US equities. We show that these illustrative results hold in general.

We first estimate regressions of asset managers' expectations on the price-earnings ratio. We find that a ten percent increase in the price-earnings ratio is associated with a 69 basis points decline in long-term equity premium expectations, mirroring the relationship between actual returns and equity valuation ratios documented in the return predictability literature. This estimate implies that asset managers' equity premium expectations are time-varying and is consistent with the notion that equity prices move primarily because of variation in expected returns.

We then study the term structure of subjective equity premium expectations. The modal capital market assumption has a horizon of exactly ten years, but there is variation. Some providers also publish a term structure of expectations. For instance, BlackRock (the largest asset manager in the world with USD 9 trillion in AUM in 2021) as of September 2020 expects 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 speak to the literature on the equity term structure (see, e.g., Binsbergen, Brandt, and Koijen, 2012) and to show that asset managers' expectations satisfy an additional hurdle of rational expectation. This literature finds that the slope of the term structure is procyclical: It is upward sloping when valuations are high and downward sloping when valuations are low (Binsbergen, Hueskes, Koijen, and Vrugt, 2013). Under rational

[3] In fact, GMO is so pessimistic about US equities that one may wonder why they sometimes have long positions in US equities at all. One resolution of this puzzle is that GMO forecasts broad US equity returns, whereas their allocation is to segments of this market they perceive to be undervalued (e.g., stocks with small market capitalization or low price-earnings ratios).

expectations, this pattern should be mirrored in subjective expectations and, indeed, we find that it is.

Finally, we evaluate whether asset managers' portfolios reflect asset managers' expectations. To do so, we focus on asset managers' allocation funds. These funds invest in equities, bonds, and cash, and we expect them to have some leeway to respond to their equity premium expectations. According to the asset managers, capital market assumptions are used to assess portfolio risk as well as assist in portfolio construction. Indeed, our evidence suggests that they are. A one-percentage-point increase in the long-term US equity premium expectation is associated with a two to four percentage points larger allocation to US equities, depending on whether the estimate is identified by variation across both time and funds or just by cross-sectional variation across funds. Our coefficient estimate of four using cross-sectional variation compares with a 0.69 coefficient estimate in Giglio et al. (2021) who study Vanguard investors. Thus, the sensitivity of portfolios to beliefs is significantly larger for professional asset managers than for retail investors.

This large estimate is perhaps somewhat surprising as we expect the typical allocation fund to be constrained by its investment mandate as well. For instance, a fund investing 60% of its assets in equities and 40% in bonds may not be allowed to deviate significantly from these weights. So-called tactical allocation funds have the most leeway to allocate freely across asset classes as their purpose is to precisely do so: their purpose is to time the markets. Consistent with the notion that investment mandate constraints matter, we find that the sensitivity of portfolios to beliefs is even larger for tactical allocation funds. The incremental impact of managing a tactical allocation fund for the sensitivity of portfolios to expectations is five to seven percentage points.

The allocation funds in our sample manage a substantial USD 744 billion as of 2021, but asset managers' expectations may affect capital far beyond this amount. For instance, asset managers may use their capital market assumptions to design portfolios in private wealth

management, sophisticated retail investors may rely on these assumptions to design their portfolios, and so on. Indeed, it is easy to verify that capital market assumptions of various providers are frequently discussed on investment forums such as Bogleheads. To put USD 744 billion into perspective, the actual respondents in the survey of Vanguard investors in Giglio et al. (2021) manage around USD 1 billion.[4] They note that their sample is representative of USD 2 trillion and we believe that asset managers' expectations are representative of at least a similar magnitude.[5]

Asset managers' expectations differ from most other subjective expectations studied in the literature in two important dimensions. First, they represent expectations of a new set of investors. Second, asset managers' expectations primarily represent long-term return expectations as opposed to the commonly studied short-term return expectations (see, e.g., Greenwood and Shleifer, 2014). We contrast asset managers' return expectations to the one- and ten-year return expectations of chief financial officers (CFOs) and professional forecasters, and conclude that our results differ mostly because of the former dimension. Asset managers' return expectations are the only expectations in consideration that are consistently countercyclical. As such, they are the only ones that are consistent with rational expectations. That said, we are not able to confirm that CFOs' and professional forecasters' expectations are procyclical once we consider equity premium expectations—the key objects in rational expectations asset pricing models and the return predictability literature—as opposed to nominal equity return expectations. CFOs' and professional forecasters' equity premium expectations are either countercyclical as well or unrelated to valuation ratios. Focusing on equity premium expectations is justified as long as Treasury yields enter forecasters' information set, which we believe is a reasonable assumption for asset managers,

[4]They have around 2,000 respondents in each wave with average wealth of USD 500,000 in Vanguard accounts.

[5]Indeed, when we include target-date funds in the sample, the results are similar and aggregate AUM jump by another USD 1 trillion.

CFOs, and professional forecasters.

While we believe that expectations from capital market assumptions are a substantial addition to the literature on subjective equity return expectations and while we have given our best to collect as many expectations as possible, the data are not without drawbacks. For instance, with the data starting in 2005 and being sparse in earlier years, like most other studies that focus on long-term expectations, we cannot meaningfully evaluate forecast errors (e.g., realized ten-year returns less expected ten-year returns).

The rest of this paper is organized as follows. The next paragraphs review the literature and discuss our contribution. Section 2 describes the data. Section 3 shows that asset managers' equity premium and equity return expectations are countercyclical. It also contains the results on the term structure of subjective equity premia. Section 4 connects expectations to the portfolios of allocation funds. Section 5 contrasts asset managers' expectations with CFOs' and professional forecasters' expectations. Section 6 summarizes.

Related literature Our paper contributes to several strands of literature.

First, we contribute to the literature on subjective equity return expectations, which typically documents procyclical and 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, 2020). While this literature has focused on retail investors, whether return expectations are extrapolative does not appear to be a matter of retail investing versus professional investing alone: Andonov and Rauh (2020) find that pension funds extrapolate from past performance. Somewhat surprisingly, we are among few to show that some subjective expectations actually vary negatively with equity valuations (see also Welch, 2000; Glaser and Weber, 2005; Ghosh and Roussellet, 2020; Wang, 2020). Our finding that CFOs' and professional forecasters' equity premium expectations (as opposed to nominal equity return expectations) do not vary positively with

equity valuation ratios is a nuance but seems novel as well. The CFO executive survey of Graham and Harvey (2001) is one of the six surveys for which Greenwood and Shleifer (2014) document extrapolative and procyclical expectations.

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 (2020) and Bordalo, Gennaioli, 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 expected equity returns have low volatility.

Second, our results on the term structure of equity premium expectations are novel and link our paper to the literature on the term structure of equity (see, e.g., Binsbergen et al., 2012, 2013). Preceeding this literature, Welch (2000) reports that financial economists expect the term structure of equity premia to slope upward, but does not focus on its time variation. Most of the value of equities is concentrated in claims to long-term as opposed to short-term cash flows. Thus, studying the term structure of equity return expectations—in particular, studying long-term expectations in addition to the commonly studied short-term expectations—is important (see, e.g., Brunnermeier, Farhi, Koijen, Krishnamurthy, Ludvigson, Lustig, Nagel, and Piazzesi, 2021).

Third, we contribute to a literature that connects subjective expectations with economic outcomes. The subset of this literature focusing on equity return expectations typically finds a significant relation between expectations and respondents' equity share (see, e.g., Vissing-Jorgensen, 2003).[6] However, in a rare instance of academic consensus, this relationship is

[6]Similarly, some authors find that higher equity return expectations increase equity market participation rates (see, e.g., Dominitz and Manski, 2007; Hurd, Van Rooij, and Winter, 2011). Relatedly, other authors have linked financial portfolios with risk preferences (see, e.g., Guiso, Sapienza, and Zingales, 2018) or lifetime experiences (see, e.g., Malmendier and Nagel, 2011) .

consistently weak in multiple different studies and data sets (Fisher and Statman, 2000; Kézdi and Willis, 2011; Amromin and Sharpe, 2014; Merkle and Weber, 2014; Ameriks et al., 2020; Giglio et al., 2021). In contrast, our results show that the economically weak link between expectations and portfolios seems to be confined to individual investors.

Fourth, our paper also speaks to the literature on theoretical asset pricing models. The excess volatility puzzle (see, e.g., Shiller, 1981), the equity premium puzzle (see, e.g., Mehra and Prescott, 1985), and the evidence on return predictability by equity valuation ratios (see, e.g., Campbell and Shiller, 1988) are largely explained by now standard macro-finance asset pricing models (Campbell and Cochrane, 1999; Bansal and Yaron, 2004; Gabaix, 2012; Wachter, 2013). However, these models have been challenged by the literature on subjective equity return expectations, leading to a string of new models that try to match procyclical subjective equity return expectations (see, e.g., Barberis et al., 2015, 2018; Nagel and Xu, 2019). In fact, the absence of evidence of countercyclical expectations has led researchers to develop models in which the *representative agent* holds procyclical expectations (see, e.g., Adam et al., 2017; Jin and Sui, 2019). In contrast, the subjective expectations of large asset managers are in principle consistent with standard macro-finance models. However, asset managers' expectations do exhibit a large amount of persistent heterogeneity, which is perhaps better captured by models that allow for heterogeneous beliefs as opposed to representative agent models. This persistent heterogeneity in expectations seems to be a general feature of expectations and is not confined to the asset managers in our sample (see, e.g., Giglio et al., 2021).

2 Data

2.1 Expectations from capital market assumptions

We hand 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 have collected so-called capital market assumptions from 43 providers, but focus on the sample of 22 providers that manage allocation funds and, thus, for which we can connect expectations with portfolios. We discuss the full sample of 43 providers in Internet Appendix A.

These capital markets assumptions are fairly standardized across asset managers, but show 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, while another forecasts the return on broad US equities, while a third forecasts 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 on 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 20% of the sample). The very short-term and very-long

term forecast horizons are from managers that provide a term structure of 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. Appendix A contains additional details on the data construction.

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. Many asset managers updated their expectations after the decline in equity valuations in March 2020. The earliest report we collect is from 2005. 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 has some gaps for a given manager and is sparse in the cross section in earlier years.

A short time series is not uncommon for new data on subjective expectations and is a result of many surveys being newly administered, following increased interest in subjective expectations and recent methodological advances (see, e.g., Gillen, Snowberg, and Yariv, 2019). For instance, Giglio et al. (2021) survey Vanguard investors since 2017.

2.2 Portfolio data

Data on asset managers' actively-managed US-domiciled allocation funds are from Morningstar. We identify allocation funds of asset managers using Morningstar's *GlobalBroadCategoryGroup* and *BrandingName* variables. We drop target-date funds. 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.[7] Of particular interest is a variable that states what

[7]The remaining funds belong to the following categories: US Fund Allocation–15% to 30% Equity, US Fund Allocation–30% to 50% Equity, US Fund Allocation–50% to 70% Equity, US Fund Allocation–70% to 85% Equity, US Fund Allocation–85%+ Equity, US Fund Tactical Allocation, and US Fund World Allocation. Internet Appendix B shows that the results are similar when target-date funds are included. In this case, asset managers' allocation funds manage a combined USD 1.72 trillion as of 2021.

percentage of the fund's assets are 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.[8] Some funds make their holdings available monthly to Morningstar, while other funds only report their holdings quarterly. The latter is the mandated reporting frequency of the Securities and Exchange Commission.

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 forecaster's information set at the time of the forecast. Treasury yields are from the Federal Reserve Economic Data at the Federal Reserve Bank of St. Louis.

2.4 Summary statistics

We construct the equity premium expectation by subtracting the horizon-matched Treasury yield from the equity return expectation. Some horizons for equity return expectations do not have a corresponding Treasury yield (e.g., the 15-year horizon), in which case we interpolate between the nearest available Treasury yields to obtain the corresponding Treasury yield. 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

[8] We believe that us having no discretion over it is desirable as it ensures that our results are transparent and easily replicable.

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 (in nominal terms) as reinvestment rates are uncertain.

Table 1 shows summary statistics. The total number of US equity return expectations is 365. Out of these 365 forecasts, 180 are for a horizon of less than ten years, 162 are for a horizon of ten or more years but less or equal than 30 years, and 23 are for horizons longer than 30 years. Equity premium expectations are markedly hetereogenous. For instance, the minimum equity premium expectation is -6.50%, whereas the maximum expectation is 11.54%. This is because of systematic differences across asset managers, systematic differences across forecast horizons, and differences in valuation ratios over time. Some asset managers are generally more pessimistic than others, leading to negative equity premium forecasts. Other managers are generally more optimistic and particularly so for short-term horizons when valuation ratios are low, leading to large equity premium expectations. For instance, the 11.54% 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.

In Panel F, the table also shows summary statistics for the US equity share and non-US equity share of asset managers' allocation funds. There are 183 such funds that manage a combined USD 744 billion as of 2021. The average fund invests 34.80% of its assets in US equities and 18.21% of its assets in international equities. The rest of its assets are mostly invested in bonds (37.88%, not tabulated), with a smaller share in cash (4.81%) and other assets (4.30%).

3 Asset managers' return expectations

3.1 Equity premium expectations and equity valuations

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

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

where $F_{i,t}[r^e_{t\to t+h}]$ is the subjective expectation (forecast) of asset manager i on day t of the equity premium over the period from t to $t+h$, $\ln(\text{CAPE}_t)$ is the logarithm of the cyclically adjusted price-earnings ratio, and $\varepsilon_{i,t,h}$ is an error term for a forecast horizon h. Our data contain expectations across different horizons and from different forecasters at different points in time. Since the question "How do expectations change as the price-earnings ratio changes?" is inherently a question to be answered using time-series variation, we also include a manager-times-horizon fixed effect $\alpha_{i,h}$. The coefficient estimate for β is then identified from time-series variation of expectations in response to variation of the log price-earnings ratio for a given manager and a given horizon.

Since most managers only forecast returns over one particular horizon, the manager-times-horizon fixed effect is similar to a simple manager fixed effect. We cluster standard errors by both year-month and managers. Clustering only by year-month yields lower standard errors.

Specification (1) of Table 2 shows the results. The coefficient estimate on the log price-earnings ratio is –6.88 and it implies that a ten percent increase in the price-earnings ratio is associated with a 69 basis points lower equity premium expectation. As prices are volatile, ten percent increases (or decreases) in the price-earnings ratio are no rare events such that the fitted equity premium expectations are correspondingly volatile. Expressed differently, the

coefficient estimate in (1) standardized to zero mean and unit volatility is -0.87, implying that a one-standard-deviation increase in the log price-earnings ratio is associated with a 87 basis points lower equity premium expectation.

Specification (2) shows the 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 (2) is a simple manager fixed effect.[9]

The adjusted R^2 value in (2) is 88%. Most of the variation in expectations is explained by manager fixed effects, echoing the persistent cross-sectional dispersion in expectations that has been documented for retail investors (see, e.g., Giglio et al., 2021). For instance, for the sample in (2) manager fixed effects explain about 80% of the variation, whereas year-quarter fixed effects only explain about 5% (not tabulated).

Specification (3) shows the results when we consider nominal equity return expectations. The results are similar, but we prefer to focus on equity premia as equity premia 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 asset managers' information sets. We believe that this is a reasonable assumption.

However, if managers were agnostic to the level of interest rates, subtracting the actual Treasury yield from the nominal equity return expectation would not yield the actual (unobserved) subjective equity premium expectation and our results could be misleading. We alleviate such concerns by the alternative definition of the equity premium expectation as the equity return expectation over the return expectation on cash over the same horizon with

[9]There are two observations for which the distinction between managers-times-horizon fixed effects and manager fixed effects makes a difference as two managers change the forecast horizon and the two observations drop out as singletons with manager-times-horizon fixed effects. For a similar reason, the regression in (1) only has 338 observations, whereas the summary statistics show 342.

results reported in specification (4). The coefficient estimate is similar, but the standard error is larger.

Overall, asset managers' return expectations are countercyclical: they are high when valuations are low and low when valuations are high, consistent with rational expectations. Asset managers' countercylical return expectations stand in sharp contrast to the procyclical expectations documented previously in the literature (see, e.g., Greenwood and Shleifer, 2014).

3.2 Term structure of equity premium expectations

Capital market assumptions 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 speak to the literature on the equity term structure (see, e.g., Binsbergen et al., 2012).[10] Two features of the term structure of equity premia are of particular interest: its average slope and time-variation in the slope. Habit (see, e.g., Campbell and Cochrane, 1999) and long-run risk models (see, e.g., Bansal and Yaron, 2004) imply that the slope is positive on average, upward-sloping in expansions, and downward-sloping in recessions.[11] While there is evidence that the slope is indeed procyclical, evidence on the average slope is mixed (Binsbergen et al., 2012; Binsbergen and

[10] Following Binsbergen et al. (2013), we can define the (forward) equity yield at time t with maturity h as

$$E_t[r_{t\to t+h}] - E_t[g_{t\to t+h}], \tag{2}$$

where $E_t[r_{t\to t+h}]$ is the expected return on equity at time t from t to $t+h$ and $E_t[g_{t\to t+h}]$ is the expected dividend growth at time t from t to $t+h$. Equity yields can be obtained from the futures price of derivatives called dividend futures. However, the key economic quantity of interest $E_t[r_{t\to t+h}]$ cannot be inferred from market prices alone. $E_t[r_{t\to t+h}]$ is the appropriate discount rate for a dividend payment in h days. To study $E_t[r_{t\to t+h}]$, researchers typically need to take a stance on $E_t[g_{t\to t+h}]$. We directly observe subjective equity return expectations $F_t[r_{t\to t+h}]$, the relevant discount rates, across horizons from the capital market assumptions and so we do not need to model expected dividend growth.

[11] Rare disaster models (see, e.g., Barro, 2006; Gabaix, 2012) imply that the term structure of equity premia is flat; see Binsbergen et al. (2012).

Koijen, 2017; Boguth, Carlson, Fisher, and Simutin, 2019; Bansal, Miller, Song, and Yaron, 2021). Preceding this literature, Welch (2000) finds that the term structure of subjective equity premia is upward sloping on average using a sample of academic financial economists.

In specifications (1) and (2) of Table 3 we first study the average slope, with little additional insights. Consistent with the mixed empirical evidence on the relationship using actual returns, the impact of investment horizon on equity premium expectations is not statistically different from zero and we do not claim that these tests have power. In (2), the coefficient estimate is identified only from managers that provide a term structure of expectations.

We next study time variation in the slope. Specification (3) of Table 3 interacts the forecast horizon with the log price-earnings ratio. The interaction is significantly positive. That is, the slope of the term structure is larger when the log price-earnings ratio is higher. However, this does not necessarily mean that the term structure is upward sloping when the price-earnings ratio is high and downward sloping when the price-earnings ratio is low (e.g., the term structure could simply be less upward-sloping when the price-earnings ratio is low).

To check whether our regression estimates can generate a downward-sloping term structure when valuations are low and an upward-sloping term structure when valuations are high, we consider the fitted values of our regression in specification (3). Figure 2 plots the term structure of subjective equity premium expectations for two different values of the price-earnings ratio based on our regression estimates. Indeed, for low (high) values of the price-earnings ratio, the term structure is downward (upward) sloping.

Overall, asset managers' expectations pass another hurdle imposed by the rational expectations paradigm: not only do they vary negatively with equity valuation ratios, but the slope of the term structure of equity premium expectations also varies positively with equity valuation ratios.

3.3 Conceptual framework

The formation of asset managers' return expectations is not entirely a black box. Many 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; Rangvid, 2017, and our Appendix B for a derivation):

$$r_{t+1} = dp_{t+1} + \Delta pe_{t+1} + \Delta e_{t+1}, \tag{3}$$

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 log change in the price-earnings ratio, and $\Delta e_{t+1} = \ln(E_{t+1}) - \ln(E_t)$ is the change log in earnings. Similarly, the expected return can be decomposed into the expectations of the three terms.

Asset managers sometimes approximate the conditional expectation of dp_{t+1} by the inverse of the current price-earnings ratio times an expected payout ratio, but note that technically all components of dp_{t+1} are unobserved as of time t.[12]

Having said that, some readers conjecture that the negative relationship between asset managers' expectations and valuation ratios is expected as asset managers use the price-earnings ratio (or the price-dividend ratio) to build their return forecasts. First, such a behavior would be entirely consistent with expectations formation under rational expectations, the very form of expectations we are arguing asset managers possess. Second, since many asset managers rely on a version of Equation (3) their expectations formation is, in fact, more nuanced.

Assuming asset managers use the current earnings-price ratio times a payout ratio to ap-

[12] Also note that if Equation (3) is derived in levels, the dividend-price ratio is observed as of time t. We present the log formulation as most managers express their expectations as geometric as opposed to arithmetic averages.

proximate the conditional expectation of the first term in Equation (3), the current earnings-price ratio *is* positively related to expected returns such that return expectations *do* correlate negatively with the current price-earnings ratio. However, this countercyclicality can be dampened by the second and third terms. For instance, if earnings growth expectations are extrapolative (the third term), overall return expectations could be extrapolative.

Of particular interest is the second term, which is easy to disagree on as it amounts to forecasting the long-run price-earnings ratio and thereby the expected adjustment of the current ratio towards the long-run ratio. We conjecture that the vast heterogeneity in expectations we observe is mostly driven by the second term. Consider two extremes: in December 2020 Grantham, Mayo, & van Otterloo's (GMO) seven-year nominal equity forecast was –2.2% per year, whereas BlackRock's corresponding nominal equity forecast was 5.9% per year.[13] 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 around 16 (see a GMO white paper from August 2017), far below its December 2020 value of 33.73.

4 Return expectations and portfolios

4.1 Cross-sectional variation

Next, we evaluate whether asset managers' expectations are reflected in their portfolios. Asset managers' expectations are stated as of a given day, typically the last day of a month. Portfolio data for allocation funds are available at the end of each month or, if a fund only reports quarterly, at the end of each quarter.

[13] 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.

Since asset managers report their expectations at best quarterly and often only once a year, it seems reasonable to assume that these expectations are valid for a certain time period. If funds react to expectations, they may need some time to adjust their portfolios. In our baseline analysis, we assume that expectations are valid for up to twelve months and, accordingly, we forward-fill expectations for a given asset manager up to twelve months. In case a manager provides a term structure of expectations, we select the expectation that is closest to ten years. An asset manager that reports expectations once a year then has no missing monthly expectations data. One justification for this assumption is given by asset managers' behavior during the COVID-19 market sell-off: when equity valuations and expectations changed significantly, many asset managers updated their capital market assumptions. Had expectations not changed, the capital market assumptions likely would not have been updated. Alternatively, Internet Appendix B presents similar results assuming that expectations are only valid for the following quarter.

We estimate a regression of fund j's monthly share invested in US equities on the monthly long-term US equity premium expectation of the asset manager i fund j belongs to. Note that asset managers typically manage multiple funds. Note also that we focus on the share invested in US equities, which is generally different from the overall equity share as most funds also invest in international equities (see Table 1). Previous research does not make this distinction, but perhaps it does not matter for samples of individual investors who typically invest little in international equities. Previous research also often estimates a tobit regression as the equity share of individual investors is typically censored at 0% and 100% (see, e.g., Vissing-Jorgensen, 2003; Giglio et al., 2021). We estimate a linear regression because some funds, albeit rarely, enter short positions (see Figure 1):

$$\text{US Equity Share}_{j(i),t} = \theta + \delta F_{i,t}[r^e_{t\to t+h}] + \eta_{j(i),t} \tag{4}$$

Specification (1) in Panel A of Table 4 shows that a one-percentage-point increase in the US equity premium expectation is associated with a 1.90-percentage-point larger US equity share. The coefficient estimate is statistically significant.

We are not necessarily interested in the causal effect of expectations on portfolios. Indeed, mimicking an experiment in which expectations are randomly assigned across asset managers would be difficult. Nonetheless, it would be interesting to know what variation, if any, subsumes the effect of expectations on portfolios. For instance, it could be that both expectations and portfolios respond to equity valuation ratios, rather than portfolios responding to expectations. Specification (2) in Panel A of Table 4 rules this out. The specification includes year-month fixed effects and absorbs any variable that is constant for a given cross section (e.g., the price-earnings ratio). The coefficient estimate is 1.81.

In principle, we also want to control for variances, correlations, and expected returns of other asset classes. For instance, without controlling for return expectations on other asset classes it is not obvious that the US equity share *should* increase as US equity premium expectations increase. Perhaps, when US equity premium expectations increase, international equity premium expectations increase even more such that the share invested in US equities should be unchanged or decline. Consider the portfolio weights vector of a mean-variance investor in case there are multiple risky assets:

$$w = \frac{1}{\gamma}\Sigma^{-1}\mu, \tag{5}$$

where γ is constant relative risk aversion, Σ is the variance-covariance matrix, and μ is a vector of risk premium expectations. Consider the case with two risky assets. It is straightforward to verify that the weight on one risky asset, say US equities, decreases in the risk premium of the other risky asset, say international equities, if the correlation between the two is positive.

Of course, controlling for all these additional inputs is not feasible as most 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 from 22 to 16, but we cover expectations on worldwide equity returns. Return on expectations on bonds are largely subsumed by our focus on equity premia and the year-month fixed effects. Variances and correlations are arguably easier to estimate than expected returns and so there is less variation across asset managers.

Controlling for these additional expectations is important. Specification (3) in Panel A of Table 4 shows a regression of the US equity share on US equity, developed markets equity, and emerging markets equity premium expectations. The coefficient estimate on US equity premium expectations increases from 1.81 to 4.22. 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. As developed markets equity premium expectations increase, funds allocate less to US equities. Indeed, in Internet Appendix C we provide evidence that the money used to finance a higher US equity share in response to increasing US equity premium expectations comes from money invested in international equities and from cash, but evidently not from bonds.

The increase in the coefficient estimate on US equity premium expectations is not due to sample selection: specification (4) restricts specification (2), which does not control for the additional expectations, to the sample of the 16 asset managers that provide additional expectations on international equity returns and the coefficient estimate decreases back to 2.02.

Analogous to Figure 2 in Giglio et al. (2021), Figure 3 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.[14]

Overall, the sensitivity of US equity shares to US equity premium expectations is significantly larger compared with previous studies that focus on individual as opposed to institutional investors. For instance, our estimate of 4.22 using cross-sectional variation compares with a 0.30 estimate in Kézdi and Willis (2011), a 0.33 estimate in Amromin and Sharpe (2014), a 0.45 estimate in Ameriks et al. (2020), and a 0.69 estimate in Giglio et al. (2021).

4.2 Unobserved fund heterogeneity

The allocation funds in the sample—though they have in common that they all invest in a mix of equities, bonds, and cash—are heterogenous. In particular, they may have different investment mandates. For instance, some funds could be restricted to invest in US assets while other funds may be restricted to have a minimum or maximum share of assets invested in equities. Investment mandates could be correlated with expectations and portfolios: perhaps an asset manager bearish on equities launches few funds with a 60% or 80% target equity allocation. Again, such a correlation between investment mandates and expectations would not necessarily be uninteresting, but it would mute the effect of expectations on portfolios for a given fund. To account for fund-specific heterogeneity, we estimate our specifications with fund fixed effects.

Specifications (1) to (4) in Panel B of Table 4 are analogous to (1) to (4) in Panel A, but add fund fixed effects. In (1) the coefficient estimate is significant, but decreases from 1.90 to 1.10, meaning that a one-percentage-point larger US equity premium expectation is asso-

[14] Albeit we think that the negative equity premium expectations are important for identification as they are representative of investors who are particularly bearish about US equities, Internet Appendix B shows specifications where we restrict the sample to positive US equity premium expectations and the results are similar.

ciated with a 1.10-percentage-point larger US equity share. In (1), the coefficient estimate reflects only time-series variation in expectations and equity shares. With only fund fixed effects, the coefficient estimate is equal to a weighted average across funds of the coefficient estimates from fund-by-fund time-series regressions of equity shares on expectations. The weighting scheme places larger weights on funds with more observations and funds in which expectations have larger time-series variation.[15]

Including both year-month and fund fixed effects in (2) reduces the coefficient estimate further such that it is only borderline significant. Specifications (3) and (4) again highlight the importance of including international equity premium expectations. In (3), the coefficient estimate increases to 1.83 and, as (4) shows, again this increase is not due to sample selection.

In sum, accounting for unobserved fund heterogeneity leads to lower coefficient estimates. Nonetheless, they remain statistically significant and economically large.

4.3 Tactical allocation funds

While the previous subsection shows that a given fund's portfolio responds to variation in expectations over time, the portfolio response could still be muted as a result of the fund's investment mandate. For instance, even if a fund with a target allocation of 60% in equities responds to expectations over time, the fund may still not be allowed to deviate too far from its target weights.

However, there are allocation funds that are less restricted by their investment mandates. The purpose of these so-called tactical allocation funds is to time entry and exit into different asset classes to generate abnormal returns. We expect the response of portfolios to expectations to be even larger for tactical allocation funds. The caveat is that there are only eleven such funds in the sample. These funds manage USD 33 billion as of 2021.[16]

[15] Analogously, the coefficient estimate in specification (2) in Panel A only reflects cross-sectional variation.

[16] We identify tactical allocation funds as such if they belong to the *MorningstarCategory* US Fund Tactical Allocation. The GMO fund in Figure 1 does not belong to this category.

Table 5 confirms that the sensitivity of US equity shares to US equity premium expectations is stronger for tactical allocation funds. In specification (2), which includes both year-month and fund fixed effects as well as return expectations on international equities, a one-percentage-point increase in US equity premium expectations is associated with a 8.70 larger US equity share for a tactical fund. This estimate is about 20 times larger than the estimates for individual investors in the literature, more than four times larger than the estimate for a non-tactical fund, and consistent with the notion that investment mandates mute the response of portfolios to expectations.

5 CFOs' and professional forecasters' return expectations

The expectations considered in this paper so far differ from the subjective expectations typically studied in the literature in two important ways. First, asset managers' expectations represent 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. In addition, we focus on equity premium expectations—the key objects in standard macro-finance models—as opposed to nominal equity return expectations.

Our results could differ from previous results in the literature for either reason. To investigate why our results differ, we contrast asset managers return expectations with expectations of CFOs and professional forecasters, two surveys for which long-term expectations are available. We have already shown that the distinction between equity premium expectations and nominal equity return expectations has no effect for the correlation between asset managers' expectations and equity valuation ratios, but it turns out that the distinction matters for CFOs' expectations.

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 SPF conducted by the Philadelphia Fed, and semi-annual one-year forecasts for 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-year forecasts and the ten-year forecasts of professional forecasters correspond to different sets of professional forecasters. Additional details on the surveys of CFOs and professional forecasters are in Internet Appendix D.[17]

5.1 CFOs

To begin with, the top panel of Figure 4 plots the time series of average CFO equity premium expectations for a one- and ten-year horizon together with the price-earnings ratio. 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 6 show regressions of CFOs' expectations on the log price-earnings ratio and confirm these intuitions. One-year equity premium expectations are negatively correlated with the log price-earnings ratio, whereas the coefficient estimate on the log price-earnings ratio 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 is 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 price-earnings ratio is significantly positive. This specification is similar to specification (9) in Table 3 of Greenwood and Shleifer (2014).

[17] We also evaluate forecast errors of CFOs' and professional forecasters' one-year forecasts in the Internet Appendix.

Using a slightly different sample and specification, their coefficient estimate on the valuation ratio (the price-dividend ratio in their case) of 3.40 is extremely 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 6. That is, Treasury yields are low in recessions and high in expansions, contributing to variation in equity premia. Table 6 implies that, for instance, in recessions Treasury yields move more than CFOs' one-year subjective nominal equity return expectations: as valuations decline, CFOs' nominal equity return expectations decline (specification (3)), but Treasury yields decline more such that CFOs' equity premium expectations increase (specification (1)).

Again, variation in subjective equity premia due to variation in Treasury yields is fine as long as Treasury yields enter forecasters' information sets. For asset managers' expectations, we have alleviated concerns that they may not by the alternative definition of subjective expected equity premia as the subjective expected equity return over the subjective expected return on cash. Unfortunately, CFOs' cash return expectations are not available.

5.2 Professional forecasters

The bottom panel of Figure 4 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 countercylicality: one-year equity premium expectations of above 30% after the financial crisis are too large to be explained by declining Treasury yields alone. There is no obvious correlation between ten-year equity premium expectations of professional forecasters and the price-earnings ratio.

Table 7 shows regressions of professional forecasters' expectations on the log price-

earnings ratio. In contrast to CFOs' expectations, for the professional forecasters we have access to the underlying panel of forecasts, so we can include forecaster fixed effects in our regressions. Panel A of Table 7 confirms the intuition of the bottom panel of Figure 4. Both one-year equity premium and one-year nominal equity return expectations are countercyclical, and the results are similar whether we include forecaster fixed effects or not.

Panel B of Table 7 shows the results for professional forecasters' ten-year expectations. The coefficient estimates on the log price-earnings ratio are statistically zero in all specifications, consistent with the bottom panel of Figure 4, and not supportive of rational expectations.

We conclude that our results obtained using asset managers' return expectations differ from the results in the previous literature, which documents a positive correlation between expectations and equity valuation ratios, primarily because we consider a new set of investors. Asset managers' return expectations are the only expectations in consideration that consistently correlate negatively with the price-earnings ratio. That said, our focus on equity premium as opposed to nominal equity return expectations leads us to find no evidence at all that expectations correlate *positively* with the price-earnings ratio. Finally, the forecast horizon also matters: both CFOs' and professional forecasters' one-year equity premium expectations correlate negatively with the price-earnings ratio, but their ten-year expectations do not.

6 Summary

In most asset pricing models, prices are driven by wealth-weighted expectations (see, e.g., Heyerdahl-Larsen and Illeditsch, 2021). Thus, understanding the expectations and portfolios of the largest investors is central to understanding the behavior of asset prices.

The largest investors in today's financial markets are institutional investors such as mu-

tual funds, pension funds, and insurance companies. The fraction of the equity market directly held by households and individuals has declined steadily from more than 90% just after World War II, to 50% in 1980, to 20% in 2010 (Stambaugh, 2014). Over the same horizon equity ownership by institutional investors has increased (see, e.g., Ben-David, Franzoni, Moussawi, and Sedunov, 2020).

In contrast to the commonly studied expectations and portfolios of retail investors, we find that large asset managers' equity premium expectations correlate negatively with equity valuation ratios and that the sensitivity of asset managers' portfolios to their expectations is economically large. Overall, the results support rational expectations asset pricing models with time-varying expected returns.

A Data appendix

A.1 Capital market assumptions

Grouping expectations into asset classes Asset managers use different names and indices for 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 equities, emerging 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 only forecast either 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 equities and emerging markets equities are the MSCI EAFE Index and the MSCI Emerging Markets Index. US cash typically stands for the 3-month Treasury bill.

Geometric versus arithmetic average returns We assume that returns are stated as geometric averages as opposed to arithmetic averages unless otherwise specified. Two managers only provide expectations expressed in arithmetic averages, but these managers also provide volatility forecasts. We convert arithmetic averages to geometric averages assuming returns are lognormally distributed. In that case, the geometric mean is the arithmetic mean less half of the squared volatility 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 (most of the time) also 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 than 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 states a forecast for a "10+" years horizon, which we assume to mean exactly ten year.

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 two acquisitions in the sample: 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.

Data errors We drop one observation for which the share invested in U.S. equities is 750%, which we assume to be a data error.

A.3 List of asset managers and sample composition

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 price-earnings ratio. The number of observations per asset manager in (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 (see Figure 1).

Second, J.P. Morgan started publishing capital market assumptions in 2010. We have access to the complete time series since 2010, but in column (1) J.P. Morgan contributes only eleven observations as J.P. Morgan only provides expectations once a year.

Third, following correspondence BlackRock told us that they started publishing capital market assumptions only in 2018.[18] Nonetheless, in (1) they contribute a relatively 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 (1) and (2) it is apparent which managers provide a term structure of expectations.

Columns (3) and (4) refer to specifications (1) and (3) in Panel A of Table 4. The number of observations per asset manager in column (3) is primarily 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, and iv) whether these funds report their holdings only quarterly or every month.

[18] We did find one capital market assumptions report from the BlackRock Investment Institute from 2016, which we include in the sample.

The frequency with which a manager reports expectations matters to a lesser extent since we forward-fill expectations up to twelve months. For instance, if J.P. Morgan and GMO had managed exactly the same funds since 2010, J.P. Morgan and GMO would enter with equal number of observations into (3) even though their reporting frequencies differ. A term structure of expectations does not matter at all since we choose the expectation closest to a ten-year horizon in case a manager provides a term structure of expectations.

In column (4) the sample is restricted to manager-report 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 dot not provide these additional forecasts often provide some other forecasts of international equities. For instance, DWS does forecast emerging markets equity returns, but then provides separate forecasts for different countries/regions in the MSCI EAFE Index (e.g., Europe, United Kingdom, Japan, etc.) 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 proxed by the MSCI EAFE Index) and emerging markets equities (as proxied by the MSCI Emerging Markets Index), so we implicitly drop them.

The robustness tests in Internet Appendix B have in common that they, using different assumptions, lead to different sample compositions.

Table A1: List of asset managers

Asset manager	Number of observations				
	(1)	(2)	(3)	(4)	(5)
Amundi	35	12	160	0	2.89
AQR	9	9	176	104	0.19
BlackRock	78	11	263	196	53.41
BMO	3	3	180	180	0.69
BNY Mellon	5	5	176	176	4.45
Columbia Threadneedle	2	2	223	223	25.45
DWS	7	7	244	0	4.29
Franklin Templeton	5	5	584	94	101.04
GMO	47	47	375	375	16.08
Graystone Consulting / Morgan Stanley	7	5	51	27	0.55
Invesco	9	9	318	318	26.99
J.P. Morgan	11	11	1082	1082	39.39
Morningstar	16	16	60	60	0.50
Northern Trust	10	10	40	0	0.13
PIMCO	3	3	49	49	22.93
Pioneer Investments	6	2	138	0	0.00
StateStreet	65	19	125	120	0.21
T. Rowe Price	3	3	80	0	69.48
UBS	3	3	16	16	0.53
Vanguard	5	5	174	0	345.66
Voya	6	6	884	884	18.48
Wells Fargo Investment Institute	3	3	345	345	9.46
Total	338	196	5884	4245	743.55

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 (1) in Panel A of Table 4. Column (4) refers to specification (3) in Panel A of Table 4. Column (5) shows the 2021 assets under management (AUM) for funds in the sample in (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.

B Derivation of return identity

This appendix derives the accounting identity (3) in the main text; see also Ferreira and Santa-Clara (2011) and Rangvid (2017) for similar derivations and the use of the identity to forecast equity returns. While in the main text we focus on earnings as the fundamental, the decomposition holds for any fundamental.

Let R_{t+1} denote the simple return between dates t and $t+1$. Consider the gross return:

$$\begin{aligned} 1+R_{t+1} &= \frac{P_{t+1}+D_{t+1}}{P_t}, \\ &= \frac{D_{t+1}}{P_t}+\frac{P_{t+1}}{P_t}, \end{aligned}$$

where P_t is the price at date t and D_t is the dividend at date t. Note that the gross return is decomposed into an income component and a capital gain component.

Let F_t denote a fundamental (such as dividends, earnings, GDP). Rewrite the gross return:

$$\begin{aligned} 1+R_{t+1} &= \frac{D_{t+1}}{P_{t+1}}\frac{P_{t+1}}{P_t}+\frac{P_{t+1}}{P_t}, \\ &= (1+D_{t+1}/P_{t+1})\frac{P_{t+1}}{P_t}, \\ &= (1+D_{t+1}/P_{t+1})\frac{P_{t+1}}{P_t}\frac{F_{t+1}/F_{t+1}}{F_t/F_t}, \\ &= (1+D_{t+1}/P_{t+1})\frac{P_{t+1}/F_{t+1}}{P_t/F_t}\frac{F_{t+1}}{F_t}, \end{aligned}$$

Taking logs yields:

$$r_{t+1} = dp_{t+1} + \Delta pf_{t+1} + \Delta f_{t+1},$$

where $r_{t+1} = \ln(1+R_{t+1})$, $dp_{t+1} = \ln(1+D_{t+1}/P_{t+1})$, $\Delta pf_{t+1} = \ln(P_{t+1}/F_{t+1}) - \ln(P_t/F_t)$, and $\Delta f_{t+1} = \ln(F_{t+1}) - \ln(F_t)$. Hence, the log return can be decomposed into three terms: 1. the log of one plus next date's dividend-price ratio; 2. the log change in the price-fundamental ratio; and 3. the log change in the fundamentals. Similarly, the expected log return can be decomposed into the expectations of the three terms.

Finally, note that (3) in the main text is shown for earnings as the fundamental.

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Table 1: Summary statistics

	N	Mean	Median	SD	Min	Max
Panel A: US equity premium (over yield)						
All horizons	342	3.06	3.85	2.83	−6.50	11.54
<10-year horizon	180	2.33	3.38	3.42	−6.50	11.54
≥10-year horizon	162	3.87	4.19	1.63	−1.25	7.41
Panel B: US equity return (nominal level)						
All horizons	365	5.02	5.60	2.65	−5.10	11.80
<10-year horizon	180	3.95	5.08	3.10	−5.10	11.80
≥10-year horizon	185	6.06	6.50	1.53	−0.10	9.30
Panel C: US equity premium (over cash)						
All horizons	327	3.08	3.99	2.89	−6.50	11.50
<10-year horizon	163	2.16	3.20	3.61	−6.50	11.50
≥10-year horizon	164	4.00	4.45	1.44	−0.70	6.25
Panel D: DM equity premium (over yield)						
All horizons	219	3.79	3.98	2.27	−1.50	9.24
<10-year horizon	111	3.08	3.22	2.57	−1.50	9.24
≥10-year horizon	108	4.51	4.64	1.64	0.20	8.80
Panel E: EM equity premium (over yield)						
All horizons	301	5.36	5.59	1.98	−1.56	13.24
<10-year horizon	167	5.12	5.25	2.18	−1.56	13.24
≥10-year horizon	134	5.66	5.90	1.66	1.64	13.11
Panel F: Equity shares						
US equity share	5884	34.80	33.16	18.57	−16.22	100.04
Non-US equity share	5884	18.21	16.83	12.34	−37.38	99.49

The table shows number of observations and summary statistics (mean, median, standard deviation, minimum, and maximum) for asset managers' expectations of the US equity premium (over a matched yield), the US equity return (nominal level), US equity return over the subjective return on cash over the same horizon, developed markets equity premium (DM, over a matched yield), and emerging markets equity premium (EM, over a matched yield). The table also shows the shares invested in US equities and non-US equities for asset managers' allocation funds. The summary statistics are expressed in % per year.

Table 2: Equity return expectations and price-earnings ratio

	Equity premium (over yield)		Equity return (nominal level)	Equity premium (over cash)
	All horizons	Closest to 10 years		
	(1)	(2)	(3)	(4)
ln(CAPE)	-6.881^{***}	-7.984^{***}	-5.984^{**}	-6.413^{*}
	(2.389)	(2.567)	(2.666)	(3.146)
N	338	196	361	322
Adjusted R^2	0.784	0.878	0.821	0.789
Manager×Horizon FE	Yes	Yes	Yes	Yes

The table shows panel regressions of asset managers' US equity return expectations on the logarithm of the cyclically adjusted price-earnings ratio (CAPE). 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 of all horizons; specification (2) includes at a given date only one equity premium expectation per asset manager (the one closest to a horizon of 10 years). All specifications include a manager-times-horizon fixed effect, but the fixed effect coefficients 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: Equity return expectations, price-earnings ratio, and forecast horizon

	(1)	(2)	(3)
Horizon	0.014	0.003	-1.368^{***}
	(0.029)	(0.038)	(0.342)
ln(CAPE)			-9.780^{***}
			(3.112)
ln(CAPE)×Horizon			0.411^{***}
			(0.105)
N	342	189	342
Adjusted R^2	0.704	0.534	0.780
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 logarithm 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 coefficients 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: US equity share and equity return expectations

	(1)	(2)	(3)	(4)
Panel A: Without fund fixed effects				
US expectations	1.897***	1.814***	4.224***	2.018***
	(0.483)	(0.589)	(0.796)	(0.647)
DM expectations			−4.846***	
			(1.238)	
EM expectations			1.638*	
			(0.959)	
N	5884	5884	4245	4245
Adjusted R^2	0.044	0.045	0.124	0.050
Fund FE	No	No	No	No
Year-month FE	No	Yes	Yes	Yes
Panel B: With fund fixed effects				
US expectations	1.099***	0.715*	1.828***	0.853*
	(0.273)	(0.365)	(0.617)	(0.440)
DM expectations			−0.586	
			(0.699)	
EM expectations			−0.362	
			(0.415)	
N	5882	5882	4244	4244
Adjusted R^2	0.887	0.893	0.897	0.896
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	No	Yes	Yes	Yes

The table shows panel regressions of US equity shares of asset managers' allocation funds (funds that invest in both equities an bonds) on US, developed markets (DM), and emerging markets (EM) equity return expectations. Returns expectations are equity premia (nominal equity forecast minus a matched nominal yield) expressed in USD. Panel A shows regressions without a fund fixed effect; Panel B shows regressions with a fund fixed effect. Specifications (2)–(4) also include a year-month fixed effect. Standard errors (in parentheses) are clustered by year-month and fund. *, **, 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 equity return expectations with tactical funds

	(1)	(2)
US expectations	4.297***	1.426***
	(0.792)	(0.592)
Tactical fund	−43.626***	−29.861***
	(10.383)	(9.976)
US expectations×Tactical fund	4.553**	7.269***
	(2.247)	(1.616)
DM expectations	−4.068***	−0.266
	(1.168)	(0.646)
EM expectations	0.994	−0.532
	(0.827)	(0.384)
N	4245	4244
Adjusted R^2	0.201	0.901
Fund FE	No	Yes
Year-month FE	Yes	Yes

The table shows panel regressions of US equity shares of asset managers' allocation funds (funds that invest in both equities an bonds) on US, developed markets (DM), and emerging markets (EM) equity return expectations, allowing for specific sensitivity for tactical funds. Returns expectations are equity premia (nominal equity forecast minus a matched nominal yield) expressed in USD. The variable "Tactical fund" is a dummy variable that takes a value of one if the equity share is for a tactical allocation fund. The specifications include the tactical fund dummy itself as well as interacted with the US equity return expectations. 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 fund. *, **, 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: CFOs' expectations and price-earnings ratio

	Equity premium		Equity return	
	1-year horizon (1)	10-year horizon (2)	1-year horizon (3)	10-year horizon (4)
ln(CAPE)	-2.089^{**}	0.506	3.468^{***}	3.014^{**}
	(0.976)	(0.548)	(0.875)	(1.488)
Constant	10.525^{***}	2.006	-5.603^{*}	-2.658
	(3.169)	(1.783)	(5.891)	(4.766)
N	75	75	75	75
Adjusted R^2	0.208	0.043	0.277	0.017

The table shows time-series regressions of Chief Financial Officers' (CFOs) US equity return expectations on the logarithm 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. Specification (1) and (2) are for equity premia (equity return minus either a one-year yield or a 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 7: Professional forecasters' expectations and price-earnings ratio

	Equity premium		Equity return	
	(1)	(2)	(3)	(4)
Panel A: 1-year horizon				
ln(CAPE)	-9.763^{**}	-13.499^{***}	-8.714^{**}	-10.903^{***}
	(4.771)	(4.672)	(3.868)	(4.484)
Constant	36.343^{**}		36.284^{***}	
	(15.816)		(12.715)	
N	1357	1318	1357	1318
Adjusted R^2	0.056	0.296	0.053	0.245
Forecaster FE	No	Yes	No	Yes
Panel B: 10-year horizon				
ln(CAPE)	-0.587	-0.522	0.555	0.377
	(0.534)	(0.539)	(0.935)	(0.579)
Constant	5.035^{***}		5.644^{*}	
	(1.775)		(3.062)	
N	704	681	704	681
Adjusted R^2	0.003	0.233	0.002	0.284
Forecaster FE	No	Yes	No	Yes

The table shows panel regressions of professional forecasters' expectations of US equity return expectations on the logarithm of the cyclically adjusted price-earnings ratio (CAPE). Panel A shows expectations over one-year horizons; Panel B shows expectations over ten-year horizons. Specifications (1) and (2) are for equity premia (equity return minus either a one-year yield or a ten-year yield); specifications (3) and (4) are for equity returns. Specifications (2) and (4) include a forecaster fixed effect. Fixed effect coefficients 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, equity share, and price-earnings ratio
The figure shows GMO's seven-year US equity premium expectations (red filled circles; left axis), the share invested in US equities of GMO's Benchmark-Free Allocation Fund (blue filled circles; right axis), and Shiller's cyclically adjusted price-earnings ratio (CAPE; green solid line; right axis).

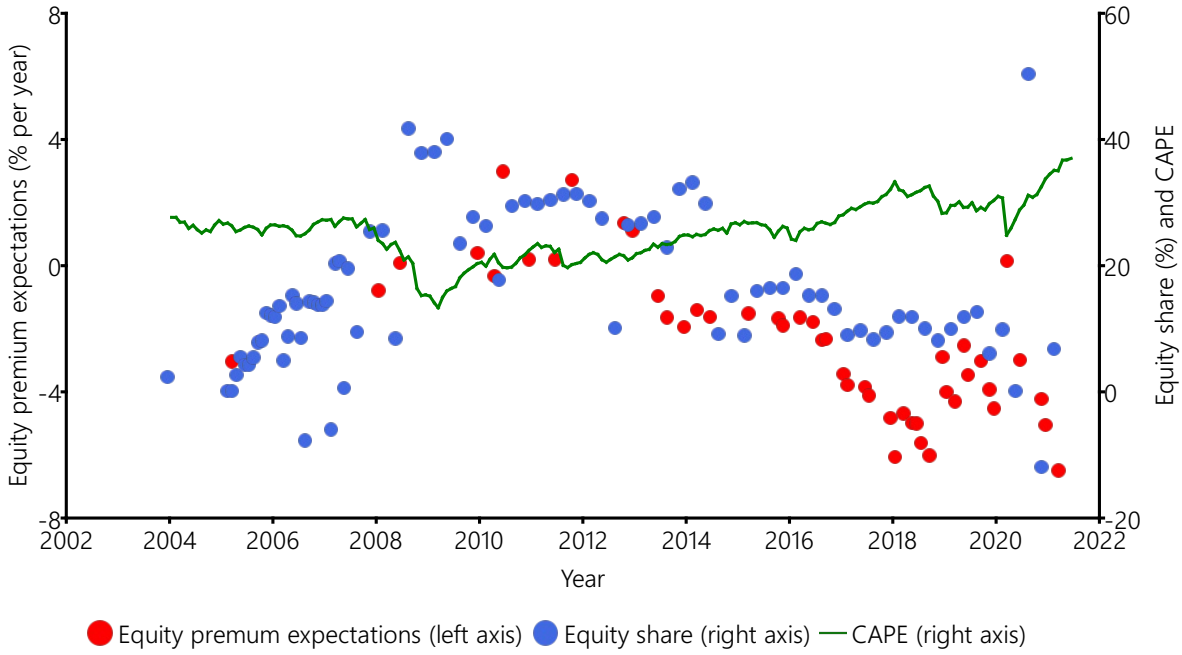


Figure 2: Fitted US equity return expectations against forecast horizons
The figure shows fitted lines of US equity premium expectations over horizons based on estimates in specification (3) of Table 3. The blue solid line with filled squares and the red solid line with filled diamonds are conditional on a cyclically adjusted price-earnings ratio (CAPE) of 22 and 34, respectively.

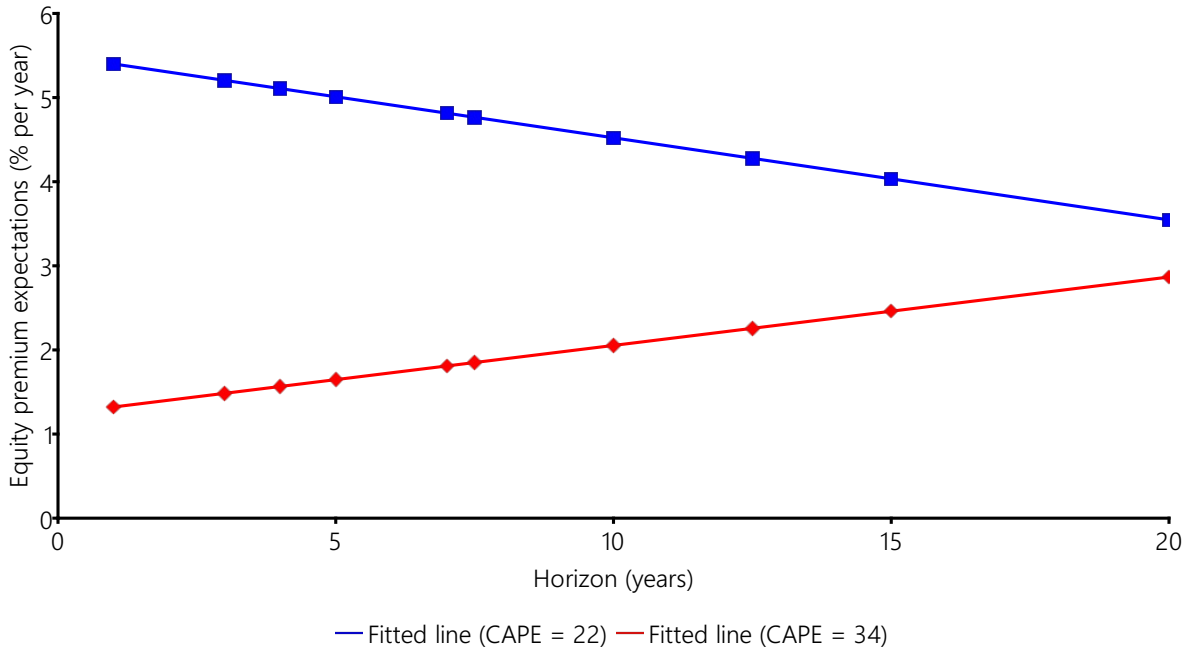


Figure 3: US equity shares and equity return expectations
The figure shows a conditional binscatter plot of US equity shares (the fraction of US equity in a fund's portfolio) and asset managers' US equity premium expectations, conditional on year-month fixed effects and developed as well as emerging 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 premiums expectations into 20 equal-sized bins, compute the mean within each bin, and create a scatterplot of the resulting data points.

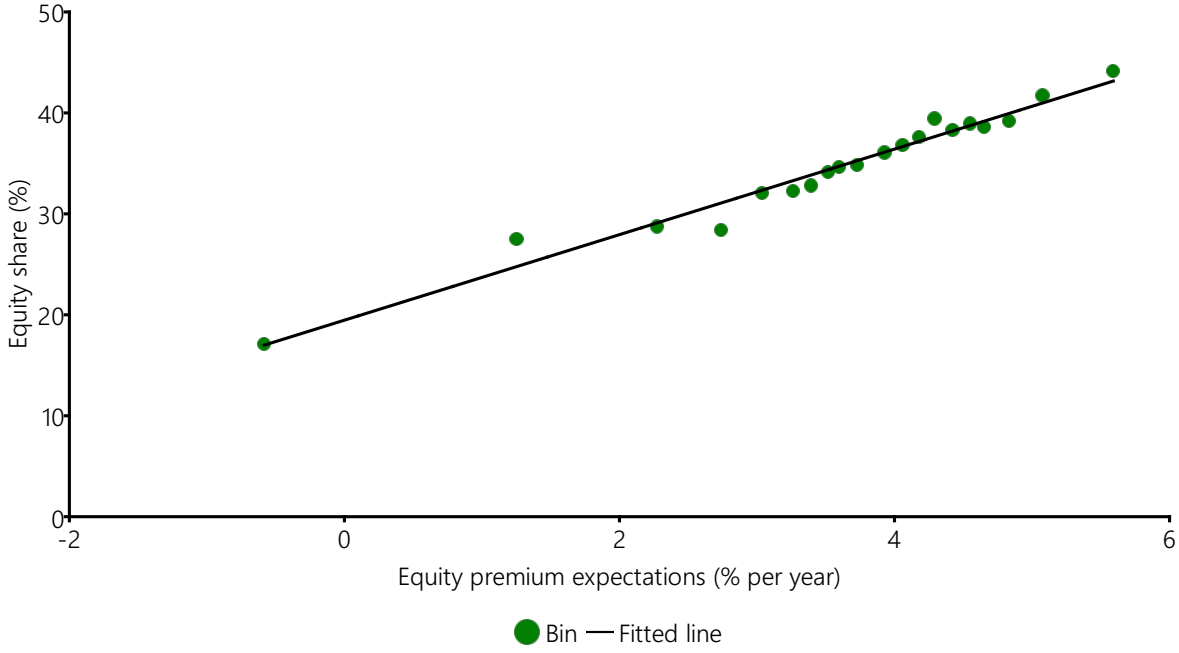
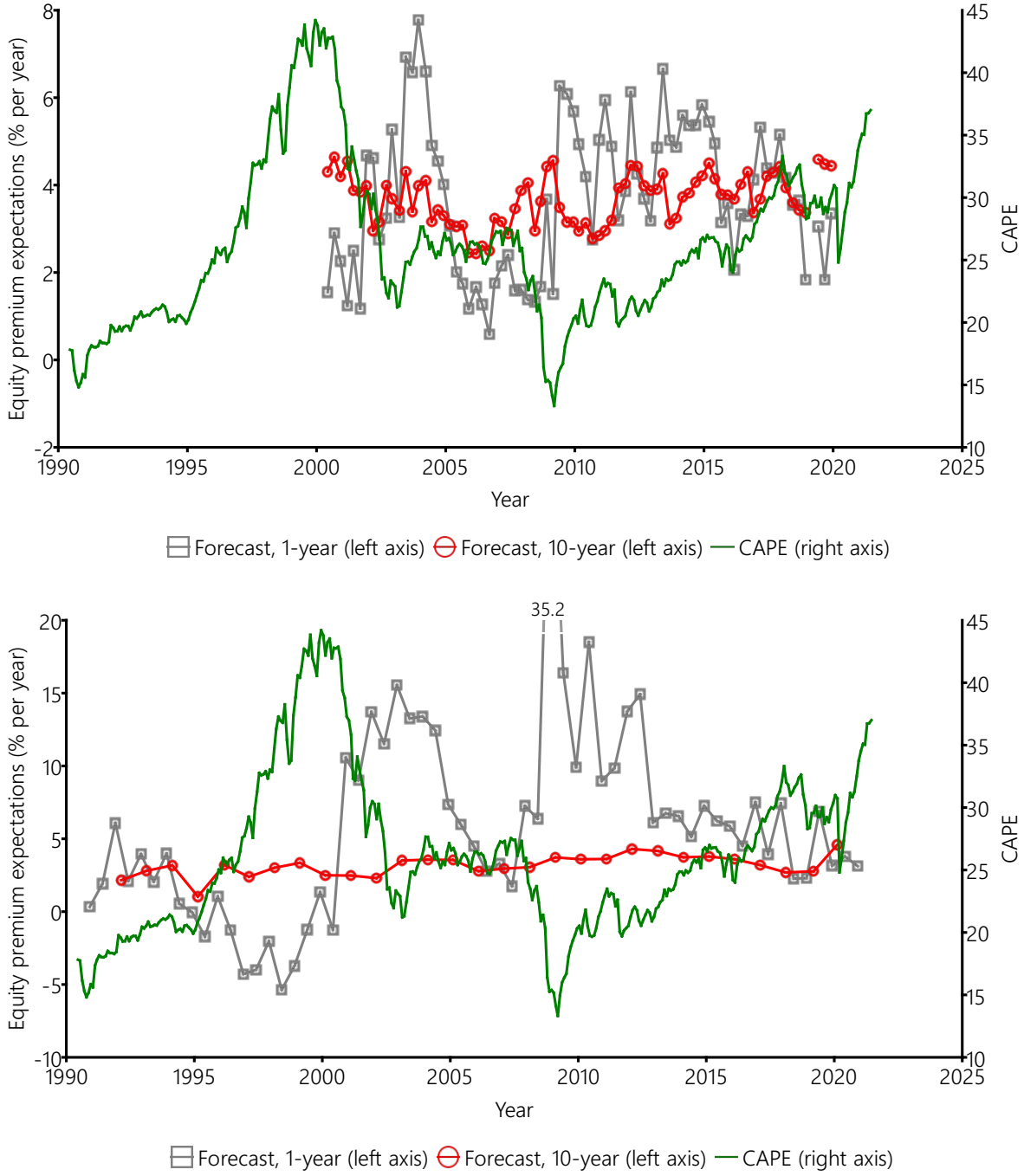


Figure 4: CFOs' and professional forecasters' expectations and CAPE
The top figure shows Chief Financial Officers' (CFOs) average one- and ten-year US equity premium expectations (red circles and grey squares; left axis) and Shiller's cyclically adjusted price-earnings ratio (CAPE; blue solid line; right axis). The bottom figure shows the average one- and ten-year US equity premium expectations of professional forecasters (red circles and grey squares; left axis) and the CAPE (green solid line; right axis). The sample period for CFOs' expectations is from Q2:2000 to Q4:2018. The sample period for professional forecaters' expectations is from Q4:1990 to Q4:2020. One observation (35.2 for one-year professional forecasters) is outside the plotted ranges.



Internet Appendix for "Return Expectations and Portfolios: Evidence from Large Asset Managers"

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July 2021

A Capital market assumptions from additional providers

Table A1 shows regressions of equity return expectations on the price-earnings ratio when capital market assumptions from additional providers are included in the sample. These additional providers, however, do not manage any US allocation mutual 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, 2020).

Table A1: Equity return expectations and price-earnings ratio (all providers)

	Equity premium (over yield)		Equity return (nominal level)	Equity premium (over cash)
	All horizons	Closest to 10 years		
	(1)	(2)	(3)	(4)
ln(CAPE)	-5.939^{***}	-6.467^{***}	-5.217^{**}	-5.784^{**}
	(1.914)	(2.100)	(1.986)	(2.514)
N	512	359	535	456
Adjusted R^2	0.783	0.860	0.836	0.794
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.

B Changes in sample composition

Quarterly forward-filling of expectations

In our baseline analysis, we forward-fill expectations up to twelve months. In that case, say, J.P. Morgan, which reports only annually, has no missing monthly expectations data. One justification for this assumption is given by asset managers' behavior during the COVID-19 crisis. When expectations changed significantly, many managers published updated capital market assumptions.

Alternatively, in this subsection we forward-fill expectations only up to three months. In that case, managers that publish expectations more frequently naturally constitute a larger share of the sample. Table B1 re-estimates Tables 4 in the main text and the results are similar.

Averaging across funds

In our baseline analysis, asset managers with more allocation funds constitute a larger share of the total number of observations. This analysis on the fund level allows us to estimate our regressions with fund fixed effects which, as we have emphasized in the main text, we believe is important given the heterogeneity in funds' investment objectives.

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), but the results are similar with an equal-weighted average. 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 B2 re-estimates our main specifications. We cluster standard errors by both year-month and asset manager, albeit the number of asset managers is small such that there are less than 50 clusters. Clustering only by year-month yields significantly lower standard errors. The results are similar to the results in our baseline analysis.

Alternative specifications

Table B3 shows results for a potpourri of regressions. The specifications in (1) include target-date funds, with and without fund fixed effects. A target-date fund is a fund that periodically rebalances asset class weights to optimize risk and returns for a predetermined time frame (e.g., years until retirement). We exclude target-date funds in our main analysis

Table B1: US equity share and equity return expectations (forward filling)

	(1)	(2)	(3)	(4)
Panel A: Without fund fixed effects				
US expectations	1.996***	2.076***	4.061***	2.269***
	(0.505)	(0.611)	(0.766)	(0.635)
DM expectations			−4.966***	
			(1.295)	
EM expectations			2.090*	
			(1.134)	
N	2888	2883	2028	2028
Adjusted R^2	0.071	0.063	0.128	0.079
Fund FE	No	No	No	No
Year-month FE	No	Yes	Yes	Yes
Panel B: With fund fixed effects				
US expectations	1.064***	1.037**	2.032**	1.752***
	(0.296)	(0.426)	(0.807)	(0.472)
DM expectations			−0.779	
			(0.832)	
EM expectations			−0.375	
			(0.536)	
N	2886	2881	2027	2027
Adjusted R^2	0.876	0.884	0.889	0.888
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	No	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 4 in the main text, but the return expectations are forward-filled for three rather than twelve months. See the caption of Table 4 in the main text for more detailed information.

Table B2: US equity share and equity return expectations (AUM weighting)

	(1)	(2)	(3)	(4)
Panel A: Without manager fixed effects				
US expectations	1.850***	2.079***	4.743***	2.684***
	(0.566)	(0.596)	(0.920)	(0.486)
DM expectations			−4.946*	
			(2.372)	
EM expectations			0.951	
			(1.372)	
N	875	864	592	592
Adjusted R^2	0.079	0.051	0.288	0.083
Manager FE	No	No	No	No
Year-month FE	No	Yes	Yes	Yes
Panel B: With manager fixed effects				
US expectations	1.744***	1.404**	2.830**	1.492***
	(0.413)	(0.550)	(1.161)	(0.429)
DM expectations			−1.697	
			(1.372)	
EM expectations			0.249	
			(0.754)	
N	875	864	592	592
Adjusted R^2	0.740	0.761	0.744	0.740
Manager FE	Yes	Yes	Yes	Yes
Year-month FE	No	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 4 in the main text, 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, Panel B includes asset manager fixed effects as opposed to fund fixed effects. A given asset manager typically manages multiple funds. See the caption of Table 4 for more detailed information.

as we believe asset allocations of target-date funds are primarily driven by the target date and not by expected returns across asset classes, but the results are robust when target-date funds are included.

Specification (2) excludes observations for which equity premium expectations are negative. In our sample, there are two managers that at some points in the sample report negative equity premium expectations: GMO and Morningstar. In our main analysis, we include negative equity premium expectations as they are not driven by measurement error, but represent true pessimistic beliefs about the US equity market and are, therefore, potentially important observations for identifying the effect of expectations on portfolios.

Specification (3) shows a regression of the log equity share on log expectations. These specifications are similar to the primary specification estimated in Amromin and Sharpe (2014). Again, our coefficient estimates on the log equity premium expectation are about ten times larger. In addition to negative equity premium expectations, this sample also excludes funds that short US equities—again, both types of observations are potentially important observations for identification in our context.

Table B3: Equity asset share and equity return expectations (alternatives)

	Including target-date funds (1)	Only positive equity premia (2)	Log of equity share (3)
Panel A: Without fund fixed effects			
US expectations	4.201***	3.617***	
	(0.673)	(1.238)	
DM expectations	−4.406***	−4.875***	
	(0.801)	(1.275)	
EM expectations	1.094	1.832	
	(0.693)	(1.193)	
Log of US expectations			0.354**
			(0.155)
Log of DM expectations			−0.343***
			(0.088)
Log of EM expectations			0.499*
			(0.300)
N	10383	3940	3901
Adjusted R^2	0.109	0.071	0.056
Fund FE	No	No	No
Year-month FE	Yes	Yes	Yes
Panel B: With fund fixed effects			
US expectations	1.488***	1.600**	
	(0.450)	(0.713)	
DM expectations	−0.828	−0.962	
	(0.527)	(0.828)	
EM expectations	0.063	−0.257	
	(0.348)	(0.553)	
Log of US expectations			0.435*
			(0.251)
Log of DM expectations			0.008
			(0.063)
Log of EM expectations			−0.280
			(0.292)
N	10382	3938	3899
Adjusted R^2	0.897	0.901	0.603
Fund FE	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 4 in the main text. Specification (1) includes target-date funds, specification (2) excludes negative US equity premium expectations, and specification (3) has the log US equity share as the dependent variable and the log equity premium expectation as the independent variables.

C Substitution effects

The main text shows that asset managers' allocation funds' share invested in US equities increases as US equity premium expectations increase. When the share invested in US equities increases, some portfolio shares in other assets must decrease: the money must come from somewhere. We decompose a fund's portfolio into a share invested in US equities, a share invested in Non-US equities, a share invested in bonds, a share invested in cash, and a share invested in other assets such that:[1]

$$100\% = \text{US Equity}(\%) + \text{NonUS Equity}(\%) + \text{Bond}(\%) + \text{Cash}(\%) + \text{Other}(\%) \quad (1)$$

These variables again come directly from Morningstar and we have no discretion over them. Table C1 shows regressions of each of these components (except for the share invested in US equities for which results are in the main text) on US equity and international equity premium expectations. The negative coefficient estimates on US equity premium expectations in specifications (1) and (2) suggest that some of the money allocated to US equities in response to increasing US equity premium expectations comes from money allocated to international equities. Similarly, (5) and (6) suggest that some money also comes from money that was previously invested in cash. The coefficient estimate in (6) is large, but not statistically different from zero. In contrast, there is no evidence that funds decrease their share invested in bonds as US equity premium expectations increase.

[1] For the vast majority of funds, these shares add up to 100%. However, for a minority of funds they do not.

Table C1: Other asset class shares and equity return expectations

	Non-US equity (1)	Bonds (2)	Cash (3)	Other (4)
Panel A: Without fund fixed effects				
US expectations	-3.132^{***}	0.648	-1.153^{**}	-0.465^{**}
	(0.772)	(0.979)	(0.491)	(0.185)
DM expectations	1.030	2.186	0.707	0.910
	(0.880)	(1.977)	(1.395)	(0.514)
EM expectations	0.568	-1.652	-0.314	-0.359
	(0.737)	(1.578)	(1.442)	(0.488)
N	4245	4245	4245	4245
Adjusted R^2	0.170	0.027	0.048	0.106
Fund FE	No	No	No	No
Year-month FE	Yes	Yes	Yes	Yes
Panel B: With fund fixed effects				
US expectations	-0.923^{*}	2.273	-3.713	0.495
	(0.494)	(1.718)	(2.275)	(0.375)
DM expectations	1.202^{**}	-3.831^{***}	2.916^{*}	0.297
	(0.461)	(1.358)	(1.491)	(0.306)
EM expectations	0.058	1.845^{*}	-1.453	-0.174
	(0.313)	(0.969)	(1.173)	(0.213)
N	4244	4244	4244	4244
Adjusted R^2	0.819	0.695	0.412	0.730
Fund FE	Yes	Yes	Yes	Yes
Year-month FE	Yes	Yes	Yes	Yes

The table shows panel regressions similar to those of Table 4 in the main text, but for other asset classes (non-US equity, bonds, cash, and other). See the caption of Table 4 for more detailed information.

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

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 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 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 identity of professional forecasters in the SPF and professional forecasters in the Livingston survey is not the same. Second, the Livingston survey only asks about the level of the S&P 500. Hence, the imputed S&P 500 returns, 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 divided by the level of the index on that day.

Forecast errors

Table D1 shows regressions of CFOs' one-year forecast errors for the S&P 500 on a constant, and on a constant and the log price-earnings ratio. 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 log price-earnings ratio. A one percent increase in the price-earnings ratio is associated with a 0.46 percentage points lower forecast error.

Table D2 shows regressions of professional forecasters' one-year forecast errors for the S&P 500 on a constant, and on a constant and the log price-earnings ratio. Specification (1) shows that professional forecasters' expectations are on average unbiased. The average forecast

Table D1: CFOs' forecast errors

	(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 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.

error is minus 2 percentage points but not statistically different from zero. Specifications (2) and (3) show that we cannot reject the null hypothesis that forecast errors are unpredictable by the log price-earnings ratio.

Table D2: Professional forecasters' forecast errors

	(1)	(2)	(3)
ln(CAPE)		−6.731	−9.126
		(7.696)	(7.700)
Constant	2.053	23.676	
	(2.249)	(23.973)	
N	1328	1328	1290
Adjusted R^2		0.782	0.121
Forecaster FE	No	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. Specifications (2) and (3) include the CAPE. Specification (3) also include 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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