Survey Expectations of Returns and Asset Pricing Puzzles*

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Abstract

Survey expectations of returns negatively predict future returns both in the cross section of countries and in the time series in three major asset classes: global equities, currencies, and global fixed income. The negative returns of an investment strategy based on survey expectations cannot be explained by standard factors such as carry, momentum, and value. While past returns and survey expectations of economic growth predict survey expectations of returns, the residual variation in survey expectations of returns is important to predict future returns. We find that the variation in discount rates that is related to survey expectations is positively correlated with the amount of excess volatility across global equity markets, while there is no such link for other well-known predictors such as carry, momentum, and value.

JEL-Classification: G12

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Survey expectations of fundamentals and inflation are widely used in accounting, macroeconomics, and finance.[1] However, survey expectations of asset prices or returns have received much less attention. This is surprising given how important expected returns, or discount rates, are for financial and real decisions. Indeed, a large part of the empirical asset pricing literature is concerned with estimating cross-sectional and time-series variation in expected returns. In this paper, we study survey expectations of returns in three major asset classes: global equities, currencies, and global fixed income.

We use the survey expectations from the World Economic Survey, which conducts surveys in the same way for a large group of countries. The survey respondents reside in the country for which they complete the survey and work for international corporations (both financial and non-financial), research institutes, and international organizations such as the OECD and the IMF. We have a broad coverage of countries with 13 equity markets, 19 currencies, and 10 fixed income markets. The survey is conducted quarterly and starts in 1989 for currencies and in 1998 for global equities and global fixed income.

Theoretical models of expected returns, as summarized at the end of the introduction, point to macro-economic risk, business cycle conditions, past returns, and growth expectations as important determinants of expected returns. We do indeed find that survey expectations of returns are positively related to lagged returns in all asset classes, which is consistent with models of extrapolative expectations of returns (Barberis, Greenwood, Jin, and Shleifer, 2014).

For equities and fixed income, there is a strong link to survey expectations of economic growth. Survey respondents expect high equity returns and low bond returns when expected growth rates are low. Growth expectations are not related to survey expectations of currency returns. Macro-economic risk and business cycle conditions have a similar, opposite effect on expected equity and fixed income returns, but the additional predictive power beyond past returns and growth expectations is small in all three asset classes. Although we consider a fairly general model to explain survey expectations of returns, the determinants account for about 40% of the variation in return expectations.

In the second part of the paper, we relate survey expectations of returns to future realized returns. Greenwood and Shleifer (2013) show that survey expectations negatively forecast

[1]See for instance Claus and Thomas (2001), Gebhardt, Lee, and Swaminathan (2001), Easton (2004), Pástor, Sinha, and Swaminathan (2008), and Bansal and Shaliastovich (2010) for survey expectations of fundamentals and Pennacchi (1991), Mankiw, Reis, and Wolfers (2003), Carroll (2003), Ang, Bekaert, and Wei (2007), Wright (2011), Chernov and Mueller (2012), Cieslak and Povala (2014), and Bachmann, Berg, and Sims (2015) for survey expectations of inflation.

future realized returns on the aggregate U.S. stock market for a variety of surveys.[2] Consistent with their findings, we find that survey expectations are, on average, negatively related to future returns in all three asset classes, both in the cross section and in the time series. A simple investment strategy that combines the information in all three asset classes yields an annual Sharpe ratio of -0.78 for the sample from 1989 to 2012.

For the same cross section of countries, we also construct asset pricing factors based on carry, momentum, and value signals that have been shown to capture important variation in expected returns in the cross section and times series across global asset classes (Asness, Moskowitz, and Pedersen, 2013; Koijen, Moskowitz, Pedersen, and Vrugt, 2013). We find that these standard factors do not explain much of the variation of our survey-based investment strategies. Over our sample period, the survey-based strategy performs somewhat worse than carry strategies but better than momentum and value strategies. Hence, we uncover a new dimension of expected returns in global asset markets beyond the traditional factors.

Given that there are various predictors of returns in global asset markets, such as carry, momentum, value, and now survey expectations of returns, it is natural to ask whether these predictors capture an important part of overall discount rate variation. It is impossible to answer this question directly as true discount rates are not directly observable. However, since the seminal work by Shiller (1981) and Campbell and Shiller (1988b), it is well understood that excess volatility in stock markets is directly related to variation in discount rates.

Although most of the work on excess volatility focuses on the aggregate U.S. equity market, the amount of excess volatility varies substantially across equity markets. For instance, a simple measure of excess volatility, namely the standard deviation of returns relative to the standard deviation of dividend growth, is around two in the United States, but closer to one in Switzerland. The most excessively volatile country in our sample is Hong Kong, where this ratio equals three. If we decompose the excess volatility across countries, then there is more heterogeneity in the volatility of dividend growth than in the volatility of returns.

The question is whether in countries where the difference between dividend growth volatility and return volatility is largest, the variation in discount rates related to survey expectations of returns is high as well. We indeed find a strong link between excess volatility and the discount rate variation related to surveys. If we repeat this exercise for carry, momentum or value signals, then we do not find that excess volatility is positively correlated with discount

[2]See also Vissing-Jørgensen (2004) and Brown and Cliff (2005) for earlier work on survey expectations of equity returns and future realized returns. Adam, Beutel, and Marcet (2014) also show that U.S. equity valuation levels comove postively with survey-implied return expectations. Campbell and Diebold (2009) and Lemmon and Portniaguina (2006) find that survey-based expectations of business conditions and consumer confidence forecast U.S. equity returns. Amronin and Sharpe (2013) find that survey-based expected returns are consistent with extrapolative expectations for the U.S. equity market.

rate variation that can be related to any of these alternative predictors.

Any empirical work using survey expectations of returns can be interpreted in two ways. One view is that survey respondents indeed report expected returns and that a non-trivial group of investors uses similar beliefs in forming their investment portfolios. We discuss various theoretical models that are consistent with this view below. Alternatively, survey participants misinterpret or misunderstand the survey questions and instead report demand functions for risky assets, which entangle return expectations, risk, and risk preferences, instead of expected returns directly.

For policy and welfare questions that one would like to ultimately answer with macro-finance models, the precise interpretation matters. However, it is generally hard, if not impossible, to separate both views. Even direct information on expected returns and portfolio holdings (Vissing-Jørgensen, 2004) or fund flows (Greenwood and Shleifer, 2013) can be consistent with both interpretations, although these additional facts are useful to show that survey expectations are consistent with actual portfolio decisions. Despite the ambiguity about the precise interpretation of survey expectations, we show at the minimum that survey expectations of returns capture an important component of expected returns both in the time series and in the cross section of countries across three major asset classes.

Our paper relates to a literature studying survey expectations of asset prices in other asset classes than equities. Frankel and Froot (1987) study survey expectations in currency markets and Piazzesi and Schneider (2009) document price extrapolation in the housing market.[3] Piazzesi and Schneider (2013) study bond risk premia implied by survey expectations in the United States. Nagel (2012) links micro-survey data on inflation, equity return, and house price expectations to macro experiences of survey participants.[4]

Our paper also relates to Bacchetta, Mertens, and van Wincoop (2009), who show that a certain set of variables predicts both expectational errors (the difference between actual excess returns and the survey-implied expected excess returns) and excess returns themselves in bond, currency, and stock markets.[5] The set of variables includes the interest rate differential for currencies, cay, the short rate, and the dividend yield for equities, and the yield spread for bonds. The sample for the stock market only contains Japan and the United States. The main difference relative to our paper is that we use survey expectations directly to predict excess returns and price changes and not only in the time series, but also in the cross-section. We

[3]Beber, Breedon, and Buraschi (2010) link differences in beliefs and currency risk premia. Case, Shiller, and Thompson (2012) provide further evidence on survey-based expectations of house prices.

[4]Malmendier and Nagel (2011, 2014) link stock returns, risk-taking, and inflation expectations to macroeconomic experiences of survey participants.

[5]Bacchetta, Mertens, and van Wincoop (2009) also look at money markets, but do not find any predictability of returns or expectational errors.

consider a broader cross-section of countries in all asset classes and relate survey expectations to other asset pricing anomalies such as carry, momentum, and value across asset classes as well as excess volatility in equity markets.

Theoretical Models of Expected Returns

In recent years, various behavioral and rational macro-finance models have been proposed that are consistent with key asset pricing facts such as the the level of, and the variation in, the risk-free rate and the equity risk premium.

Leading rational macro-finance models reconcile the variation in risk premia either by introducing variation in risk aversion (Campbell and Cochrane (1999)) or macro-economic risk (Bansal and Yaron (2004), Gabaix (2009), and Wachter (2010)). In these models, the return expectations of the representative agent obviously predict future returns with the correct, positive sign.

Bidder and Dew-Becker (2014) propose a model in which the representative agent has Epstein and Zin (1989) preferences, but is unsure about the exact specification of the consumption process. The agent considers a large set of possible consumption processes and picks the worst-case model within a plausible set of models that are hard to distinguish based on the available data. The agent picks the worst-case model unconditionally and cannot change the worst-case model across states.[6] Bidder and Dew-Becker (2014) show that the worst-case model adds persistence to the consumption process. Importantly, risk premia are constant in the model under the agent's beliefs, but as the risk-free rate fluctuates, expected returns do vary over time. In response to a negative shock to consumption growth, the agent lowers growth expectations going forward more than what the agent would do without concerns about model misspecification, which depresses stock prices. At the same time, the risk-free rate, and hence expected returns, fall, which leads to a negative correlation between expected returns and future realized returns and excess returns.

We distinguish two types of behavioral models. The first group assumes that agents make mistakes in forming beliefs about future fundamentals, see for instance Barberis, Shleifer, and Vishny (1998), Fuster, Laibson, and Mendel (2010), Fuster, Hebert, and Laibson (2011), and Hirschleifer and Yu (2012).[7] However, these models do not necessarily imply that agents' expectations of returns are negatively correlated with future realized returns as, depending on the assumptions regarding preferences, prices adjust and expected returns under the agent's beliefs are often constant over time (e.g., in the models of Barberis, Shleifer, and Vishny (1998) and Fuster, Laibson, and Mendel (2010)).

[6] Alternatively, Hansen and Sargent (2010) consider two models and allow the representative agent to update the probability that each of the models is the right one.

[7] See also Barsky and De Long (1993) for an early model of extrapolation of dividends.

Ehling, Graniero, and Heyerdahl-Larsen (2015) propose a model that features agents that have different levels of experience in the stock market, which is reflected in the precision of their priors regarding fundamentals. Younger agents are more sensitive to news about the fundamental and update their beliefs more aggressively. However, older agents, who are more conservative, are wealthier and therefore have a larger impact on equilibrium asset prices. If the consensus forecast is the equally weighted average of beliefs across investors, they show that the consensus forecast is negatively correlated with actual expected returns and positively correlated with lagged returns. A similar mechanism could operate in a different context where smaller institutional investors trade more aggressively in response to news than larger institutional investors, yet survey expectations weigh their views equally.[8]

In the second class of models, starting with Cutler, Poterba, and Summers (1990) and De Long, Shleifer, Summers, and Waldmann (1990), and recently extended by Barberis, Greenwood, Jin, and Shleifer (2014), there are at least two groups of agents. One of the groups has extrapolative expectations of returns. The other agents have limited risk-bearing capacity, implying that the behavior of the agents with extrapolative beliefs will be reflected in asset prices. The model can reproduce the fact that survey expectations of returns are positively correlated with lagged returns, but negatively correlated with future returns.

Most of these models focus only on a single market and on a single asset class, the aggregate stock market.[9] Given our results, it may be interesting to explore how the models of beliefs of both fundamentals and returns can be extended to multiple assets in case of equities or to other asset classes, like currencies and fixed income.

1. Data and Portfolio Construction

1.1. Asset Returns and Fundamentals

Our international return data for equities, currencies, and fixed income are the same as in Koijen, Moskowitz, Pedersen, and Vrugt (2013) who provide further details on the data construction. We use futures returns for equities and fixed income, and forward returns for currencies. As a result, all returns are excess returns and expressed in U.S. dollars. We use currency-hedged returns for equities and fixed income.

We use equity index returns from 13 countries, which are the United States (S&P 500), Canada (S&P TSE 60), the United Kingdom (FTSE 100), France (CAC), Germany (DAX),

[8]See Koijen and Yogo (2015) for recent evidence on the impact of institutional investors of different sizes on equilibrium asset prices.

[9]Gabaix (2009) is an important exception by studying multiple asset classes at the same time. Several of the papers that we discuss also study the real term structure of interest rates.

Spain (IBEX), Italy (FTSE MIB), The Netherlands (AEX), Sweden (OMX), Switzerland (SMI), Japan (Nikkei), Hong Kong (Hang Seng), and Australia (S&P ASX 200).

We consider the returns on 19 currencies, which are all measured against the US dollar and include Australia, Austria, Belgium, Canada, Denmark, Euro, France, Germany, Ireland, Italy, Japan, The Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Countries that joined the EMU are eliminated after the introduction of the Euro.

Fixed income returns are based on 10-year bonds and computed using synthetic futures for 10 countries, which are Australia, Canada, Germany, Japan, New Zealand, Norway, Sweden, Switzerland, the United Kingdom, and the United States.

To compute our measures of excess volatility, we require dividends, which we obtain from Datastream based on MSCI country indices. Business cycle indicators are from the Economic Cycle Research Institute (ECRI), who try to mimic the NBER methodology to construct business cycle indicators for a large cross section of countries. We construct a global business cycle indicator by weighing the country-level indicators by GDP. Appendix B describes our data sources in detail.

Table 1 reports the annualized means and standard deviations (in parentheses) of returns. The first column describes the start of the sample for each contract, which is when both survey and returns data are available. Sample periods for a given country and asset are largely dictated by data availability of the surveys whereas the cross-sectional coverage of countries within each asset class is largely dictated by the availability of liquid securities. All equity and fixed-income surveys start in the second quarter of 1998, whereas all currency surveys start in the first quarter of 1989. If a later start date is indicated in Table 1 then this means that returns become available later.

1.2. Survey Expectations of Returns and Fundamentals

Our data on return expectations and fundamentals come from the "World Economic Survey" (WES), run by the IFO Institute, Paris Chamber of Commerce, and the EU Commission. The survey is conducted in the same way in all countries, providing comparable survey expectations across countries. Survey expectations are available for a number of different series, among them price expectations and macro-economic fundamentals. We collect survey data from Datastream for all countries that we list above for which we have data on returns.[10]

The survey is run in the first month of every quarter. Experts are asked for their near-term expectations, which correspond to a 6-month horizon. The survey respondents are domiciled

[10]Datastream mnemonics for the survey data are summarized in the appendix.

in the country for which they answer the survey. The WES panel contains economic experts with a range of specializations in management, finance, and other business functions.[11] About 65 percent of the WES panelists work for international corporations, which are made up of non-financial companies (ca. 45%), banks (ca. 15%), and insurance (ca. 5%). Some respondents work in economic research institutes (ca. 10%), chambers of commerce (ca. 10%), and consulates and embassies (ca. 5%). The remaining 10% are affiliated with international organizations such as the OECD, the IMF, the Asian Development Bank, foundations, media and press or smaller-scale enterprises.

Although the panel members are heterogeneous with respect to their professional affiliation, all respondents are in a leading position or work in an economic research department within their institution.

For each quarterly survey, the WES receives in total about 1,100 questionnaires from 121 countries, which makes for an average of 9 questionnaires for each country. The number of respondents is related to country size. For example for Germany, France, United Kingdom, Italy and Spain, there are between 20 and 50 experts per country. In contrast, for Luxembourg and Cyprus, which are not part of our sample, the WES receives only about 3 answers. Since 2002, the number of respondents remains stable at over 1,000 questionnaires. For more information about the survey, we refer to Stangl (2007).

The survey is qualitative in nature and respondents can answer either "higher," "about the same" or "lower." These answers are then coded as 1 (lower), 5 (about the same) or 9 (higher), respectively. The published score for each quarter is the average of all respondents' individual answers and hence ranges between 1 and 9. We do not have access to the underlying survey scores or the fraction of respondents that answers lower, about the same or higher.

In our empirical analysis below, we make use of survey scores for equities, currencies, interest rates, and the overall economic situation to which we will refer as "economic growth." To be precise, the survey asks respondents:

1. "The level of domestic share prices (in domestic currency) by the end of the next 6 months will be" — "higher", "about the same", "lower"

2. "The value of the US$ in relation to this country's currency by the end of the next 6 months will be" — "higher", "about the same", "lower"

3. "Expected interest rates by the end of the next 6 months – long-term rates (government bonds with 10 and more years of maturity)" — "higher", "about the same", "lower"

[11] We thank Johanna Plenk for providing detailed information about the survey respondents.

4. "The country's general situation regarding overall economy – from now on: expected situation by the end of the next 6 months" — "better", "about the same", "worse"

We use the first question to measure expected stock returns,[12] the second question for expected currency returns, the third question for expected bond returns, and the last question to measure growth expectations.

For currencies, respondents provide expectations for the price of U.S. dollars (USD) in foreign currency (FC), which we invert to make them correspond to a USD/FC forecast, that is, higher survey scores imply a positive return on holding foreign currency. For interest rate forecasts, we also invert the survey score so that a higher value indicates declining interest rates and therefore higher bond returns.

1.3. Summary Statistics

Table 1 provides descriptive statistics for survey scores across countries. The third column reports the average survey scores and standard deviations (in parentheses) for all three asset classes and countries.

For each country, the average equity score exceeds 5, while the average fixed-income score is below 5. This means that survey respondents expected positive equity returns and rising long-term interest rates, on average, during our sample period. For currencies, there is no similarly uniform pattern, pointing to the fact that respondents expected some currencies to appreciate and some to depreciate relative to the U.S. dollar.[13]

In terms of variability, we find that the survey scores fluctuate the least for equities, then fixed income, and the survey scores are most volatile for currencies. However, within each asset class, there is a non-trivial amount of heterogeneity. For instance, within equities, Italy and Switzerland have volatilities of the survey scores of 0.66 and 0.79, respectively, while the survey score for Hong Kong is about twice as volatile with a standard deviation of 1.53. We return to these differences in Section 4 and relate them to heterogeneity in excess volatility across global equity markets.

In Table 2, Panel A, we report the correlation between survey expectations of returns across the three asset classes. We compute the time-series correlations per country and then average these estimates across countries. We report the standard deviation of the estimated correlations across countries in parentheses. According to the survey respondents, currency risk premia have a fairly low correlation with equity and bond risk premia. However, equity

[12] In Section 3, we also compare the predictability of returns and price changes.

[13] We provide additional summary statistics of survey scores in Tables IA.1 and IA.2. Table IA.1 reports unconditional frequencies with which survey scores s fall in the interval $1 \leq s < 2$, $2 \leq s < 3$, ..., $8 \leq s \leq 9$. Table IA.2 shows transition probabilities for these intervals.

and bond risk premia have a negative correlation of -42% with a cross-sectional standard deviation of 18%.

In Panel B of Table 2, we summarize the factor structure in survey-based expected returns for all three asset classes. We compute the first three principal components within each asset class and the fraction that can be explained by each of these factors. The first principal component explains between 50% (equities) and 68% (currencies) of the variation. In total, the first three principal components explain between 71% (equities) and 82% (fixed income) of the variation, suggesting a strong factor structure in global risk premia as perceived by survey respondents.

1.4. Comparison to Other Survey Expectations of Returns and Fundamentals

Greenwood and Shleifer (2013) compare various survey measures of expected returns for the U.S. equity market and show that these different measures are positively correlated. We use the data provided by Greenwood and Shleifer (2013) to compare the WES survey expectations of returns to the return expectations of Gallup, the American Association of Individual Investors (AAII), Shiller, and Graham and Harvey.[14]

In the cases of Gallup and the AAII, Greenwood and Shleifer (2013) measure the fraction of respondents that is bullish minus the fraction that is bearish. The underlying surveys are similar to ours, where investors are asked whether stock prices are expected to go up, down or remain the same. However, we do not have the underlying percentages. Shiller's survey reports the fraction of respondents who expect that the market will rise over the following year. The surveys of Gallup, the AAII, and Shiller ask individual investors, while Graham and Harvey ask CFOs about their views on the expected stock market return directly. The frequency of the surveys varies from weekly (AAII) to quarterly (Graham and Harvey), although the Gallup and Graham and Harvey surveys are missing for some periods.

In Figure 1, we plot the times series of the WES survey for the U.S. alongside Gallup (top left panel), the AII (top right panel), Shiller (bottom left panel), and Graham and Harvey (bottom right panel). Although there are obviously some differences between the surveys, as one would expect based on the questions that are asked and who actually answers the surveys, the patterns are broadly the same. Indeed, expected returns are low in all surveys in both U.S. recessions in the sample around 2001 and the financial crisis.

In Figure 2, we compare WES survey expectations of economic growth to the U.S. Sur-

[14]For this comparison of the WES survey to the surveys discussed in Greenwood and Shleifer (2013), we omit the Investors' Intelligence newsletter expectations, which is not an actual survey, and and the Michigan survey for which only a couple of years of data are available. However, Greenwood and Shleifer (2013) show that these other measures of expected returns are positively correlated with the four measures in Figure 1.

vey of Professional Forecasters (SPF) for which we use the median forecast. As measures of expected growth from the SPF, we consider (the negative of) the expected change in unemployment (top left panel), the expected change in real GDP (top right panel), the expected change in industrial production (bottom left panel), and the expected change in corporate profits (bottom right panel). As is clear from the figure, the WES survey expectations align closely with the survey expectations of corporate profits from the SPF.

1.5. Carry, Momentum, and Value Signals

Carry, momentum, and value are well-known predictors of returns in various asset classes across global asset markets. We study below whether survey-based investment strategies are related to these traditional factors. We briefly explain the construction of carry, momentum, and value signals.

To compute a security's carry, we follow Koijen, Moskowitz, Pedersen, and Vrugt (2013) who propose a general definition of carry as the return on any asset if market conditions stay constant. In case of futures contracts, this definition implies as a measure of carry, C_t,

$$C_t \equiv \frac{P_t - F_t}{F_t}, \tag{1}$$

where F_t denotes the 1-period futures price and P_t the spot price. Koijen, Moskowitz, Pedersen, and Vrugt (2013) provide further details how to interpolate the futures curve to obtain a consistent measure of carry over time and across asset classes.

The momentum signal is defined as the sum of lagged returns over the last 12 months. The momentum signal, like the carry signal, is easy to apply consistently across asset classes.

Value is typically defined as a measure of fundamental value relative to price, which requires assumptions about the measurement of the fundamental value across asset classes. We follow Asness, Moskowitz, and Pedersen (2013) in our choices of fundamental value. The value signal for equities is the book-to-market ratio of each index. For currencies, the value signal is computed as the negative of the 5-year change in the real exchange rate (5-year change in the spot return minus 5-year U.S. inflation plus 5-year inflation of the foreign country). The value signal for fixed income is given by the 5-year change in bond yields. We provide further details on the data used for computing the value signals in Appendix A.

2. Determinants of Survey Expectations of Returns

To understand the variation in survey expectations of returns across countries and asset classes over time, we consider panel regressions of survey expectations on various determinants that are implied by the theoretical models that we discuss in the introduction.

We first regress survey expectations on lagged returns as predicted by models of extrapolative expectations. To aggregate historical returns, we employ a parsimonious weighting scheme

$$\widetilde{R}_{i,q}(\tau) = \frac{\sum_{j=0}^{\infty} \tau^j R_{i,q-j}}{\sum_{j=0}^{\infty} \tau^j}, \tag{2}$$

where the decay parameter $\tau \in (0,1)$ controls the speed of discounting and $R_{i,q}$ denotes the quarterly return of country i.[15]

To illustrate the impact of τ for each asset class, we estimate a pooled panel regression of survey expectations of country i, $S_{i,q}$, on $\widetilde{R}_{i,q-1}(\tau)$ at a quarterly frequency for each asset class,

$$S_{i,q} = a_\tau + b_\tau \widetilde{R}_{i,q-1}(\tau) + u_{i,q}(\tau), \tag{3}$$

for different values of τ. We plot the estimated coefficients, b_τ, t-statistics (clustered by quarter and country), and R-squared values in Figure 3.

The loadings on lagged returns, b_τ, are positive for all three asset classes, other than for equities for high values of τ,[16] which is consistent with models of extrapolative expectations (Barberis, Greenwood, Jin, and Shleifer, 2014). We summarize the results in Column (i) of Table 3.

In the bottom row of Figure 3, we also plot the weights $\tau^j / \sum \tau^j$ associated with the most recent 20 quarters of returns for the decay parameter that maximizes the R-squared value in (3). The maximum R-squared is found for $\tau = 0.48$ for equities, $\tau = 0.94$ for currencies, and $\tau = 0.49$ for fixed income. This implies that survey respondents put most weight on recent returns for equities and fixed income and that the weights are basically zero after four quarters. However, to explain survey expectations for currency returns, returns 20 quarters ago still matter for today's expectations of the survey respondents.

Next, we add survey expectations of economic growth, $Growth_{i,q}$, to the panel regression,

$$S_{i,q} = \alpha_0 + \alpha_1 \widetilde{R}_{i,q-1}(\tau) + \alpha_2 Growth_{i,q} + u_{i,q}, \tag{4}$$

where we re-optimize over the parameter τ. We report the estimated coefficients in Column (ii) of Table 3.

We find a strong positive relationship between growth expectations and expected equity returns, but a strong negative relationship between growth expectations and expected bond

[15] In our empirical application below, we truncate the sum at 20 quarters, that is, $j = 0, 1, ..., 19$.

[16] The behavior for high values of τ is consistent with long-term reversals in stock markets (DeBondt and Thaler, 1985).

returns. The R-squared jumps by around 25% in each case. For currencies, where we use the difference in growth expectations between a given country and the United States, we do not find a relation between expected currency returns and growth expectations.[17] Once we control for growth expectations, lagged returns remain a significant predictor of return expectations for currencies and global fixed income, but not for global equities.

To graphically illustrate the link between survey expectations of returns and measures of expected growth, we regress the survey expectation of returns for each country on the survey expectation of economic growth only. We compute the average survey expectation of returns, the average predicted value, and the average residual across countries for a given asset class. The figures of the individual countries, which we do not present for brevity, look strikingly similar to the series that are averaged across countries.

In Figure 4, we plot the survey expectation of returns for equities (left panels), currencies (middle panels), and fixed income (right panels) alongside the fitted values of a regression of return expectations on survey expectations of growth in the panels in the top row. In the panels in the middle row, we plot the average growth expectation. In the bottom row, we plot the average residual.

Figure 4 and Table 3 imply that when survey respondents predict bad economic times, as measured by low growth expectations, survey respondents expect low equity returns and high long-term bond returns, while they predict not much of an impact on global exchange rates relative to the U.S. dollar.[18]

Lastly, we estimate pooled panel regressions of survey scores on aggregated lagged returns, survey growth expectations, the lagged VIX index as a measure of aggregate risk (VIX_{q-1}), and a global business cycle indicator (GBC_q),

$$S_{i,q} = \alpha_0 + \alpha_1 \widetilde{R}_{i,q-1}(\tau) + \alpha_2 Growth_{i,q} + \alpha_3 VIX_{q-1} + \alpha_4 GBC_q + u_{i,q}, \tag{5}$$

where we lag the VIX by one quarter, using the last trading day of the previous quarter, as we do not know the exact day of the month at which the respondents complete the survey.

Columns (iii) and (iv) of Table 3 report the estimation results for the panel regressions outlined in equation (5), where we again re-estimate τ in each specification. Consistent with the results on growth expectations, we find that the VIX has opposite effects on equities compared to fixed income, while little impact on currencies. If the VIX increases, which during our sample period can be interpreted as an increase in macro-economic risk, expected

[17] The results are similar if we only use the growth expectations of the foreign country, such as the U.K.'s growth expectation in case of the USD/GBP exchange rate instead of the growth differential.

[18] By averaging all foreign currencies relative to the U.S. dollar, we compute the expected return on to the "dollar factor" as studied in detail by Lustig, Roussanov, and Verdelhan (2011).

equity returns decrease, while expected bond returns increase.

We find a similar (opposite) effect for the global business cycle indicator, but its effect is insignificant for equities. The global business cycle does have a positive effect on currencies, meaning that if many countries experience a recession, survey respondents expect the U.S. dollar to depreciate in the future.

Despite this relatively rich model, we only explain 41-46% of the variation in survey expectations. This implies that a non-trivial amount of variation is left unexplained by including past returns, growth expectations, standard measures of risk, and business cycle indicators. In Section 3.5, we revisit the decomposition of survey expectations of returns into the predicted part and the residual, $u_{i,q}$, and study which of these terms predicts future returns better.

We verify the robustness of our results along two dimensions. First, instead of estimating τ, we simply sum the 12 months of lagged returns. Second, instead of estimating a pooled panel regression, we estimate separate regression models for each country.

We present the results in Table IA.3. In Panel A, we report the results of a pooled regression where we replace $\widetilde{R}_{i,q-1}(\tau)$ with the sum of 12 months of lagged returns. By comparing the results to Column (i)-(iii) of Table 3, it follows that our results are not sensitive to the exact weighting that we use to aggregate historical returns, other than for currencies, where the R-squared value drops from 40% to 20% in the model that incudes lagged returns, growth expectations, and the VIX.

In Panel B, we estimate the model for each country separately. We report the average coefficient across countries. The R-squared values hardly increase in the more flexible model, which implies that the heterogeneity in predictive coefficients across countries is fairly small.

3. Survey Expectations of Returns and Future Realized Returns

In this section, we explore the link between survey expectations of returns and future realized returns in all three asset classes. Most of the existing literature focuses on the time-series predictability of survey expectations of returns in a single asset market and for a single asset class, the U.S. aggregate stock market. We explore both the cross-sectional and the time-series predictability of returns.

3.1. Portfolio Construction

A cross-sectional investment strategy exploits relative differences in signals *across* countries at a given point in time and is always long and short the same dollar amount. This means that even if survey respondents are optimistic about all countries at a particular point in time, the strategy takes the same number of long and short positions. As a result, a cross-sectional strategy tends to be (close to) market neutral. For currencies, this means that the strategy is neutral with respect to the U.S. dollar.

Let $w_{i,t}^{XS}(k)$ denote the portfolio weight for country i in month t for the cross-sectional strategy. Following Asness, Moskowitz, and Pedersen (2013), we consider an investment strategy for which the weights are linear in the cross-sectional rank of the signal:

$$w_{i,t}^{XS}(k) = c_t \left(\text{rank}(x_{i,t-k+1}) - N_t^{-1} \sum_{i=1}^{N_t} \text{rank}(x_{i,t-k+1}) \right), \tag{6}$$

where N_t is the total number of countries with available data in month t, x_t is the investment signal in month t, and k is an implementation lag ($k = 1, 2, \ldots, 12$). c_t is a scalar that we use to scale positions to ensure that the portfolio invests one dollar long and one dollar short. In some of our analyses below, we use a quarterly frequency and denote the time index in these analyses by q and the implementation lag by l to avoid confusion. The weights of the cross-sectional strategy in quarter q are then given by

$$w_{i,q}^{XS}(l) = c_t \left(\text{rank}(x_{i,q-l+1}) - N_t^{-1} \sum_{i=1}^{N_t} \text{rank}(x_{i,q-l+1}) \right).$$

A time-series strategy, or timing strategy, exploits variation in survey scores *within* countries. The time-series portfolio does not mechanically take long and short positions that net out, but can take long (or short) positions in all assets at the same time. Following Moskowitz, Ooi, and Pedersen (2012), we go a dollar long or short in country i in month t when the signal is above or below a certain threshold. For survey strategies, this threshold is equal to five (the middle value survey respondents can select), which results in the time-series weights

$$w_{i,t}^{TS}(k) = N_t^{-1} \left(I\left\{S_{i,t-k+1} > 5\right\} - I\left\{S_{i,t-k+1} \leq 5\right\} \right), \tag{7}$$

where $S_{i,t}$ denotes the survey score at time t for country i and $I\{\cdot\}$ denotes an indicator function that equals one if the condition has been satisfied and zero otherwise.

To understand whether the survey-based investment strategies differ from well-known investment strategies such as carry, momentum, and value, we construct cross-sectional and time-series strategies based on carry, momentum, and value signals analogously to the survey-based strategies. For carry and momentum timing strategies, we use zero as the threshold and for value we use the recursive mean of the signal as the threshold.

3.2. *The Returns to Survey-based Investment Strategies*

We start with cross-sectional strategies based on rank weights defined in (6). We rebalance the portfolio at a monthly frequency and lag the survey scores for $k = 1, 2, ..., 12$ months, implying that the portfolio weights in period t are based on survey scores in month $t + 1 - k$.

Understanding the impact of lagging the signal is interesting for at least three reasons. First, survey scores are not published immediately in the first month of the quarter in which respondents express their views, but typically with a one month lag and occasionally even with a lag of two months, so that an investable strategy would correspond to $k = 3$. The results for $k = 1$ are of independent interest, even if investors cannot build trading strategies based on this information, as these are the most recent survey expectations.

Second, as the survey is run at a quarterly frequency, $k = 3$ corresponds to a quarterly strategy where portfolios in one quarter are based on survey scores from the previous quarter and thus represents a natural benchmark.

Third, we also report results for lags of $k > 3$ because findings from the earlier literature suggest that it might take time for surveys to forecast returns (Brown and Cliff, 2005; Greenwood and Shleifer, 2013).

Table 4 reports average annualized excess returns ("mean"), volatilities ("std"), and Sharpe Ratios ("SR") of portfolios formed on surveys in global equity markets, currencies, and fixed income. Numbers in squared brackets are t-statistics of the mean returns using White standard errors. Panel A reports the results for cross-sectional strategies and Panel B for time-series strategies.

In each panel, we also report results for a strategy that combines the equities, currencies, and fixed income portfolios, to which we refer as the Cross-sectional Survey Factor and the Time-Series Survey Factor, respectively. To form this factor, we weigh the returns of the three asset classes with the inverse of their volatility to make asset classes with different levels of volatility comparable. We then scale the portfolio have an annual volatility of 10%.

Starting with Panel A, we find that the Sharpe ratios are all negative for up to $k = 8$ lags in all asset classes. At a 3-month lag, which is the first month where these data are guaranteed to be publicly available, the Sharpe ratios are lowest. For equities, the Sharpe ratio equals -0.67, for currencies it -0.52, and -0.48 for fixed income. All the mean returns are significantly different from zero.

If we combine the three strategies into the cross-sectional survey factor, then this strategy has a Sharpe ratio of -0.72 p.a. The mean return equals -7.2% p.a. with a t-statistic of -3.48. Over the same sample period, the Sharpe ratio of the US stock market equals 0.12 (Table 1), which illustrates the sizable Sharpe ratio of the Global Survey Factor.

Turning to Panel B, we find that most Sharpe ratios are again negative at a 3-month lag.

However, the Sharpe ratio for equities equals only -0.04, while it equals -0.53 for currencies, and -1.10 for fixed income. We show below that the Sharpe ratio of equities can be explained by a large market exposure, which implies that the information ratio (in particular for equities) is much lower than the Sharpe ratio. Combining all three strategies into a time-series survey factor, we find a Sharpe Ratio of -0.67 which is only slightly below the cross-sectional survey factor in Panel A.

Table 5 reports the correlations between returns of the survey-based investment strategies for both the cross-sectional and time-series strategies in all three asset classes. The correlations across asset classes are typically low and often slightly negative. One exception is the time-series strategies of global equities and fixed income, which have a correlation of 40%. For a given asset class, however, the correlations between cross-sectional and time-series strategies are all positive and range from 35% (fixed income) to 53% (currencies). The correlation structure of the strategy returns points to significant benefits of diversification across the strategies, in particular across asset classes.

Indeed, when we combine all six strategies into one Global Survey Factor (Panel C of Table 4) using the same weighting procedure as above to combine strategies, the Sharpe ratio at a 3-month lag equals -0.78, which exceeds the Sharpe Ratio of both the cross-sectional and the time-series survey factor.

Taken together, we find consistent evidence that survey expectations negatively forecast future returns in all three major asset classes, both in the time series and in the cross section, and across various implementation lags.

3.3. Survey-Based Strategies and Traditional Asset Pricing Factors

A potential explanation of our results in Table 4 is that survey-based strategies are highly correlated with other well-known asset pricing factors, which would imply that survey expectations do not add much independent information beyond well-known predictors. For example, Greenwood and Shleifer (2013) show that U.S. equity surveys are driven by lagged returns, which also holds in our larger sample, so our survey-based strategies may well be similar to a momentum strategy and do not offer positive returns once we correct the returns for exposures to standard factors.

To examine how survey strategies are linked to other factors, we form portfolios based on carry, momentum, and value, as well as passive long benchmarks (that is, an equally-weighted portfolio of all countries within an asset class) using the same portfolio construction techniques as for our survey-based strategies.[19]

[19] We report average returns, standard deviations, and Sharpe ratios for carry, momentum, and value portfolios in Tables IA.4 – IA.6.

In Figure 5, we plot the cumulative returns to the Global Survey Factor (GSF), Global Carry Factor (GCF), Global Momentum Factor (GMF), and Global Value Factor (GVF), which are based on combining cross-sectional and time-series portfolios for each of the three asset classes into a single factor. As before, we form these combined portfolios by weighting returns of both strategies by the inverse of their standard deviations and scale the positions to ensure that the strategy has a volatility of 10%. We compute the cumulative returns by summing monthly excess returns. We set $k = 3$ months for survey strategies and $k = 1$ month for carry, momentum, and value to ensure that all strategies use information that is publicly available to investors.

The top left panel contains the results for the survey-based strategy. While the cumulative return on the passive long strategy grows to 155%, the survey-based strategy drops to almost -183%. As a point of reference, the remaining three panels repeat this exercise, but now for carry (top right), momentum (bottom left), and value (bottom right) strategies. The dashed line is identical in all plots and corresponds to the passive long strategy. Of the three alternative strategies, carry performs best and grows to almost 285%, while momentum (with approximately 83%) and value (with approximately 68%) perform worse than the survey-based strategy.

Figure 6 plots annualized Sharpe ratios and their 95%-confidence intervals of the global survey (top left), carry (top right), momentum (bottom left), and value (top right) strategies for different values of k, analogously to Table 4. For carry and momentum, the Sharpe ratios decay from 1.1 and 0.5 at $k = 1$ to 0.7 and 0.1 at $k = 12$, respectively. The survey-based strategy starts at a Sharpe ratio of -0.5 at $k = 1$ and declines to -0.8 at $k = 3$, before gradually increasing to -0.5 at $k = 12$. The value strategy is rather stable with a Sharpe ratio between 0.1 and 0.4. Hence, survey-based strategies perform somewhat worse than carry strategies, but outperform value or momentum strategies over our sample period in terms of their Sharpe ratios.

To compare the strategies more formally, we consider factor regressions of the form

$$xr^S_{t+1} = \alpha + \beta^P xr^P_{t+1} + \beta^C xr^C_{t+1} + \beta^M xr^M_{t+1} + \beta^V xr^V_{t+1} + e_{t+1},$$

where xr denote excess returns and S, P, C, M, and V denote surveys, the passive long benchmarks, carry, momentum, and value factors. We use returns to cross-sectional carry, momentum, and value strategies for the cross-sectional survey portfolios and we follow the same approach for the time-series strategies.

Table 6 reports the exposures of survey strategies to these four factors as well as the alphas and the information ratios ("IR"), which is the ratio of the alpha to the residual standard deviation. We also regress the global survey factor on the global passive long benchmark, the global carry factor, the global momentum factor, and the global value factor and report the results in the final column (labeled "GSF").

All survey portfolios have negative alphas, which implies that the information ratios are all negative as well, ranging from -0.22 (cross-sectional fixed income) to -0.78 (time-series currencies). The alphas are statistically significant for the cross-sectional equity portfolio, all three time-series portfolios, and for the GSF.

The time-series equity strategy also has a significantly negative alpha even though the average return to the strategy is close to zero (see Table 4). This is driven by the fact that the equity time-series strategy is on average long most countries, as implied by the large and highly significant market beta of 0.67 in Table 6, but delivers low returns when it deviates from the market portfolio.

The value betas are mostly negative and statistically significant in four out of the seven cases. The momentum betas tend to be positive, although only statistically significant in two cases. The carry betas are negative for the cross-sectional strategies and positive for the time-series strategies, but (like for momentum) the betas are often economically small and statistically insignificant.

Although the survey-based strategies are not neutral with respect to the traditional factors, the alphas and information ratios are negative for all strategies and statistically significant for five out of the seven cases.

Lastly, we decompose the mean, Sharpe ratio, and information ratio of all six survey strategies into the part coming from long (indexed by a "+" superscript in the second panel) and short (indexed by a "−" superscript in the third panel) positions in Table 7. In the bottom panel, we report the fraction of the average return coming from long and short positions, implying that both shares aggregate to 100%.

If we focus on the information ratios on the long and the short side, which removes the market exposure as well as the exposures to the carry, momentum, and value factors, we find that the information ratios of the long and the short side are all negative. This implies that the superior performance of the long positions relative to the short positions is due to exposures to well-known factors. After correcting for these exposures, both sides of the strategy underperform by about the same amount.

3.4. Risk Premia, Price Changes, and Carry

We have focused so far on the link between survey expectations of returns and risk premia. However, the survey asks for all three asset classes about expected price changes instead of risk premia. In this section, we extend our evidence to price changes and to the wedge between the risk premium and expected price changes, which is a security's carry.

As in Koijen, Moskowitz, Pedersen, and Vrugt (2013), we decompose the excess return of any security into price changes relative to the current futures price, $(P_{i,t+1} - P_{it})/F_{it}$, and carry, C_{it},

$$r_{i,t+1} = \frac{P_{i,t+1} - P_{it}}{F_{it}} + C_{it}. \tag{8}$$

As discussed before, the carry is the return an investor realizes if market conditions remain the same or, equivalently in our context where we use futures prices, if price changes are zero. Empirically, C_{it} and $r_{i,t+1}$ are positively correlated in all asset classes that we study, which is one of the key puzzles in the international finance literature, see for instance Hansen and Hodrick (1980) and Fama (1984). Koijen, Moskowitz, Pedersen, and Vrugt (2013) extend this evidence to other asset classes such as equities, commodities, credits, fixed income, and options.

Using the decomposition in (8), we decompose the return on the strategies as

$$\sum_{i=1}^{N_t} w_{it}^j r_{i,t+1} = \sum_{i=1}^{N_t} w_{it}^j \left(\frac{P_{i,t+1} - P_{it}}{F_{it}} \right) + \sum_{i=1}^{N_t} w_{it}^j C_{it}, \tag{9}$$

where $j = XS, TS$. We average each of the terms and report the decomposition in Table 8. We report the cross-sectional and time-series strategies for each asset class in the first six columns, followed by a combined cross-sectional and time-series strategy in the next two columns, and the global survey factor in the final column. As before, we set $k = 3$ month.

For all strategies, survey expectations not only negatively predict future excess returns ($\overline{xr}$), but also price changes ($\bar{r}$). For six out of the nine strategies, survey expectations are also negatively correlated with the (contemporaneous) carry ($\overline{C}$). For all cross-sectional strategies, the correlation between survey expectations and carry is negative. This means that survey respondents expect the market to take back part of the carry: When the carry is high, survey respondents expect future price changes to be low. The results in Koijen, Moskowitz, Pedersen, and Vrugt (2013) show that in all three asset classes that we consider, carry and future price changes are uncorrelated or positively correlated, which is inconsistent with the expectations of survey respondents.

3.5. Survey Determinants and Return Predictability

In Section 2, we regress survey expectations of returns on lagged returns, survey expectations of economic growth, the VIX, and a global business cycle indicator. These determinants, which are motivated by various theoretical models, explain between 41-46% of the variation in survey expectations of returns (see Table 3). In this section, we have shown that survey expectations of returns predict future returns with the negative sign both in the cross section and in the time series.

The natural next question is whether the predictability of future returns is due to the predicted component of (5), $\alpha_0 + \alpha_1 \widetilde{R}_{i,q-1}(\tau) + \alpha_2 Growth_{i,q} + \alpha_3 VIX_{q-1} + \alpha_4 GBC_q$, or due to the residual, $u_{i,q}$. This decomposition may also have interesting implications for theoretical models that focus on past returns, growth expectations, macro-economic risk or business cycle conditions to explain variation in risk premia.

As before, we form cross-sectional and time-series strategies. For the cross-sectional strategies, we use weights that are linear in survey expectations so that we obtain an exact decomposition of the average returns. In Table 9, Panel A, we present the average returns to the survey-based strategies, S, a strategy using linear weights based on the predicted component, S^E, and on the residual, S^U.

If we focus on $k = 3$ months, we find that a substantial part of the predictability is due to the residual instead of the predicted component of survey expectations. For instance, for equities, we find that the average return is -6.68%, of which -2.19% can be attributed to the predictable component of survey expectations and -4.59% to the residual.

In Panel B of the same table, we decompose the returns to the time-series strategy. For the time-series strategy, we generally need to select a threshold that determines when we take a long or a short position in a given country (see Section 3). For the predicted component of survey expectations, we set the threshold to 5 as we did before. For the residual, which is mean zero by construction, we set the threshold to 0. In this case, the decomposition is by definition not exact, but the sum of S^E and S^U tends to be close to S.

Consistent with our results in Panel A for cross-sectional strategies, we find that most of the negative returns are due to the residual component of survey expectations. The time-series strategy for fixed income is an exception where the predictable component is more important than the residual with $S^E = -3.58\%$ and $S^U = -3.43\%$ for $k = 3$.

These results suggest that survey expectations of returns contain important information about future returns that is not entirely captured by lagged returns, growth expectations, macro-economic risk as measured by VIX or business cycle conditions.

Considering the determinants that we use to explain variation in survey expectations of returns, our results may not be too surprising. If all that matters for expectations are lagged returns or growth expectations, for instance, then strategies based on those signals should produce negative returns as well. We know that a strategy that sorts securities on one year of lagged returns produces positive returns, which is known as the momentum factor.

Along the same lines, in Table IA.7, which has a similar structure as Table 4, we use the survey respondents' growth expectations instead of return expectations to form the investment strategies. The Sharpe ratios are positive for four of the six strategies and range from -0.17 for the cross-sectional currency strategy to 0.61 for the time-series fixed income strategy for $k = 3$. The bottom line of each panel also shows the correlation, ρ, between the expected growth and expected return strategies. The correlations range from 52% for the cross-sectional equities strategy to -39% for the time-series fixed income strategy.

Hence, our results are not fully driven by the fact that past returns and growth expectations predict future returns and that they are related to survey expectations of returns. The fact that the residual has most predictive power for future returns has interesting implications for the design of theoretical models. Lagged returns and growth expectations, sometimes in addition to the wealth distribution, are important state variables in most models discussed in the introduction. Our results suggest that it may be worth exploring more general models of return expectations to match these facts.

One potential caveat of our analysis is that it could be the case that the predicted component of survey expectations has stronger predictive power for long-horizon returns, even though survey respondents are asked about asset prices in the next six months, which we cannot reliably test given the length of our sample.

4. Excess Volatility and Survey-Implied Expected Returns

Although we have shown that survey-based expected returns are negatively related to future realized returns in many countries and across three major asset classes, it is unclear how much of overall discount rate variation is related to variation in survey expectations.

Answering this question is challenging as true discount rates cannot be observed directly. However, since the seminal work by Shiller (1981) and Campbell and Shiller (1988b), it is well understood that fluctuations in discount rates are directly related to the observation that prices are more volatile than dividends. If surveys capture an important part of discount rate variation across countries, we would expect to see a link between excess volatility and the variation in discount rates related to survey expectations across different equity markets. The remainder of this section formalizes and tests this intuition.

4.1. Excess Volatility Across Global Equity Markets

We use a simple valuation model to motivate our measure of excess volatility. We suppress subscipts i to simplify notation. Geometric dividend growth, Δd_{t+1}, is assumed to be i.i.d.,[20]

$$\Delta d_{t+1} = g + \epsilon^d_{t+1}, \tag{10}$$

and we assume that discount rates are an AR(1),

$$\mu_{t+1} = \mu + \delta(\mu_t - \mu) + \epsilon^\mu_{t+1}, \tag{11}$$

consistent with Campbell and Cochrane (1999). Using the log-linear approximation of returns of Campbell and Shiller (1988a), it holds (see Binsbergen and Koijen (2010))

$$\begin{aligned} r_{t+1} &= \mu_t - \frac{\rho \epsilon^\mu_{t+1}}{1-\rho\delta} + \epsilon^d_{t+1} \\ &\equiv r^\mu_{t+1} + \epsilon^d_{t+1}, \end{aligned} \tag{12}$$

where $\rho < 1$, but close to one, is the log-linearization constant of Campbell and Shiller (1988a).[21] By computing the variance of returns in (12) and scaling it by the variance of dividend growth, we obtain a simple measure of excess variance

$$\frac{Var(r_{t+1})}{Var(\Delta d_{t+1})} = 1 + \frac{Var(r^\mu_{t+1}) - \phi Cov(\epsilon^\mu_{t+1}, \epsilon^d_{t+1})}{Var(\Delta d_{t+1})}, \tag{13}$$

where $\phi = \rho(1-\rho\delta)^{-1}$. If discount rates do not fluctuate over time, that is, $Var(\epsilon^\mu_{t+1}) = Var(\mu_t) = 0$ and hence $Var(r^\mu_{t+1}) = 0$, then the variance ratio is equal to 1. Deviations from 1 are related to variation in discount rates and the covariation of discount rates with dividend growth rates.

Because of the covariance term, $Cov(\epsilon^\mu_{t+1}, \epsilon^d_{t+1})$, the ratio in (13) could in theory be decreasing in the variance of discount rates. In most theoretical models, however, the covariance between cash flow innovations and shocks to actual discount rates is negative. For instance, in the Campbell and Cochrane (1999) model, risk aversion and risk premia rise when consumption and dividends fall. In Appendix A, we show that the variance ratio in (13) is

[20] It is possible to derive similar expressions if dividend growth rates are somewhat predictable, see for instance Lettau and Ludvigson (2005) and Binsbergen and Koijen (2010).

[21] Formally, $\rho = \exp(\overline{pd})/(1+\exp(\overline{pd}))$, where $\overline{pd} \equiv E(pd_t)$ and pd_t denotes the log price-dividend ratio.

increasing in $Var(\mu_t)$ as long as

$$\rho_{\mu d} < \frac{\sigma(\epsilon^{\mu}_{t+1})}{\sigma(\epsilon^{d}_{t+1})} \frac{1+(1-\delta^2)\phi^2}{(1-\delta^2)\phi}, \tag{14}$$

where $\sigma(x_t)$ denotes the time-series volatility of x_t and $\rho_{\mu d}$ the time-series correlation between ϵ^{μ}_{t+1} and ϵ^{d}_{t+1}. The right-hand side of (14) is positive and this condition is therefore surely satisfied as long as discount rate shocks and cash flow shocks are negatively correlated. In what follows, we assume that the (weaker) condition in (14) is satisfied.

As it is easier to interpret standard deviations in what follows, we take the square root of (13) and define a measure of excess volatility for country i as

$$EV_i = \frac{\sigma(r_{it})}{\sigma(\Delta d_{it})}. \tag{15}$$

Taking the square root of (13) does not change its economic interpretation. To avoid seasonalities in dividends, we compute annual dividends by summing monthly dividends for 12 months following Fama and French (1988).[22] We then use annual returns and dividend growth to measure excess volatility for each country.

To estimate whether cross-country variation in excess volatility is mostly driven by variation in the volatility of returns or dividend growth, we compute the following variance decomposition

$$100\% \;= \frac{Cov(\ln EV_i, \ln\sigma(r_{it}))}{Var(\ln EV_i)} + \frac{Cov(\ln EV_i, -\ln\sigma(\Delta d_{it}))}{Var(\ln EV_i)}, \tag{16}$$

where the (co)variance terms are estimated across countries.

In Table 10, in the column labeled "1998-2011 geometric," we report EV_i and for each country in our sample.[23] In most countries, the volatility of returns exceeds the volatility of dividend growth. For instance, in the United States, Canada, and Hong Kong, returns are twice or three times as volatile as dividend growth. However, in Italy and Switzerland, the volatility of returns is actually lower than the volatility of dividend growth.

In the bottom two lines of the table, we use (16) to decompose the cross-sectional variation in excess volatility measure. As it turns out, most of the variation is due to differences in the

[22] We obtain annual dividends by computing monthly dividend levels from MSCI country price and total return indices and then sum monthly dividends within each year to obtain dividend levels at the annual frequency. Dividend levels in month t are computed as $(R^{TR}_t - R^{PI}_t)PI_{t-1}$ where R^{TR}_t and R^{PI}_t denote the return on the total return index and price index, respectively, and PI denotes the price index level. Since we require a full year of data to compute excess volatility.

[23] Our returns data ends in September 2012, which is why we omit 2012 from these calculations.

volatility of dividend growth, which is not associated with similar cross-sectional differences in the volatility of stock returns. The question is whether in those countries where the difference between return volatility and dividend growth volatility is largest, survey expectations, as so far as related to true discount rates, are more volatile as well. This fact is of independent interest to the international macro-finance literature regardless of the link to surveys that we document in the next section.

As our sample from 1998 until 2011 is fairly short, one may be worried that the dispersion in excess volatility is specific to our sample. We therefore compute the excess volatility measure for a longer sample from 1983 until 2011. Although the sample for Spain and Hong Kong starts later, we have data going back to 1983 for all other countries. The column "1983-2011, geometric" reports the excess volatility measure, as well as the correlation with the excess volatility measure over the shorter sample. The correlation is 87%, suggesting that the excess volatility measures are quite stable over time (the correlation between the ranks is 85%).

Lastly, as all of our predictability results are for arithmetic instead of geometric returns, we also compute the excess volatility measure using arithmetic returns. The results are presented in the column labeled '1998-2011, arithmetic." Moving from geometric to arithmetic returns hardly changes the ratio and the correlation is 98%. For consistency with the predictability results, we will use arithmetic returns in the next section, but our results do not depend on this choice.

4.2. Excess Volatility and Discount Rate Variation Related Survey Expectations

Our goal is to estimate the amount of discount rate variation that can be related to survey expectations of returns. To this end, we start with a simple panel model,

$$R_{i,q+1} = \alpha + \beta_1 S_{i,q} + \varepsilon_{i,q+1}. \tag{17}$$

We run the panel regression on a quarterly frequency (in calendar time) so that it corresponds to our benchmark survey portfolios above (with $k = 3$ months or $q = 1$ in quarters) and we use the full sample period for all countries.

The discount rate variation related to survey-implied expected returns is given by

$$E[R_{i,q+1} \mid S_{i,q}] = \alpha + \beta_1 S_{i,q}.$$

We compute the variation in discount rates related to survey expectations as

$$\sigma(E[R_{i,q+1} \mid S_{i,q}])$$

for each country i. In this simple model, this measure coincides with the time-series variation in survey expectations for each country, $\sigma(S_{i,q})$.

We employ returns and dividends based on MSCI country indices in local currency for the excess volatility computation and the panel regressions as the dividend data for the indices underlying the futures returns are imprecise in both Bloomberg and Datastream. Using MSCI country indices is equally relevant as surveys ask for "share prices" in a particular country with no reference to a specific index.

Figure 7 shows a scatter plot with our measure of excess volatility on the vertical axis and the variation in discount rates related to survey expectations on the horizontal axis. We find a strong positive link between these measures with a cross-country correlation of 81%. For instance, the returns in Hong Kong are three times as volatile as dividend growth and the amount of discount rate variation associated with survey expectations is almost 50% higher than in Switzerland, where returns are about as volatile as dividend growth. This implies that countries with higher excess volatility also have a higher variation in discount rates related to surveys. These results also suggest that survey-implied expected returns are correlated with an important part of overall discount rate variation.

To illustrate that this result is not mechanically driven by, for instance, differences in return volatility across countries, we repeat this exercise but now replace the survey scores in (18) with either the carry (top left panel), momentum (top right panel) or value scores (bottom panel) in Figure 8. In case of carry, the correlation is 0%, for momentum it is -2%, and for value it is -50%, implying that the link that we find between discount rate variation related to surveys and excess volatility appears to be weaker or absent for other well-known predictors of returns.

To further illustrate the robustness of the result, we consider a more general panel in which both the level as well as the rank of the signal, as measured by $w_{i,q}^{XS}(1)$, can predict future returns,

$$R_{i,q+1} = \alpha + \beta_1 S_{i,q} + \beta_2 w_{i,q}^{XS}(1) + \varepsilon_{i,q+1}. \tag{18}$$

This model is motivated by the fact that we show that survey expectations of returns predict returns both in the time series and in the cross section. By including both the level of surveys as well as the cross-sectional rank, we extract most information from surveys to predict future returns. We now compute the discount rate variation associated with surveys as

$$\sigma(E[R_{i,q+1} \mid S_{i,q}, w_{i,q}^{XS}(1)]) = \sigma(\beta_1 S_{i,q} + \beta_2 w_{i,q}^{XS}(1)).$$

The results are presented in Figure IA.1. Also when including the cross-sectional signal, we find a strong link between discount rate variation related to surveys and our excess volatility measure. The cross-sectional correlation equals 72%. In Figure IA.2, we repeat the same exercise for carry, momentum, and value. The correlations remain low and vary between -31% (value) and 3% (carry).

5. Conclusions

Survey expectations of returns predict future returns negatively both in the cross section and in the time series in three major asset classes: global equities, currencies, and global fixed income. The negative returns of survey-based strategies are not explained by traditional factors such as the market portfolio or carry, momentum, and value strategies.

Survey-based expected returns are positively related to lagged returns in all asset classes. We also uncover a connection to growth expectations and macro-economic risk as measured by the VIX for equities (positive) and fixed income (negative). Even if we account for all these determinants suggested by theoretical models, we can only explain about 40% of the variation in survey expectations of returns. We show in addition that the residual component that is not spanned by these determinants is important to predict future returns.

In the last part of the paper, we link excess volatility across global equity markets to the amount of discount rate variation that is related to survey expectations of returns. First, regardless of the link to survey expectations, we document that there is a significant amount of heterogeneity in excess volatility across countries. It is well known that in the United States, the volatility of returns is about twice as high as the volatility of dividend growth. However, in for instance Italy and Switzerland, returns and dividend growth rates are about equally volatile.

Across countries, there is more variation in dividend growth volatility than there is variation in return volatility. We show that in those countries where the difference between return volatility and dividend growth volatility is particularly large, the variation in discount rates related to survey expectations is particularly high as well. This result is unique to surveys and we do not find the same result using other well-known predictors of returns, such as carry, momentum, and value.

At the minimum, our results suggest that survey expectations of returns are important state variables that capture variation in global risk premia. Under the assumption that survey expectations of returns correspond to actual expectations of a non-trivial group of investors, our findings can have interesting implications for the design of theoretical models.

First, most models focus on a single market and on a single asset class. We think it would be interesting to consider more general models of beliefs that extend to a cross-section of assets and multiple asset classes. Such a model would also be able to speak to our results on the cross-section of excess volatility. Second, our results suggest that the residual component of survey expectations of returns, which is not spanned by past returns, growth expectations, the VIX, and business cycle conditions, is important to predict future returns. It would interesting to explore which models of beliefs can reproduce this result.

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A. Condition on the Correlation Between Discount Rates and Cash Flows

In this appendix, we derive the condition in (14). The variance ratio in (13) can be written as

$$\frac{Var(r_{t+1})}{Var(\Delta d_{t+1})} = 1 + \frac{Var(\mu_t)(1+(1-\delta^2)\phi^2) - Var(\mu_t)\phi\rho_{\mu d}\sigma_d\sigma_\mu^{-1}(1-\delta^2)}{\sigma_d^2}, \tag{19}$$

where $\sigma_z = \sigma(\epsilon_{t+1}^z)$ with $z = \mu, d$. This implies that

$$\frac{\partial\left\{Var(r_{t+1})/Var(\Delta d_{t+1})\right\}}{\partial Var(\mu_t)} > 0, \tag{20}$$

if

$$\rho_{\mu d} < \frac{\sigma_\mu}{\sigma_d}\frac{1+(1-\delta^2)\phi^2}{(1-\delta^2)\phi}. \tag{21}$$

If we make the additional approximation that $\rho \simeq 1$, then it follows

$$\frac{\sigma_\mu}{\sigma_d}\frac{1+(1-\delta^2)\phi^2}{(1-\delta^2)\phi} \simeq \frac{\sigma_\mu}{\sigma_d}\frac{1+(1+\delta)(1-\delta)^{-1}}{1+\delta}. \tag{22}$$

B. Data Sources

Dividends and returns for excess volatility. We employ MSCI country index returns to compute dividends for the 13 countries in our sample which are used for the excess volatility computations. Table A.1 lists the corresponding Datastream data codes. More specifically, we first compute monthly dividends from the total return index (TR) and price index (PI) for each country, sum the monthly dividends within each year, and then compute annual dividend growth rates. Both dividends and returns are in local currency.

Surveys. As mentioned in the data section, we employ survey scores from the World Economic Survey (WES) which can be downloaded from Datastream at a quarterly frequency. Table A.1 lists the corresponding mnemonics for equities, foreign exchange, interest rates, and growth surveys.

Global business cycle indicator. We employ a global business cycle indicator in Table 3 which is based on data from the Economic Cycle Research Institute (ECRI), available at `www.businesscycle.com`. For each country with available data, we construct a time series of recession dummies (which equals one during a recession and zero otherwise). We then average the recession indicators across all countries to obtain the global business cycle indicator (denoted GBC in the table). Note that the GBC is asset-specific, e.g. for equities we average the individual recession indicators across the 13 countries for which we have equity futures returns. ERCI recession dummies are available for the full sample period since 1983 for all countries except Belgium, Denmark, Hong Kong, Ireland, the Netherlands, Norway, and Portugal.

Value measures. We build value measures for equities, currencies, and fixed income as in Asness, Moskowitz, and Pedersen (2013). Equity value is based on book-to-market ratios, currency value is based on (the negative of) 5-year changes in real exchange rates, and fixed income value is based on 5-year changes in 10-year bond yields. For equities, we splice MSCI country index book-to-market ratios from Datastream (until June 2010) and Bloomberg (from July 2010). For currencies, we download CPI data from Datastream to compute real exchange rates. 10-year government bond yields are based on combining the yield data by Jonathan Wright (`http://econ.jhu.edu/directory/jonathan-wright/`) and yields from Bloomberg as in Koijen, Moskowitz, Pedersen, and Vrugt (2013).

Table A.1 lists the corresponding Bloomberg and Datastream mnemonics.

Table A.1. Data codes

This table lists Bloomberg tickers and Datastream menmonics for data used in the paper. MSCI PI and MSCI TR list Bloomberg codes for MSCI price index and total return index series (in local currency and converted to USD) for the 13 equity markets in our sample. We use these data to construct dividends. The next four columns list Datastream menmonics for WES surveys series. The interest rate surveys are used to construct fixed income return expectations and "Growth" refers to surveys that ask for the expected economic situation in six months. The final three columns list Datastream mnemonics for book-to-market (BM) and CPI inflation data (CPI) as well as Bloomberg tickers for 10-year fixed income yields.

	MSCI (local ccy)		MSCI (in USD)		WES survey data				Value		
Country	PI	TR	PI	TR	Equities	FX	Int. rates	Econ	BM	CPI	Yields
Australia	MSDLAS	GDDLAS	MSDUAS	GDDUAS	AUIFDSPLR	AUIFCUUSR	AUIFIRLTR	AUIFGSOFR	MSAUSTL	AUCONPRCF	F12710y
Austria						OEIFCUUSR		OEIFGSOFR		OECONPRCF	
Belgium						BGIFCUUSR		BGIFGSOFR		BGCONPRCF	
Canada	MSDLCA	GDDLCA	MSDUCA	GDDUCA	CNIFDSPLR	CNIFCUUSR	CNIFIRLTR	CNIFGSOFR	MSCNDAL	CNCONPRCF	F10110y
Denmark						DKIFCUUSR		DKIFGSOFR		DKCONPRCF	
EMU						EMIFCUUSR		EMIFGSOFR		EMCONPRCF	
France	MSDLFR	GDDLFR	MSDUFR	GDDUFR	FRIFDSPLR	FRIFCUUSR		FRIFGSOFR	MSFRNCL	FRCONPRCE	
Germany	MSDLGR	GDDLGR	MSDUGR	GDDUGR	BDIFDSPLR	BDIFCUUSR	BDIFIRLTR	BDIFGSOFR	MSGERML	BDCONPRCF	F91010y
Hong Kong	MSDLHK	GDDLHK	MSDUHK	GDDUHK	HKIFDSPLR			HKIFGSOFR	MSHGKGL		
Ireland						IRIFCUUSR		IRIFGSOFR		IRCONPRCF	
Italy	MSDLIT	GDDLIT	MSDUIT	GDDUIT	ITIFDSPLR	ITIFCUUSR		ITIFGSOFR	MSITALL	ITCONPRCF	
Japan	MSDLJN	GDDLJN	MSDUJN	GDDUJN	JPIFDSPLR	JPIFCUUSR	JPIFIRLTR	JPIFGSOFR	MSJPANL	JPCONPRCE	F10510y
Netherlands	MSDLNE	GDDLNE	MSDUNE	GDDUNE	NLIFDSPLR	NLIFCUUSR		NLIFGSOFR	MSNETHL	NLCONPRCF	
New Zealand						NZIFCUUSR	NZIFIRLTR	NZIFGSOFR		NZCONPRCF	F25010y
Norway						NWIFCUUSR	NWIFIRLTR	NWIFGSOFR		NWCONPRCF	F26610y
Portugal						PTIFCUUSR		PTIFGSOFR		PTCONPRCF	
Spain	MSDLSP	GDDLSP	MSDUSP	GDDUSP	ESIFDSPLR	ESIFCUUSR		ESIFGSOFR	MSSPANL	ESCONPRCF	
Sweden	MSDLSW	GDDLSW	MSDUSW	GDDUSW	SDIFDSPLR	SDIFCUUSR	SDIFIRLTR	SDIFGSOFR	MSSWDNL	SDCONPRCF	F25910y
Switzerland	MSDLSZ	GDDLSZ	MSDUSZ	GDDUSZ	SWIFDSPLR	SWIFCUUSR	SWIFIRLTR	SWIFGSOFR	MSSWITL	SWCONPRCF	F25610y
U.K.	MSDLUK	GDDLUK	MSDUUK	GDDUUK	UKIFDSPLR	UKIFCUUSR	UKIFIRLTR	UKIFGSOFR	MSUTDKL	UKCONPRCF	F11010y
U.S.	MSDLUS	GDDLUS	MSDLUS	GDDLUS	USIFDSPLR		USIFIRLTR	USIFGSOFR	MSUSAML	USCONPRCE	F08210y

Table 1. Summary statistics

This table reports averages and standard deviations (in parentheses) for asset returns and survey scores. Survey scores are on a scale from 1 to 9, where 5 means ”no change” and values below 5 mean ”declining” and values above 5 mean ”increasing”. Column “Sample” shows the first month in the sample for which both returns and survey expectations are available. Average returns and return volatilities are annualized. The sample ends in September 2012.

	Sample	Returns	Surveys
Equities			
U.S.	1998/04	1.90	6.43
		(16.45)	(1.02)
Canada	1999/10	5.72	6.62
		(15.79)	(1.03)
U.K.	1998/04	0.15	5.88
		(14.97)	(1.07)
France	1998/04	1.02	6.47
		(19.73)	(0.88)
Germany	1998/04	2.86	6.72
		(23.53)	(0.88)
Spain	1998/04	1.93	6.03
		(22.28)	(0.80)
Italy	2004/04	-1.41	6.27
		(21.12)	(0.66)
Netherlands	1998/04	-0.24	6.72
		(21.46)	(1.02)
Sweden	2005/03	8.53	6.43
		(19.04)	(0.83)
Switzerland	1998/04	0.68	6.50
		(16.43)	(0.79)
Japan	1998/04	-1.88	6.32
		(20.70)	(0.97)
Hong Kong	1998/04	8.62	6.29
		(25.83)	(1.53)
Australia	2000/06	3.65	6.00
		(13.20)	(1.19)
Currencies			
Australia	1989/01	4.10	4.72
		(11.70)	(1.45)
Austria	1997/02	-2.64	4.97
		(8.70)	(0.94)
Belgium	1997/02	-2.69	5.07
		(8.67)	(1.11)
Canada	1989/01	1.73	4.39
		(7.52)	(2.18)
Denmark	1989/01	2.13	5.04
		(10.72)	(1.61)
Euro	1999/02	1.20	4.75
		(10.83)	(1.75)
France	1989/01	2.89	6.79
		(10.62)	(1.36)
Germany	1989/01	1.64	6.35
		(10.83)	(1.60)
Currencies (continued)			
Ireland	1997/02	-2.50	4.48
		(8.89)	(1.37)
Italy	1989/01	2.50	4.88
		(10.83)	(1.28)
Japan	1989/01	-0.08	4.94
		(11.13)	(1.15)
Netherlands	1989/01	1.55	5.94
		(10.74)	(1.65)
New Zealand	1989/01	4.56	5.00
		(11.61)	(1.43)
Norway	1989/01	2.84	4.38
		(11.04)	(1.43)
Portugal	1997/02	-2.26	3.14
		(8.42)	(1.78)
Spain	1997/02	-1.48	3.02
		(8.52)	(1.10)
Sweden	1989/01	1.76	4.42
		(11.77)	(1.72)
Switzerland	1989/01	1.28	5.49
		(11.64)	(1.93)
U.K.	1989/01	1.83	5.20
		(9.66)	(1.13)
Fixed Income			
Australia	1998/04	2.72	3.96
		(8.90)	(1.60)
Canada	1998/04	4.74	3.86
		(6.79)	(1.44)
Germany	1998/04	4.81	3.60
		(6.95)	(1.02)
U.K.	1998/04	3.92	4.23
		(7.68)	(1.31)
Japan	1998/04	3.22	3.77
		(5.26)	(1.12)
New Zealand	2003/07	3.30	3.75
		(8.59)	(1.36)
Norway	1998/04	3.84	3.66
		(9.08)	(2.05)
Sweden	1998/04	4.30	3.79
		(7.48)	(1.53)
Switzerland	1998/04	4.13	3.81
		(5.44)	(1.08)
U.S.	1998/04	5.84	3.95
		(10.10)	(1.31)

Table 2. Survey correlations across asset classes and survey principal components

This table reports the correlation of equity, currency, and fixed income returns surveys across asset classes within countries in Panel A. We report the average correlation coefficient across all countries to provide an aggregate correlation measure. Numbers in parentheses are standard deviations of correlation coefficients across countries. Panel B reports the share of explained variance from a principal components analysis. For each asset class, we compute the principal components across all countries and report results for the first three principal components. The sample is quarterly from 1998Q2 – 2012Q3 for all three asset classes in Panel A. In Panel B, the sample is quarterly from 1998Q2 – 2012Q3 for equities and fixed income and from 1989Q1 – 2012Q3 for currencies.

	Panel A. Correlation of return surveys		
	Equities	Foreign exchange	Fixed income
Equities	1.00	0.06	-0.42
		(0.22)	(0.18)
Foreign exchange		1.00	-0.18
			(0.20)
Fixed income			1.00
	Panel B. Principal components		
	Equities	Foreign exchange	Fixed income
PC 1	49.85	67.70	60.73
PC 2	12.02	8.91	13.69
PC 3	8.77	3.98	7.21
PC 1+PC 2+PC 3	70.64	80.59	81.63

Table 3. Determinants of survey expectations

This table reports results for pooled regressions of survey expectations on lagged returns (exponential weighting scheme with decay parameter τ), lagged volatility (VIX), growth expectations ("Growth"), and the global business cycle (GBC). VIX denotes the S&P500 implied volatility index, "Growth" denotes survey expectations (from the same survey respondents) for the future economic situation of a country (where a higher score means "better"), and GBC is a global recession indicator which averages over individual countries' recession indicators in the cross-section. Numbers in brackets are t-statistics based on standard errors clustered by country and time. The sample is quarterly from 1998Q2 – 2012Q3 for equities and fixed income and from 1989Q1 – 2012Q3 for currencies.

	Equities				Currencies				Fixed income			
	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
Lagged returns	0.06	-0.04	-0.05	-0.05	0.81	0.82	0.81	0.82	0.22	0.22	0.15	0.18
	[3.62]	[-1.10]	[-1.56]	[-1.67]	[6.64]	[6.90]	[6.76]	[6.66]	[4.37]	[4.59]	[2.83]	[3.36]
Growth		0.39	0.35	0.34		0.03	0.03	0.06		-0.45	-0.38	-0.34
		[11.67]	[10.61]	[8.92]		[0.68]	[0.81]	[1.44]		[-6.68]	[-5.78]	[-4.33]
VIX			-0.02	-0.02			-0.01	0.00			0.04	0.02
			[-3.94]	[-3.44]			[-1.05]	[-0.19]			[3.66]	[1.76]
GBC				-0.29				0.70				1.25
				[-1.55]				[2.62]				[2.04]
R^2	0.13	0.39	0.42	0.42	0.39	0.39	0.40	0.41	0.14	0.39	0.44	0.46
τ	0.48	0.99	0.98	0.96	0.94	0.94	0.94	0.94	0.49	0.64	0.67	0.71

Table 4. Survey strategies

This table reports annualized returns, standard deviations (std), and Sharpe Ratios (SR) of survey portfolios. We report results for both cross-sectional strategies (portfolios are formed on cross-sectional ranks of survey expectations – Panel A) and time-series strategies (we go long or short in a country depending on whether survey indicate a rising or falling asset price – Panel B). We allow for a lag of $k = 1, 2, ..., 12$ months between the survey expectation and portfolio formation. Panels A and B also report results for a cross-sectional survey factor (XSF) and a times-series survey factor (TSF), respectively, where we combine the individual strategies of all three asset classes by dividing individual strategy returns by their volatilities, then average across strategies, and scale the resulting return to have an annual volatility of 10%. Panel C reports results for a Global Survey Factor (GSF) which combines all six generic strategies into one single portfolio based on the same weighting procedure. The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies and the three Survey Factors (Cross-sectional survey factor, Time-series survey factor, Global survey factor).

	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel A. Cross-sectional strategies												
Equities												
mean	-4.32	-4.70	-6.32	-4.35	-4.47	-3.93	-5.00	-4.06	-3.84	-1.32	-0.14	-0.36
std	10.03	10.06	9.45	9.71	9.50	9.82	10.06	10.22	9.78	9.53	9.14	8.98
t	[-1.64]	[-1.77]	[-2.53]	[-1.69]	[-1.77]	[-1.50]	[-1.86]	[-1.48]	[-1.46]	[-0.51]	[-0.06]	[-0.15]
SR	-0.43	-0.47	-0.67	-0.45	-0.47	-0.40	-0.50	-0.40	-0.39	-0.14	-0.02	-0.04
Currencies												
mean	-2.57	-3.27	-3.21	-2.90	-3.12	-2.78	-2.54	-2.83	-2.47	-2.83	-2.98	-3.44
std	6.01	6.08	6.19	6.20	6.15	5.94	5.88	5.84	5.92	5.97	5.86	6.06
t	[-2.08]	[-2.62]	[-2.52]	[-2.27]	[-2.46]	[-2.26]	[-2.09]	[-2.33]	[-2.00]	[-2.27]	[-2.43]	[-2.72]
SR	-0.43	-0.54	-0.52	-0.47	-0.51	-0.47	-0.43	-0.48	-0.42	-0.47	-0.51	-0.57
Fixed income												
mean	-0.76	-0.85	-2.35	-1.46	-1.35	-0.60	-1.47	-0.71	0.23	0.35	0.82	0.76
std	4.26	4.54	4.90	4.94	5.00	4.67	5.03	4.89	4.91	4.70	4.77	4.70
t	[-0.68]	[-0.71]	[-1.81]	[-1.11]	[-1.02]	[-0.48]	[-1.09]	[-0.54]	[0.17]	[0.28]	[0.64]	[0.59]
SR	-0.18	-0.19	-0.48	-0.30	-0.27	-0.13	-0.29	-0.15	0.05	0.07	0.17	0.16
Cross-sectional Survey Factor (XSF)												
mean	-5.55	-6.78	-7.17	-5.41	-5.43	-4.68	-5.38	-5.26	-3.97	-4.01	-3.69	-4.74
std	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
t	[-2.71]	[-3.30]	[-3.48]	[-2.62]	[-2.63]	[-2.26]	[-2.60]	[-2.53]	[-1.91]	[-1.92]	[-1.77]	[-2.27]
SR	-0.56	-0.68	-0.72	-0.54	-0.54	-0.47	-0.54	-0.53	-0.40	-0.40	-0.37	-0.47

(continued on next page)

Table 4. continued

	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel B. Time-series strategies												
Equities												
mean	1.21	-0.36	-0.53	0.65	2.34	1.97	1.81	0.59	-0.13	-0.29	0.67	0.14
std	12.40	12.68	12.81	13.25	13.00	12.99	12.81	12.73	12.79	13.31	13.29	13.52
t	[0.37]	[-0.11]	[-0.16]	[0.19]	[0.68]	[0.57]	[0.53]	[0.17]	[-0.04]	[-0.08]	[0.19]	[0.04]
SR	0.10	-0.03	-0.04	0.05	0.18	0.15	0.14	0.05	-0.01	-0.02	0.05	0.01
Currencies												
mean	-2.16	-2.33	-2.86	-2.56	-2.32	-1.54	-1.57	-1.81	-1.98	-2.49	-2.77	-2.38
std	5.46	5.24	5.40	5.24	5.22	5.16	5.29	5.51	5.57	5.67	5.57	5.53
t	[-1.92]	[-2.16]	[-2.57]	[-2.37]	[-2.15]	[-1.44]	[-1.43]	[-1.58]	[-1.70]	[-2.10]	[-2.38]	[-2.06]
SR	-0.39	-0.44	-0.53	-0.49	-0.44	-0.30	-0.30	-0.33	-0.35	-0.44	-0.50	-0.43
Fixed income												
mean	-3.57	-4.19	-5.12	-4.15	-3.20	-2.93	-3.25	-2.56	-2.76	-3.06	-3.23	-2.54
std	4.95	4.77	4.68	4.81	4.73	4.55	4.49	4.63	4.54	4.57	4.72	5.04
t	[-2.75]	[-3.34]	[-4.15]	[-3.25]	[-2.55]	[-2.41]	[-2.71]	[-2.06]	[-2.26]	[-2.49]	[-2.53]	[-1.86]
SR	-0.72	-0.88	-1.10	-0.86	-0.68	-0.64	-0.72	-0.55	-0.61	-0.67	-0.68	-0.51
Time-series Survey Factor (TSF)												
mean	-4.38	-5.65	-6.69	-5.30	-3.73	-2.80	-3.77	-3.97	-4.17	-5.38	-5.36	-4.55
std	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
t	[-2.14]	[-2.75]	[-3.25]	[-2.57]	[-1.80]	[-1.35]	[-1.82]	[-1.91]	[-2.00]	[-2.58]	[-2.57]	[-2.18]
SR	-0.44	-0.56	-0.67	-0.53	-0.37	-0.28	-0.38	-0.40	-0.42	-0.54	-0.54	-0.46
Panel C. Global Survey Factor (GSF)												
mean	-5.53	-6.90	-7.79	-5.95	-5.14	-4.25	-5.25	-5.31	-4.61	-5.29	-5.10	-5.33
std	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
t	[-2.69]	[-3.36]	[-3.78]	[-2.89]	[-2.49]	[-2.05]	[-2.53]	[-2.56]	[-2.21]	[-2.54]	[-2.44]	[-2.55]
SR	-0.55	-0.69	-0.78	-0.60	-0.51	-0.42	-0.53	-0.53	-0.46	-0.53	-0.51	-0.53

Table 5. Correlations of survey portfolios

This table reports correlation coefficients of returns to survey portfolios based on cross-sectional (CS) and time-series strategies in equities (EQ), currencies (FX), and fixed income (FI). The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies.

	EQ_{CS}	EQ_{TS}	FX_{CS}	FX_{TS}	FI_{CS}	FI_{TS}
EQ_{CS}		0.43	-0.11	0.15	-0.03	0.08
EQ_{TS}	0.43		-0.04	0.05	0.12	0.40
FX_{CS}	-0.11	-0.04		0.53	0.05	0.04
FX_{TS}	0.15	0.05	0.53		0.06	0.10
FI_{CS}	-0.03	0.12	0.05	0.06		0.35
FI_{TS}	0.08	0.40	0.04	0.10	0.35	

Table 6. Exposure of survey portfolios

This table reports exposures of survey portfolios to benchmark factors. We regress survey portfolio returns on a passive long benchmark, carry, momentum, and value returns for all asset classes and both cross-sectional and time-series strategies. We report results for survey portfolios of each asset class individually and for a Global Survey Factor (GSF) which combine all survey portfolios by weighting with the inverse of return volatility and then scaling the returns up to have 10% annualized volatility. We annualize the alphas and Information Ratios (IR), where the IR is the alpha divided by the residual volatility from the regression. We regress returns to cross-sectional (time-series) survey portfolios on returns to cross-sectional (time-series) carry, momentum, and value portfolios and regress the GSF on global carry, momentum, and value factors (constructed in an analogous way). Numbers in squared brackets are t-statistics based on White standard errors. The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies and the GSF.

	Cross-sectional strategies			Time-series strategies			
	EQ	FX	FI	EQ	FX	FI	GSF
α	-4.45	-1.72	-0.99	-3.27	-3.90	-2.49	-7.00
	[-1.97]	[-1.47]	[-0.57]	[-2.49]	[-3.62]	[-2.58]	[-2.98]
Passive	0.21	0.05	0.00	0.67	-0.06	-0.59	0.03
	[4.14]	[0.86]	[0.01]	[12.23]	[-0.70]	[-6.49]	[0.43]
Carry	-0.13	-0.11	-0.27	0.13	0.20	0.04	-0.06
	[-1.18]	[-1.93]	[-1.71]	[0.75]	[2.43]	[0.38]	[-0.70]
Mom	-0.04	0.01	0.30	0.13	0.15	0.08	0.06
	[-0.38]	[0.24]	[2.29]	[2.25]	[1.27]	[1.14]	[0.62]
Value	-0.29	-0.42	0.21	-0.19	-0.11	-0.18	-0.17
	[-2.79]	[-8.37]	[1.26]	[-1.59]	[-0.91]	[-1.95]	[-2.28]
R^2	0.17	0.27	0.12	0.72	0.13	0.50	0.03
IR	-0.52	-0.33	-0.22	-0.48	-0.78	-0.76	-0.72

Table 7. Survey portfolios: Long and short positions

This table reports annualized mean returns and Sharpe Ratios for survey portfolios in equities (EQ), currencies (FX), and fixed income (FI) based on the benchmark cross-sectional (XS) and time-series strategies with an implementation lag of $k = 3$ months. The upper part shows results for the overall portfolio (both long and short positions), the middle part (denoted by a $+$ superscript) shows results for portfolios that are based only on the long signals, whereas the lower part (denoted by a $-$ superscript) reports results for portfolios based only on the short signals at each point in time. The last two rows report the fraction of the overall portfolio returns that can be attributed to the long and short signals, respectively. Numbers in squared brackets are t-statistics based on Newwey/West standard errors. The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies.

	EQ		FX		FI	
	XS	TS	XS	TS	XS	TS
Mean	-6.32	-0.53	-3.21	-2.86	-2.35	-5.12
	[-2.53]	[-0.16]	[-2.52]	[-2.57]	[-1.81]	[-4.15]
SR	-0.67	-0.04	-0.52	-0.53	-0.48	-1.10
IR	-0.52	-0.48	-0.33	-0.78	-0.22	-0.76
Mean^{+}	-0.97	0.86	1.04	-0.14	3.02	-0.52
	[-0.19]	[0.23]	[0.54]	[-0.13]	[1.85]	[-0.94]
SR^{+}	-0.05	0.06	0.11	-0.03	0.49	-0.25
IR^{+}	-0.57	-0.48	-0.24	-0.78	-0.09	-0.76
Mean^{-}	-5.36	-1.38	-4.25	-2.72	-5.37	-4.60
	[-1.24]	[-1.07]	[-2.43]	[-2.64]	[-3.15]	[-3.61]
SR^{-}	-0.33	-0.28	-0.50	-0.54	-0.83	-0.95
IR^{+}	-0.38	-0.48	-0.35	-0.78	-0.29	-0.76
Share^{+}	0.15	-1.62	-0.33	0.05	-1.28	0.10
Share^{-}	0.85	2.62	1.33	0.95	2.28	0.90

Table 8. Components of survey portfolio returns

This table reports average annualized excess returns ($\overline{xr}$), price returns (simple percentage change in prices, $\overline{r}$), and carry ($\overline{C}$) for cross-sectional and time-series survey portfolios in equities, currencies, and fixed income. The last three columns refer to the combination of all cross-sectional portfolios (XSF – the Cross-sectional Survey Factor from Table 4), the combination of all time-series portfolios (TSF – the Time-series Survey Factor in Table 4), and the combination of all six portfolios (GSF – the Global Survey Factor). We combine portfolios by weighting them with the inverse of their return volatility, take the equally-weighted average, and then scale the return to have 10% annualized volatility. For the GSF portfolios, we apply the same weighting to all three components (i.e. the weighting of portfolio excess returns) so that simple returns and carry add up to the excess return. The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies.

	EQ_{CS}	EQ_{TS}	FX_{CS}	FX_{TS}	FI_{CS}	FI_{TS}	XSF	TSF	GSF
$\overline{xr}$	-6.32	-0.53	-3.21	-2.86	-2.35	-5.12	-7.17	-6.69	-7.79
t	[-2.53]	[-0.16]	[-2.52]	[-2.57]	[-1.81]	[-4.15]	[-3.48]	[-3.25]	[-3.78]
$\overline{r}$	-5.76	-0.67	-2.98	-3.15	-1.79	-4.01	-6.61	-6.75	-7.50
t	[-2.37]	[-0.20]	[-2.32]	[-2.84]	[-1.39]	[-3.28]	[-3.19]	[-3.25]	[-3.61]
$\overline{C}$	-0.57	0.14	-0.23	0.30	-0.56	-1.11	-0.57	0.06	-0.29
t	[-2.20]	[0.81]	[-1.91]	[3.41]	[-5.50]	[-10.53]	[-2.45]	[0.30]	[-1.32]

Table 9. Survey strategies: Expected versus unexpected

This table reports survey portfolio returns as in Table 4 in the main text but here we form portfolios based on survey scores (S), the expected part of survey scores (S^E) and the unexpected part of survey scores (S^U) where the expected and unexpected part are obtained from a (full sample) regression of survey scores on lagged 12-months returns, the lagged VIX, the global business cycle (ECRI recession dummies averaged across countries), as well as (contemporaneous) growth survey scores (Model (iv) in Table 3). We employ actual survey scores instead of ranks in the cross-sectional portfolios. The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies.

	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel A. Cross-sectional strategies												
Equities												
S	-6.62	-6.68	-6.78	-5.45	-5.07	-4.97	-5.62	-3.48	-3.17	-1.47	-1.75	-2.72
t	[-2.19]	[-2.20]	[-2.39]	[-1.92]	[-1.77]	[-1.69]	[-1.81]	[-1.12]	[-1.04]	[-0.52]	[-0.65]	[-1.01]
S^E	-0.64	-1.37	-2.19	-1.08	-0.66	-0.06	-0.86	-1.00	-1.14	-1.16	-0.66	-0.35
t	[-0.49]	[-1.10]	[-1.90]	[-0.98]	[-0.54]	[-0.05]	[-0.69]	[-0.84]	[-1.04]	[-1.03]	[-0.58]	[-0.29]
S^U	-5.97	-5.30	-4.59	-4.38	-4.40	-4.91	-4.76	-2.48	-2.03	-0.31	-1.09	-2.37
t	[-2.20]	[-1.93]	[-1.75]	[-1.71]	[-1.76]	[-1.93]	[-1.74]	[-0.89]	[-0.72]	[-0.12]	[-0.42]	[-0.92]
Currencies												
S	-2.83	-3.78	-4.00	-3.49	-3.05	-2.77	-2.69	-3.17	-2.66	-3.16	-3.84	-4.51
t	[-1.97]	[-2.61]	[-2.74]	[-2.39]	[-2.07]	[-1.99]	[-1.96]	[-2.30]	[-1.86]	[-2.17]	[-2.66]	[-3.12]
S^E	-0.98	-0.77	-1.28	-0.38	0.20	0.40	-0.43	-1.16	-1.06	-1.26	-1.53	-0.79
t	[-0.83]	[-0.66]	[-1.10]	[-0.33]	[0.17]	[0.35]	[-0.36]	[-0.98]	[-0.86]	[-0.89]	[-1.08]	[-0.59]
S^U	-1.85	-3.00	-2.72	-3.11	-3.26	-3.17	-2.26	-2.01	-1.59	-1.90	-2.32	-3.72
t	[-1.30]	[-2.17]	[-1.85]	[-2.20]	[-2.28]	[-2.47]	[-1.60]	[-1.41]	[-1.01]	[-1.20]	[-1.50]	[-2.47]
Fixed income												
S	-0.96	-0.53	-2.78	-1.70	-1.59	-1.25	-1.93	-1.32	-0.04	-0.10	1.12	1.35
t	[-0.75]	[-0.41]	[-2.17]	[-1.33]	[-1.24]	[-0.94]	[-1.35]	[-0.91]	[-0.03]	[-0.07]	[0.83]	[1.03]
S^E	-0.28	-0.51	-1.09	-1.15	-0.57	-1.14	-0.56	-0.37	-0.74	-0.91	-0.91	-0.58
t	[-0.46]	[-0.81]	[-1.94]	[-1.96]	[-1.00]	[-1.98]	[-0.95]	[-0.63]	[-1.33]	[-1.55]	[-1.58]	[-0.97]
S^U	-0.68	-0.02	-1.70	-0.55	-1.02	-0.11	-1.37	-0.95	0.71	0.81	2.03	1.93
t	[-0.54]	[-0.02]	[-1.33]	[-0.44]	[-0.81]	[-0.08]	[-0.94]	[-0.64]	[0.51]	[0.58]	[1.57]	[1.56]

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Table 9. continued

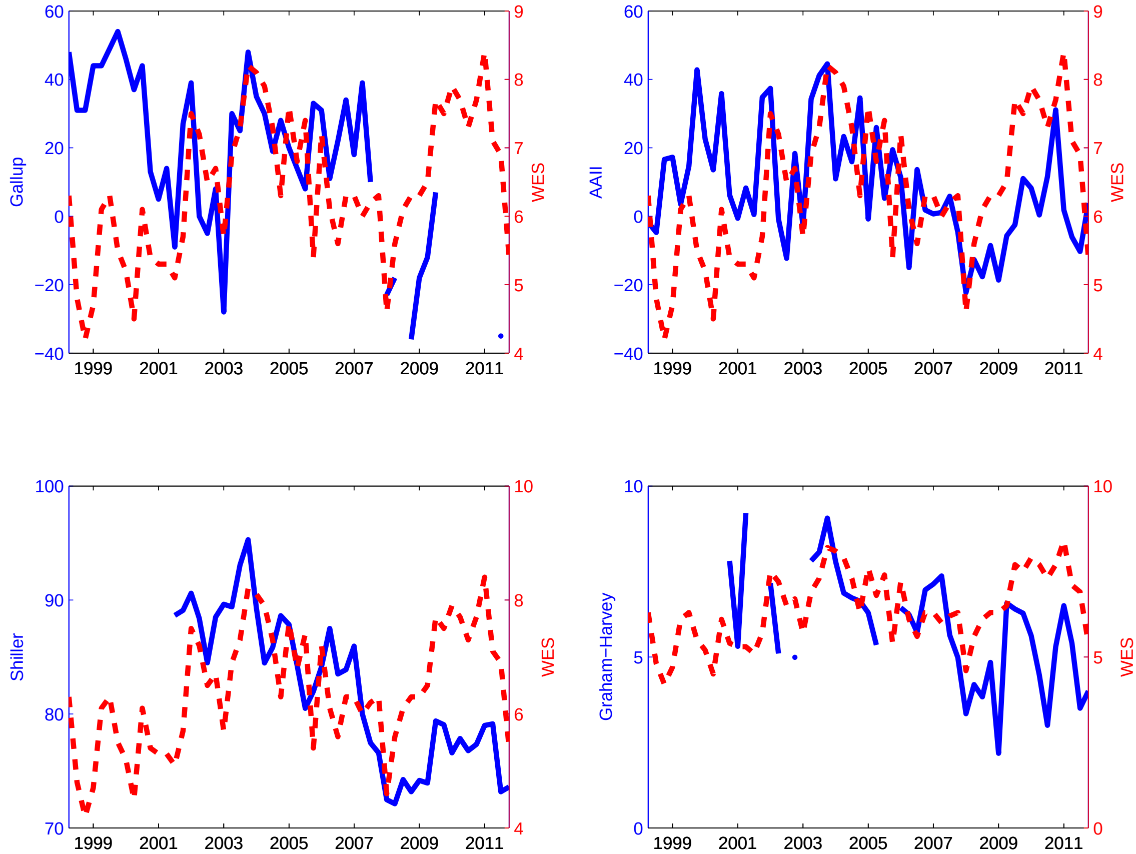
	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
	Panel B. Time-series strategies											
	Equities											
S	0.87	-0.70	-1.00	-0.22	1.31	0.94	1.10	0.19	-0.94	-1.24	-0.15	-0.35
t	[0.26]	[-0.20]	[-0.29]	[-0.06]	[0.38]	[0.27]	[0.31]	[0.05]	[-0.26]	[-0.34]	[-0.04]	[-0.09]
S^E	2.14	1.15	0.81	-0.72	-0.34	-0.32	-0.36	-0.83	-1.09	-0.21	0.00	-0.59
t	[0.52]	[0.28]	[0.20]	[-0.17]	[-0.08]	[-0.08]	[-0.09]	[-0.20]	[-0.26]	[-0.05]	[0.00]	[-0.14]
S^U	-0.49	-2.37	-3.76	-3.10	-2.89	-2.30	-1.17	1.73	1.72	1.63	0.38	0.25
t	[-0.29]	[-1.33]	[-2.11]	[-1.58]	[-1.54]	[-1.15]	[-0.60]	[0.86]	[0.82]	[0.79]	[0.19]	[0.14]
	Currencies											
S	-2.04	-2.10	-2.83	-2.47	-2.11	-1.38	-1.37	-1.70	-1.63	-2.22	-2.54	-2.19
t	[-1.72]	[-1.83]	[-2.34]	[-2.12]	[-1.81]	[-1.21]	[-1.16]	[-1.38]	[-1.32]	[-1.77]	[-2.05]	[-1.79]
S^E	0.34	-0.45	-0.81	-1.01	-0.84	-0.35	-0.37	-0.09	-0.22	-0.30	-0.34	0.22
t	[0.23]	[-0.30]	[-0.54]	[-0.67]	[-0.57]	[-0.23]	[-0.25]	[-0.06]	[-0.15]	[-0.20]	[-0.22]	[0.15]
S^U	-1.53	-1.63	-1.85	-1.62	-1.46	-0.85	-0.92	-0.92	-0.37	-0.71	-1.06	-2.29
t	[-1.53]	[-1.60]	[-1.89]	[-1.71]	[-1.54]	[-0.86]	[-0.92]	[-0.92]	[-0.37]	[-0.67]	[-1.00]	[-2.28]
	Fixed income											
S	-3.64	-4.17	-5.39	-4.16	-3.28	-3.18	-3.64	-2.89	-2.70	-3.15	-3.39	-2.72
t	[-2.75]	[-3.24]	[-4.25]	[-3.13]	[-2.51]	[-2.51]	[-2.88]	[-2.21]	[-2.09]	[-2.47]	[-2.56]	[-1.95]
S^E	-2.89	-3.21	-3.58	-3.56	-3.28	-3.64	-3.50	-3.64	-3.64	-3.57	-3.22	-3.39
t	[-1.99]	[-2.27]	[-2.50]	[-2.51]	[-2.39]	[-2.75]	[-2.63]	[-2.54]	[-2.45]	[-2.37]	[-2.15]	[-2.26]
S^U	-2.12	-2.45	-3.43	-2.28	-1.21	-0.66	-1.49	-1.05	-0.23	-0.20	0.16	0.49
t	[-2.27]	[-2.58]	[-3.62]	[-2.36]	[-1.30]	[-0.69]	[-1.47]	[-0.99]	[-0.21]	[-0.19]	[0.16]	[0.53]

Table 10. Excess volatility across countries

This table reports excess volatilities for the 13 equity markets in our sample in Panel A. Excess volatility is computed as the ratio of return volatility and dividend growth volatility, see Eq. (15). Returns and dividend growth are annual to avoid seasonalities in dividends. The first column shows excess volatilities for a sample period from 1998 − 2011 based on geometric returns and dividend growth, the second column shows excess volatilities for the period from 1983 − 2011 based on geometric returns and dividend growth, and the third column shows results for the period from 1998 – 2011 but here we use arithmetic returns and dividend growth rates. We report the cross-country correlation of excess volatilities with the baseline of geometric returns and dividend growth for the period from 1998 − 2011 in the final row of Panel A. Panel B shows a variance decomposition (*across* countries) of excess volatilities into the contributions from return volatilities and dividend growth volatilities, see Eq. (16).

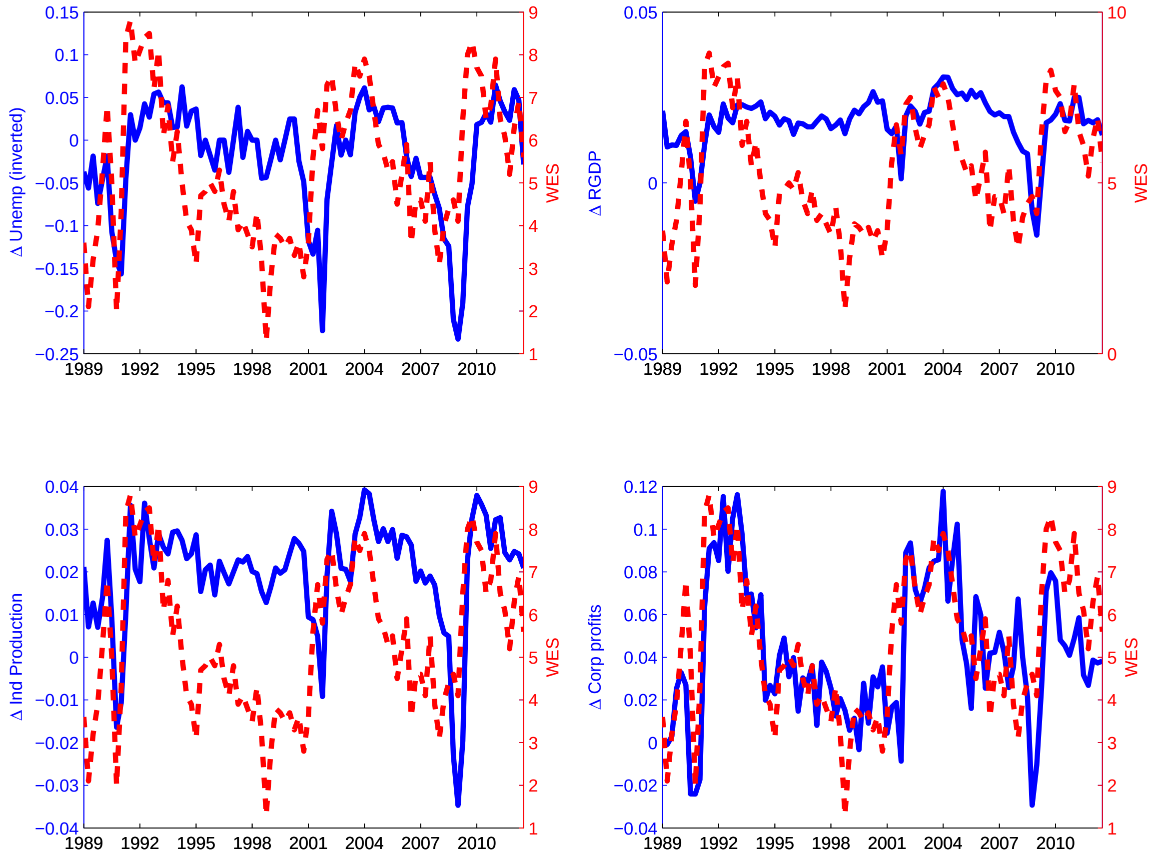
	Panel A: Excess volatilities		
	1998-2011 geometric	1983-2011 geometric	1998-2011 arithmetic
United States	2.16	2.51	2.09
Canada	2.28	2.04	2.10
United Kingdom	1.71	1.56	1.67
France	1.93	2.15	1.80
Germany	1.49	1.93	1.32
Spain	2.00	2.00	1.84
Italy	0.82	1.18	0.78
The Netherlands	1.29	1.52	1.43
Sweden	1.50	1.26	1.70
Switzerland	0.91	1.46	0.88
Japan	1.50	1.98	1.55
Hong Kong	3.06	3.06	3.05
Australia	1.81	1.54	1.69
Correlation with 1998-2011 (geometric)	100%	87%	98%
	Panel B: Variance decomposition		
% returns	6%	1%	14%
% dividend growth	94%	99%	86%

Figure 1. Comparison of survey expectations of returns



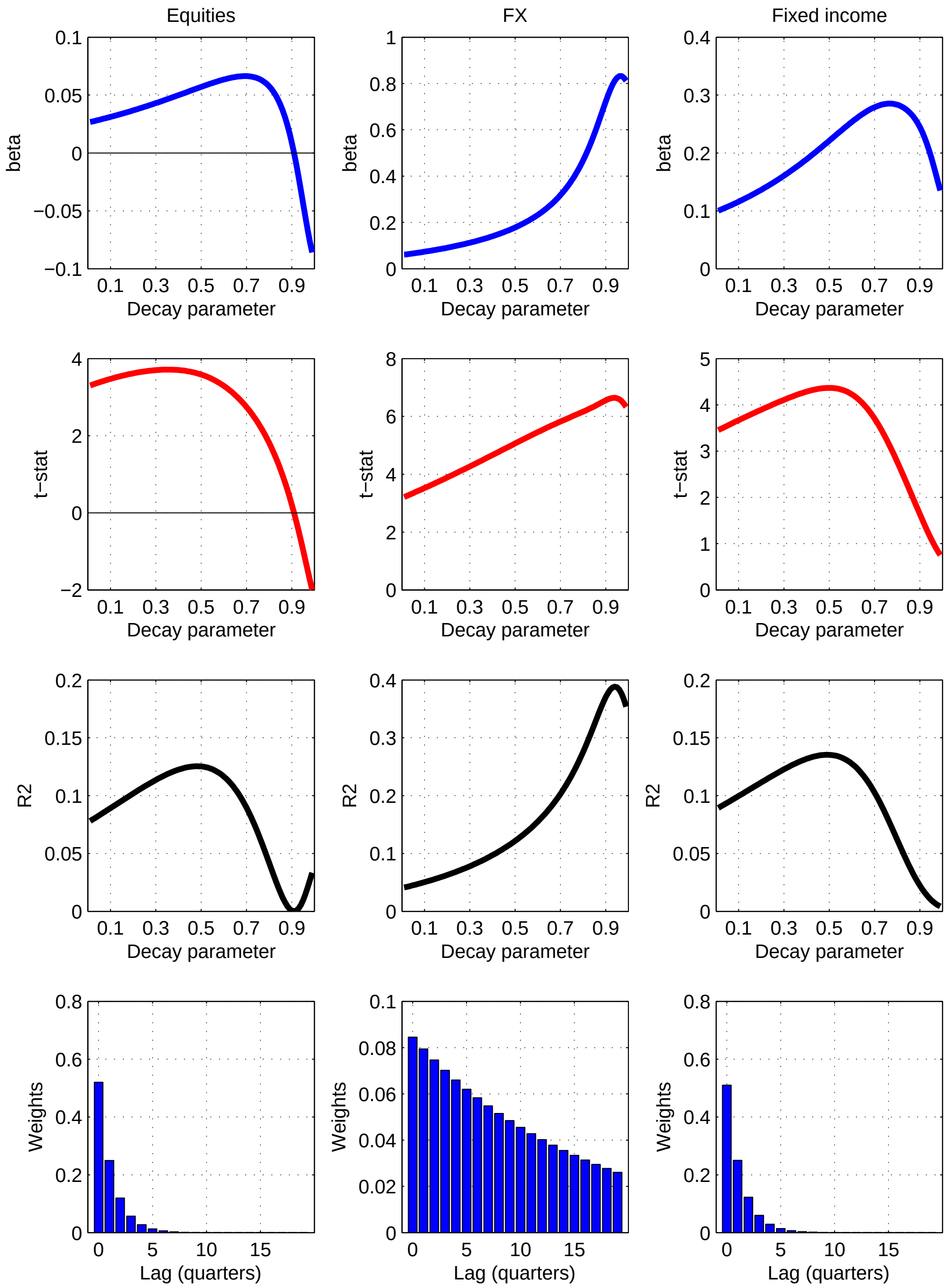
This figure shows time-series plots of survey expectations of U.S. equity returns from different sources. The red dashed line (right axis) always shows the WES U.S. equity survey whereas the blue solid line (left axis) shows survey scores/balances from the Gallup survey, American Association of Individual Investors (AAII), the Shiller survey, and the survey by Graham/Harvey. The sample is quarterly from 1998Q2 – 2012Q3.

Figure 2. Comparison of survey expectations of economic growth



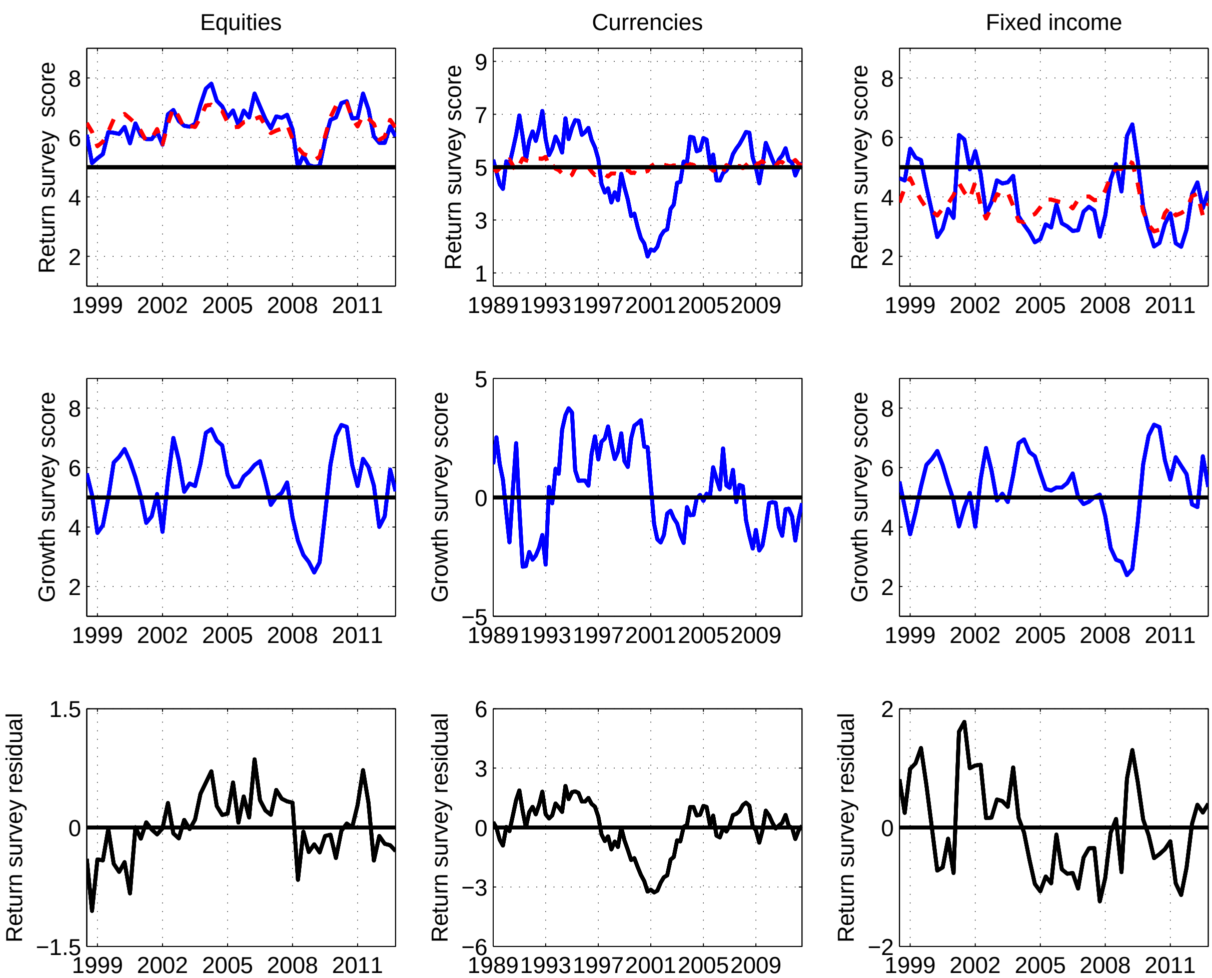
This figure shows time-series plots of survey expectations from the U.S. Survey of Professional Forecasters (SPF) and the WES growth survey. The red dashed line (right axis) in each plot corresponds to the WES survey score and the blue solid line corresponds to the expected growth rate over the next two quarters in unemployment (inverted), real GDP (RGDP), industrial production, and corporate profits. SPF forecasts are based on the median answer across forecasters. The sample is quarterly from 1989Q1 – 2012Q3.

Figure 3. Learning from returns



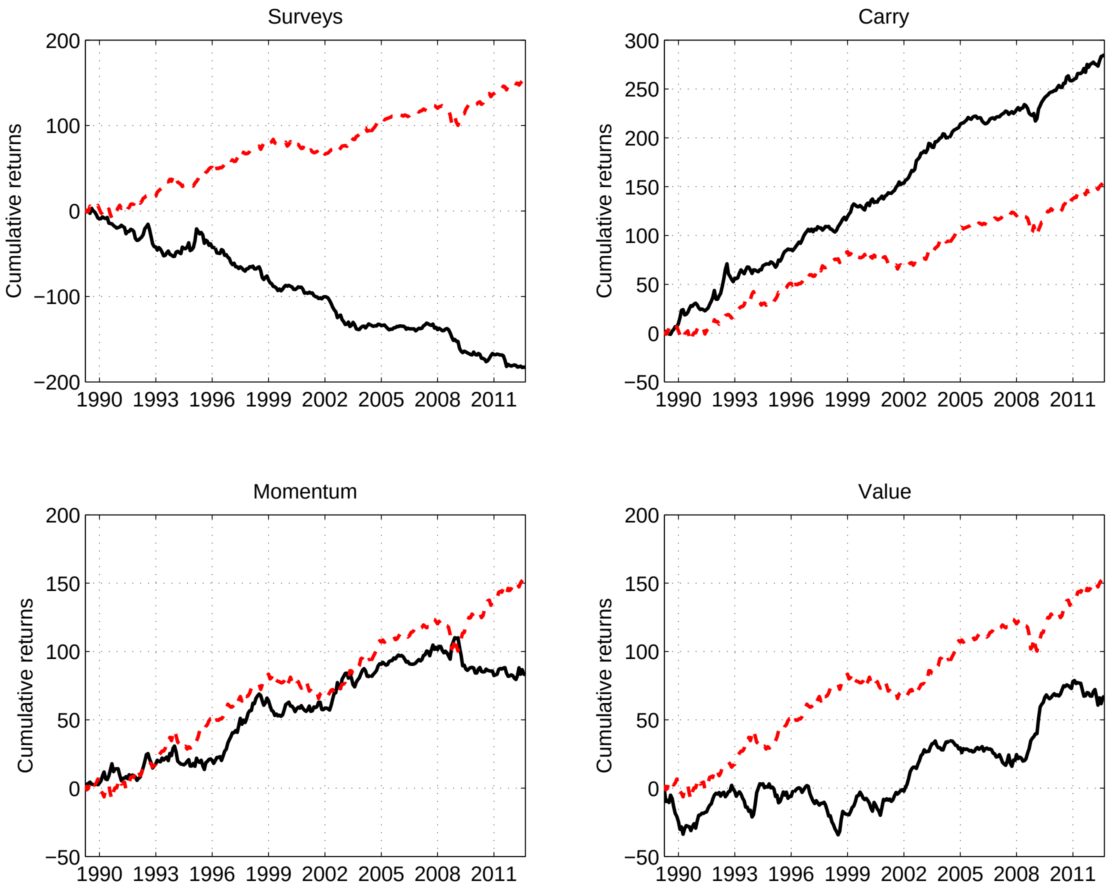
This figure shows estimated coefficients, t-statistics, and R^2s from panel regressions of survey scores on lagged returns. Lagged returns are based on an exponential weighting scheme with decay parameter τ and we let τ vary from $\tau = 0.01, 0.02, ..., 0.99$. The last row shows weights for the choice of the decay parameter τ that maximizes the R^2 of the regression. The sample is quarterly from 1998Q2 – 2012Q3 for equities and fixed income and from 1989Q1 – 2012Q3 for currencies.

Figure 4. Equity return, growth, and residual survey scores



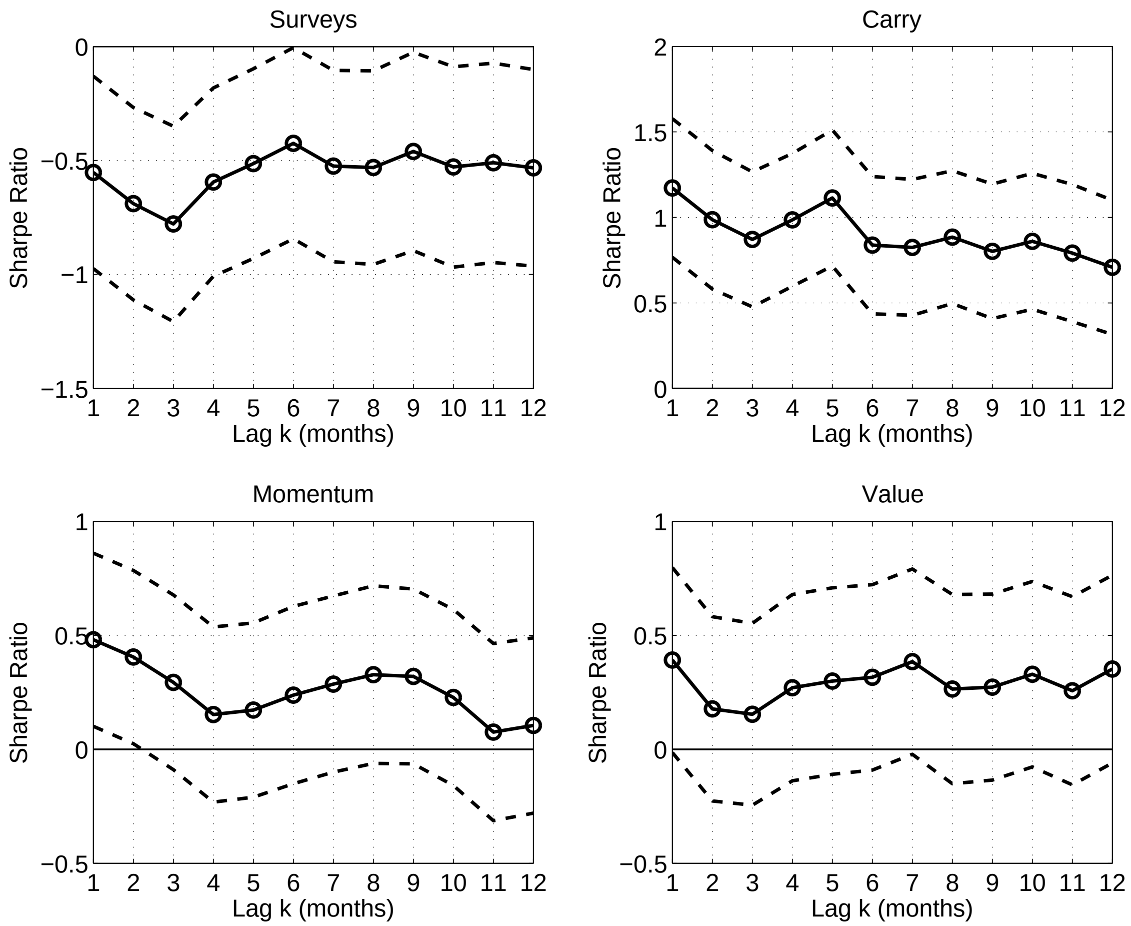
This figure shows time-series plots of survey expectations for equities (upper panel), economic growth (center panel), and the residual of a regression of return survey scores on growth survey scores (lower panel). In the upper panel, the solid line is the return survey score whereas the dashed line is the fitted return survey score (based on a regression of return surveys on growth surveys). We average these quantities across all countries/currencies in our sample in each asset class. For currencies we use the difference between the growth survey score of a respective country and the growth survey score of the U.S. The sample is quarterly from 1998Q2 – 2012Q3 for equities and fixed income and from 1989Q1 – 2012Q3 for currencies.

Figure 5. Cumulative returns of survey, carry, momentum, and value strategies



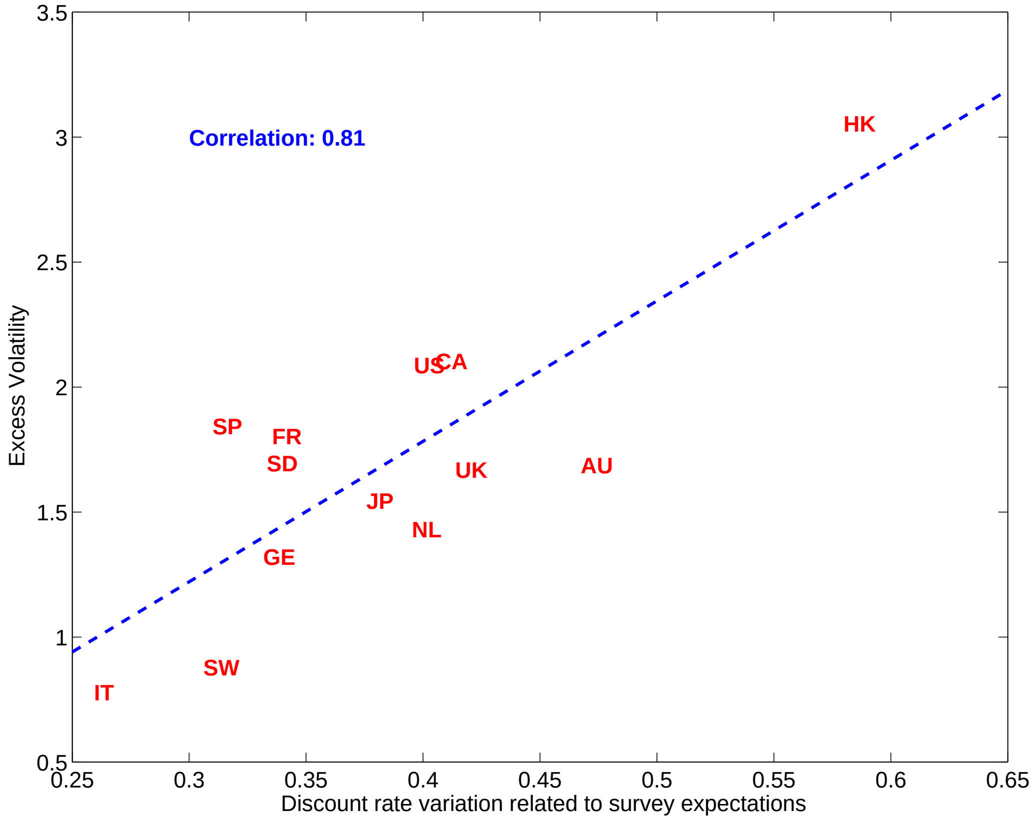
This figure shows cumulative excess returns of survey, carry, value, and momentum strategies (solid lines). We combine cross-sectional and time-series strategies and all asset classes for each strategy by dividing individual strategy returns by their volatility, then average across all strategies, and scale the resulting return to have an annual volatility of 10%. The dashed lines show cumulative returns of the passive long benchmarks which are weighted in the same way. The sample is monthly from 1989/01 – 2012/09 for all four strategies.

Figure 6. Sharpe Ratios of Survey, Carry, Momentum, and Value strategies



This figure shows annualized Sharpe Ratios for survey, carry, value, and momentum strategies (solid lines). We combine cross-sectional and time-series strategies and all asset classes for each strategy by dividing individual strategy returns by their volatility, then average across all strategies, and scale the resulting return to have an annual volatility of 10%. We plot these Sharpe Ratios for different implementation lags of $k = 1, 2, ..., 12$ months. Dashed lines correspond to 95% confidence intervals. The sample is monthly from 1989/01 – 2012/09 for all four strategies.

Figure 7. Survey expectations of returns and excess volatility

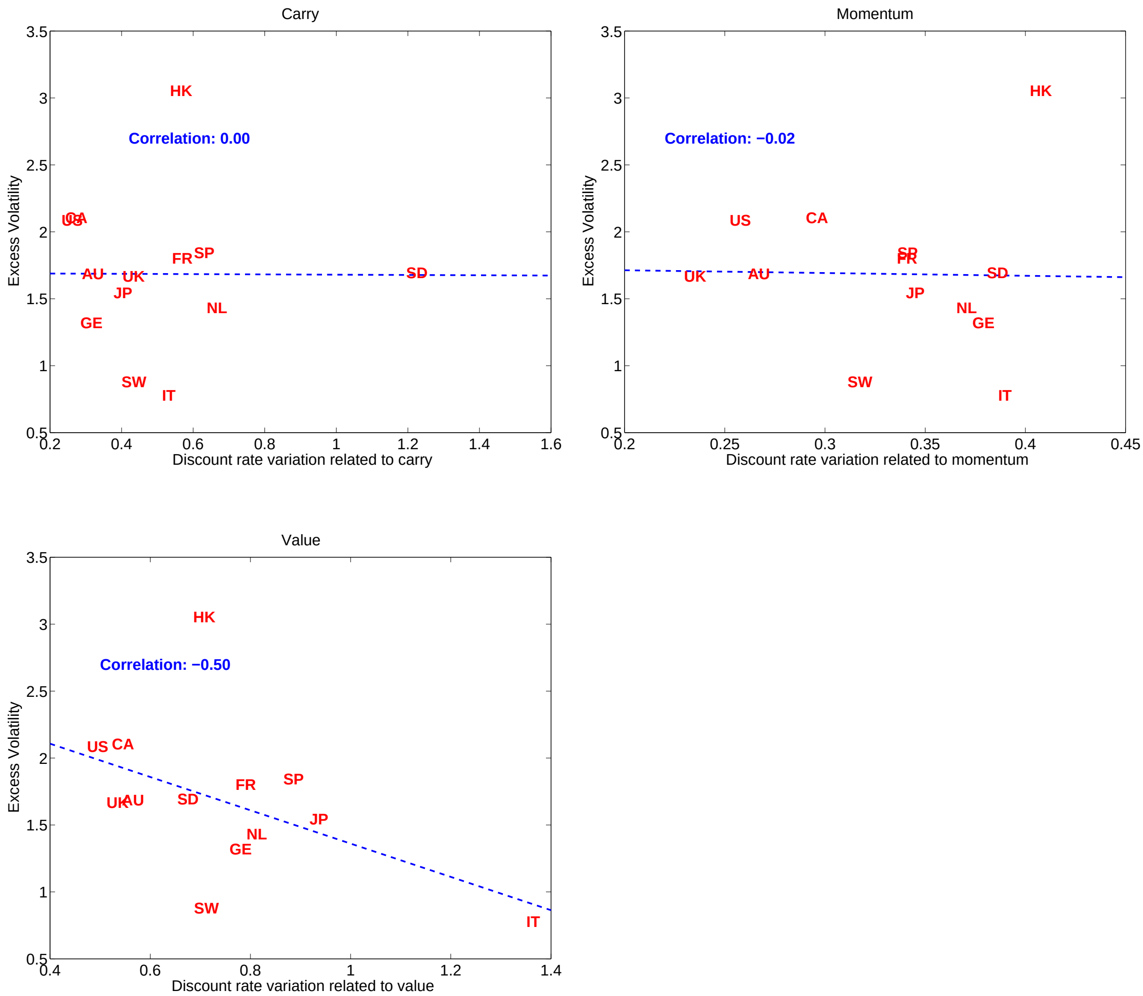


This figure shows a scatter plot of excess volatility (vertical axis) and the variation in discount rates related to survey expectations (horizontal axis). Excess volatility is computed as the ratio of the standard deviation of annual equity returns and the standard deviation of annual dividend growth. Due to the annual frequency of returns and dividends, the sample period is from 1998 – 2011. The volatility of returns related to surveys is based on the panel regression

$$R_{i,q+1} = \alpha + \beta_1 S_{i,q} + \varepsilon_{i,q+1}$$

where $R_{i,q+1}$ denotes quarterly equity returns of country i in quarter $q+1$ and $S_{i,q}$ denotes return survey scores of country i in quarter q. We then compute the variation in discount rates related to survey expectations as $\sigma(E[R_{i,q+1} \mid S_{i,q}])$ for each country i. We employ the full sample period from 1998Q2 – 2012Q3 and all return and dividend data used for this figure are based on MSCI country indices in local currency.

Figure 8. Surveys and excess volatility: Carry, momentum, and value



This Figure is similar to Figure 7 but here we use carry, momentum, or value signals ($X_{i,q}$ where X denotes either carry, momentum, or value) instead of surveys in the panel regression

$$R_{i,q+1} = \alpha + \beta_1 X_{i,q} + \varepsilon_{i,q+1}$$

to compute the volatility of returns related to surveys as $\sigma(E[R_{i,q+1} \mid X_{i,q}])$ for each country i. The sample period is annual from 1998 – 2011 for excess volatility and quarterly from 1998Q2 – 2012Q3 for the panel regression.

Internet Appendix to accompany

Survey Expectations of Returns and Asset Pricing Puzzles

(not for publication)

Table IA.1. Unconditional frequencies for survey scores

This table reports unconditional frequencies for survey scores, i.e. the frequencies with which the survey score lies within the following boundaries: $1-2, 2-3, ..., 8-9$. We report these frequencies separately for equities, currencies, and fixed income, and average over all countries within each asset class. The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies.

	Equities	Currencies	Fixed income
1-2	0.00	0.07	0.07
2-3	0.00	0.05	0.22
3-4	0.02	0.12	0.27
4-5	0.06	0.17	0.21
5-6	0.25	0.27	0.13
6-7	0.36	0.17	0.07
7-8	0.28	0.12	0.02
8-9	0.04	0.03	0.00

Table IA.2. Transition probabilities

This table reports transition probabilities for equity, currency, and fixed income survey scores where we make use of the discretization of survey scores as in Table IA.1 above. The rows correspond to the bucket at time t whereas columns correspond to the buckets at time $t+1$. The sample is monthly from 1998/04 – 2012/09 for equities and fixed income and from 1989/01 – 2012/09 for currencies.

	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9
Panel A. Equities								
1-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-3	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00
3-4	0.00	0.00	0.08	0.25	0.58	0.00	0.08	0.00
4-5	0.00	0.00	0.07	0.20	0.44	0.24	0.04	0.00
5-6	0.00	0.01	0.04	0.12	0.40	0.33	0.10	0.00
6-7	0.00	0.00	0.00	0.03	0.22	0.44	0.29	0.02
7-8	0.00	0.00	0.00	0.01	0.11	0.36	0.45	0.07
8-9	0.00	0.00	0.00	0.00	0.00	0.26	0.52	0.22
Panel B. Currencies								
1-2	0.59	0.30	0.09	0.01	0.01	0.00	0.00	0.00
2-3	0.37	0.23	0.25	0.07	0.06	0.01	0.00	0.00
3-4	0.06	0.08	0.36	0.25	0.21	0.03	0.01	0.00
4-5	0.01	0.03	0.17	0.32	0.36	0.10	0.01	0.00
5-6	0.01	0.01	0.08	0.22	0.39	0.21	0.08	0.01
6-7	0.00	0.00	0.02	0.12	0.32	0.29	0.20	0.02
7-8	0.00	0.00	0.00	0.02	0.14	0.32	0.38	0.12
8-9	0.00	0.00	0.00	0.00	0.07	0.18	0.40	0.28
Panel C. Fixed income								
1-2	0.37	0.29	0.22	0.02	0.05	0.02	0.02	0.00
2-3	0.13	0.49	0.29	0.09	0.00	0.00	0.00	0.00
3-4	0.05	0.26	0.32	0.22	0.14	0.01	0.00	0.00
4-5	0.02	0.09	0.35	0.30	0.16	0.06	0.01	0.02
5-6	0.01	0.03	0.16	0.29	0.24	0.24	0.04	0.00
6-7	0.00	0.02	0.05	0.34	0.34	0.17	0.05	0.00
7-8	0.00	0.00	0.27	0.09	0.09	0.45	0.09	0.00
8-9	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00

Table IA.3. Determinants of survey expectations: Robustness

This table reports results for regressions of survey expectations on lagged returns (12-months), growth expectations ("Growth"), and the lagged VIX. Panel A shows results for panel regressions (numbers in brackets are *t*-statistics based on standard errors clustered by country and time) whereas Panel B reports results for country-by-country time-series regressions where we average over individual country estimates (weighted by the number of observations in each country relative to all observations). The sample is quarterly from 1998Q2 – 2012Q3 for equities and fixed income and from 1989Q1 – 2012Q3 for currencies.

	Equities				Currencies				Fixed income			
	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
					Panel regressions							
Lagged returns	0.16		0.03	-0.02	0.68		0.68	0.63	0.63		0.60	0.42
	[3.13]		[0.84]	[-0.58]	[5.49]		[5.64]	[5.09]	[2.99]		[4.48]	[2.89]
Growth		0.40	0.39	0.37		-0.09		-0.02		-0.43	-0.44	-0.37
		[13.02]	[11.06]	[10.81]		[-1.33]		[-0.45]		[-7.09]	[-7.11]	[-6.54]
VIX				-0.02				-0.05				0.05
				[-3.81]				[-3.20]				[4.00]
R^2	0.09	0.38	0.39	0.41	0.15	0.01	0.15	0.20	0.08	0.24	0.34	0.41
					Weighted country-by-country regressions							
Lagged returns	0.17		0.06	0.00	0.76		0.74	0.66	0.75		0.68	0.49
	[2.45]		[0.57]	[-0.21]	[3.04]		[3.03]	[2.75]	[3.12]		[2.90]	[2.29]
Growth		0.40	0.36	0.35		-0.10	-0.03	-0.06		-0.45	-0.44	-0.35
		[6.16]	[5.82]	[5.83]		[-0.82]	[-0.28]	[-0.46]		[-4.35]	[-4.34]	[-3.68]
VIX				-0.02				-0.05				0.05
				[-1.39]				[-1.77]				[3.10]
R^2	0.15	0.39	0.44	0.48	0.20	0.04	0.23	0.29	0.16	0.26	0.39	0.49

Table IA.4. Carry strategies

This table reports annualized returns, standard deviations (std), and Sharpe Ratios (SR) of carry portfolios. We report results for both cross-sectional strategies (portfolios are formed on cross-sectional ranks of carry – Panel A) and time-series strategies (we go long or short in a country depending on whether carry is above or below zero – Panel B). We allow for a lag of $k = 1, 2, ..., 12$ months between the carry signal and portfolio formation. The sample is monthly from 1988/03 – 2012/09 for equities, from 1983/11 – 2012/09 for currencies and fixed income.

	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel A. Cross-sectional strategies												
Equities												
mean	9.57	4.50	2.17	2.02	3.61	-1.10	2.45	1.42	-0.54	1.45	2.23	1.27
std	10.48	11.48	10.45	9.40	10.17	10.77	11.07	11.32	11.04	10.35	11.15	10.91
SR	0.91	0.39	0.21	0.21	0.36	-0.10	0.22	0.13	-0.05	0.14	0.20	0.12
Currencies												
mean	4.73	4.08	3.68	3.95	3.78	3.97	3.60	3.90	3.19	3.59	2.99	3.01
std	8.01	7.97	7.90	7.83	7.79	7.76	7.89	7.87	7.78	7.81	7.82	7.71
SR	0.59	0.51	0.47	0.50	0.49	0.51	0.46	0.50	0.41	0.46	0.38	0.39
Fixed income												
mean	3.85	4.69	3.78	3.23	3.30	3.19	2.20	2.90	2.01	2.65	1.96	2.42
std	7.45	7.00	7.45	7.16	7.52	7.52	7.29	7.20	6.91	6.70	6.79	6.68
SR	0.52	0.67	0.51	0.45	0.44	0.42	0.30	0.40	0.29	0.40	0.29	0.36
Panel B. Time-series strategies												
Equities												
mean	3.85	1.35	-1.48	1.52	3.71	0.17	0.96	1.46	2.42	0.72	2.29	1.33
std	9.33	9.62	9.06	9.19	8.73	9.39	9.63	9.85	9.72	9.50	9.73	9.60
SR	0.41	0.14	-0.16	0.17	0.43	0.02	0.10	0.15	0.25	0.08	0.24	0.14
Currencies												
mean	4.29	4.05	3.84	3.94	4.28	3.68	3.36	3.36	3.52	3.18	3.19	2.75
std	5.49	5.79	5.90	5.78	5.81	5.91	6.17	5.80	5.73	5.45	5.45	5.47
SR	0.78	0.70	0.65	0.68	0.74	0.62	0.55	0.58	0.62	0.58	0.59	0.50
Fixed income												
mean	3.55	3.55	4.41	4.46	4.74	4.63	4.34	4.40	4.20	3.94	3.16	3.01
std	5.47	5.51	5.57	5.54	5.58	5.44	5.43	5.27	5.23	5.31	5.26	5.29
SR	0.65	0.64	0.79	0.81	0.85	0.85	0.80	0.83	0.80	0.74	0.60	0.57

Table IA.5. Momentum strategies

This table reports annualized returns, standard deviations (std), and Sharpe Ratios (SR) of momentum portfolios. We report results for both cross-sectional strategies (portfolios are formed on cross-sectional ranks of momentum – Panel A) and time-series strategies (we go long or short in a country depending on whether momentum is above or below zero – Panel B). Momentum is defined as the sum of lagged returns over the previous 12 months. We allow for a lag of $k = 1, 2, ..., 12$ months between the momentum signal and portfolio formation. The sample is monthly from 1989/03 – 2012/09 for equities, from 1984/11 – 2012/09 for currencies and fixed income.

	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel A. Cross-sectional strategies												
Equities												
mean	1.71	1.43	3.28	1.45	0.83	2.73	3.26	3.28	5.32	2.68	0.13	4.42
std	13.49	13.40	12.52	12.81	12.53	11.76	12.17	12.04	12.12	12.31	12.64	12.15
SR	0.13	0.11	0.26	0.11	0.07	0.23	0.27	0.27	0.44	0.22	0.01	0.36
Currencies												
mean	1.36	1.02	-0.45	-0.89	-0.92	-0.46	0.07	-1.08	-1.12	-1.62	-1.51	-1.70
std	7.95	7.40	7.23	7.37	7.38	7.21	7.03	7.27	7.40	7.29	7.37	7.32
SR	0.17	0.14	-0.06	-0.12	-0.13	-0.06	0.01	-0.15	-0.15	-0.22	-0.20	-0.23
Fixed income												
mean	-0.75	-0.29	-0.58	-0.95	0.46	1.72	1.63	2.17	1.62	1.77	0.67	0.46
std	7.61	7.06	7.20	6.93	6.99	7.30	7.42	7.08	7.27	7.47	7.19	7.40
SR	-0.10	-0.04	-0.08	-0.14	0.07	0.23	0.22	0.31	0.22	0.24	0.09	0.06
Panel B. Time-series strategies												
Equities												
mean	5.57	4.75	4.87	3.37	2.76	1.70	0.28	2.20	0.94	-0.07	-1.17	0.67
std	13.75	13.59	13.47	13.52	13.99	13.93	13.88	13.73	13.60	13.39	13.81	14.29
SR	0.41	0.35	0.36	0.25	0.20	0.12	0.02	0.16	0.07	-0.01	-0.08	0.05
Currencies												
mean	2.91	1.86	1.36	0.35	0.19	0.54	0.59	0.12	0.56	-0.10	-0.09	-0.10
std	7.82	7.75	7.72	7.90	8.02	7.93	7.91	7.72	7.70	7.59	7.75	7.91
SR	0.37	0.24	0.18	0.04	0.02	0.07	0.07	0.02	0.07	-0.01	-0.01	-0.01
Fixed income												
mean	4.04	3.37	2.91	2.51	2.58	1.62	2.26	2.89	2.67	3.26	2.57	1.46
std	6.20	6.22	6.35	6.31	6.19	6.15	6.05	6.02	6.08	6.16	5.97	5.87
SR	0.65	0.54	0.46	0.40	0.42	0.26	0.37	0.48	0.44	0.53	0.43	0.25

Table IA.6. Value strategies

This table reports annualized returns, standard deviations (std), and Sharpe Ratios (SR) of value portfolios. We report results for both cross-sectional strategies (portfolios are formed on cross-sectional ranks of value – Panel A) and time-series strategies (we go long or short in a country depending on whether value is above or below the historical mean – Panel B). We allow for a lag of $k = 1, 2, ..., 12$ months between the value signal and portfolio formation. The sample is monthly from 1988/04 – 2012/09 for equities, from 1988/11 – 2012/09 for currencies, and from 1994/05 – 2012/09 for fixed income.

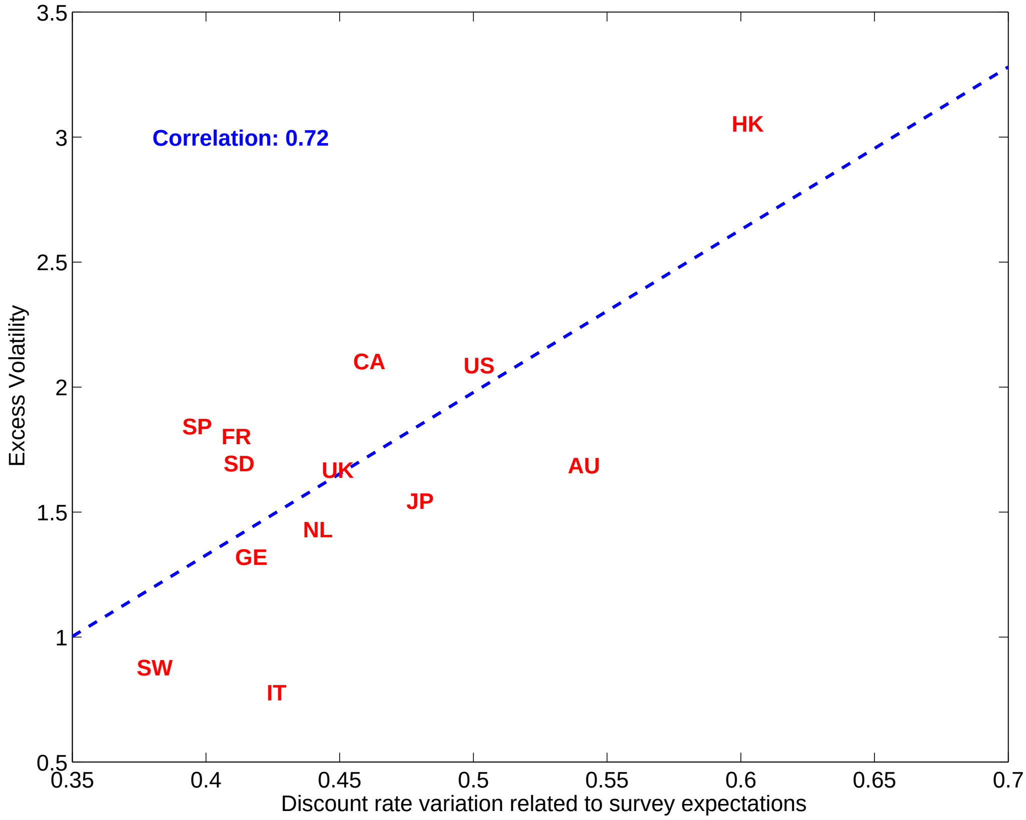
	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel A. Cross-sectional strategies												
Equities												
mean	3.22	2.03	1.88	2.54	1.64	1.66	1.91	1.78	2.21	3.67	3.38	3.51
std	11.07	11.01	11.04	11.26	11.35	11.41	11.05	11.19	11.14	11.14	11.07	11.15
SR	0.29	0.18	0.17	0.23	0.14	0.15	0.17	0.16	0.20	0.33	0.31	0.32
Currencies												
mean	2.68	2.96	3.98	4.54	4.14	3.23	3.11	3.54	3.55	3.21	3.06	2.82
std	7.43	7.41	7.23	7.44	7.45	7.45	7.43	7.60	7.72	7.62	7.64	7.61
SR	0.36	0.40	0.55	0.61	0.56	0.43	0.42	0.47	0.46	0.42	0.40	0.37
Fixed income												
mean	1.73	0.43	-0.34	-0.93	-1.14	-0.23	-0.41	-0.68	0.00	-0.34	-1.65	-0.74
std	6.14	6.49	6.09	6.30	6.26	6.39	6.35	6.28	6.16	5.95	5.83	5.95
SR	0.28	0.07	-0.06	-0.15	-0.18	-0.04	-0.06	-0.11	0.00	-0.06	-0.28	-0.12
Panel B. Time-series strategies												
Equities												
mean	-1.55	-1.60	-2.01	-2.07	-1.83	-1.75	-1.29	-1.00	-1.44	-1.85	-0.12	-0.13
std	11.51	11.19	11.16	10.99	11.25	11.05	10.93	10.96	10.85	10.62	10.61	10.49
SR	-0.13	-0.14	-0.18	-0.19	-0.16	-0.16	-0.12	-0.09	-0.13	-0.17	-0.01	-0.01
Currencies												
mean	-0.94	-1.09	-0.92	-0.04	0.91	0.75	0.80	0.21	-0.37	0.51	0.15	0.37
std	6.86	7.21	7.20	6.97	6.92	7.02	6.79	6.98	7.11	6.92	6.91	6.89
SR	-0.14	-0.15	-0.13	-0.01	0.13	0.11	0.12	0.03	-0.05	0.07	0.02	0.05
Fixed income												
mean	1.31	0.89	0.95	1.84	1.65	2.23	2.81	1.40	1.80	1.50	1.21	1.44
std	4.97	5.01	4.74	4.95	4.91	4.99	4.88	4.67	4.75	4.68	4.68	4.55
SR	0.26	0.18	0.20	0.37	0.34	0.45	0.58	0.30	0.38	0.32	0.26	0.32

Table IA.7. Growth strategies

This table reports annualized average returns (mean), standard deviations (std), and Sharpe Ratios (SR) of portfolios formed on growth expectations. ρ denotes the correlation of returns with strategies based on survey expectations of returns. We report results for both cross-sectional strategies (portfolios are formed on cross-sectional ranks of growth surveys – Panel A) and time-series strategies (we go long or short in a country depending on whether growth expectations are above or below five – Panel B). We allow for a lag of $k = 1, 2, ..., 12$ months between the signal and portfolio formation. The last row in each bucket ρ denotes the correlation with the corresponding strategy based on return surveys. The sample is monthly from 1989/01 – 2012/09.

	Lag between survey and portfolio formation k (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
Panel A. Cross-sectional strategies												
Equities												
mean	-0.61	-1.32	-1.64	-1.61	-1.27	-2.47	-2.09	-1.79	-0.94	-2.18	-1.22	-1.38
std	10.72	10.62	10.75	11.22	11.83	11.94	11.61	11.14	10.85	11.25	11.33	10.89
SR	-0.06	-0.12	-0.15	-0.14	-0.11	-0.21	-0.18	-0.16	-0.09	-0.19	-0.11	-0.13
ρ	0.56	0.56	0.52	0.54	0.59	0.61	0.62	0.60	0.51	0.49	0.50	0.48
Currencies												
mean	-0.13	-0.55	-0.91	-0.44	-0.35	-0.70	-1.99	-1.71	-2.78	-2.25	-2.45	-2.24
std	5.82	5.67	5.43	5.37	5.48	5.91	5.84	5.59	5.11	5.15	5.14	5.49
SR	-0.02	-0.10	-0.17	-0.08	-0.06	-0.12	-0.34	-0.31	-0.54	-0.44	-0.48	-0.41
ρ	0.05	0.01	-0.02	0.02	0.00	0.09	0.08	0.06	-0.13	-0.19	-0.15	-0.09
Fixed income												
mean	2.00	1.25	1.06	0.62	-0.10	0.67	0.17	0.08	0.01	0.88	1.56	0.88
std	5.56	5.49	5.55	5.33	5.24	5.10	5.06	5.10	5.01	4.97	4.99	5.27
SR	0.36	0.23	0.19	0.12	-0.02	0.13	0.03	0.02	0.00	0.18	0.31	0.17
ρ	-0.40	-0.31	-0.18	-0.19	-0.21	-0.33	-0.14	-0.17	-0.14	-0.28	-0.38	-0.42
Panel B. Time-series strategies												
Equities												
mean	2.98	3.11	2.27	2.63	2.61	2.96	4.17	2.98	2.15	1.82	3.30	2.99
std	11.01	10.88	11.16	11.27	11.40	10.98	10.75	10.77	10.32	10.09	10.21	10.14
SR	0.27	0.29	0.20	0.23	0.23	0.27	0.39	0.28	0.21	0.18	0.32	0.29
ρ	0.40	0.44	0.40	0.33	0.34	0.28	0.35	0.34	0.24	0.10	0.11	0.25
Currencies												
mean	-2.52	-2.56	-2.84	-2.84	-2.94	-2.75	-2.52	-2.65	-2.44	-2.60	-2.48	-2.33
std	8.36	8.38	8.24	8.27	8.23	8.34	8.31	8.29	8.29	8.30	8.32	8.27
SR	-0.30	-0.31	-0.34	-0.34	-0.36	-0.33	-0.30	-0.32	-0.29	-0.31	-0.30	-0.28
ρ	0.03	-0.03	-0.01	-0.05	-0.05	-0.11	-0.11	-0.17	-0.07	-0.07	0.00	-0.02
Fixed income												
mean	2.84	2.76	2.86	2.49	2.53	2.43	2.07	2.22	1.99	2.72	2.82	2.76
std	4.62	4.65	4.67	4.66	4.67	4.77	4.67	4.68	4.62	4.64	4.62	4.45
SR	0.62	0.59	0.61	0.54	0.54	0.51	0.44	0.47	0.43	0.59	0.61	0.62
ρ	-0.66	-0.52	-0.39	-0.37	-0.51	-0.57	-0.59	-0.47	-0.44	-0.42	-0.41	-0.40

Figure IA.1. Surveys and excess volatility: Levels and ranks

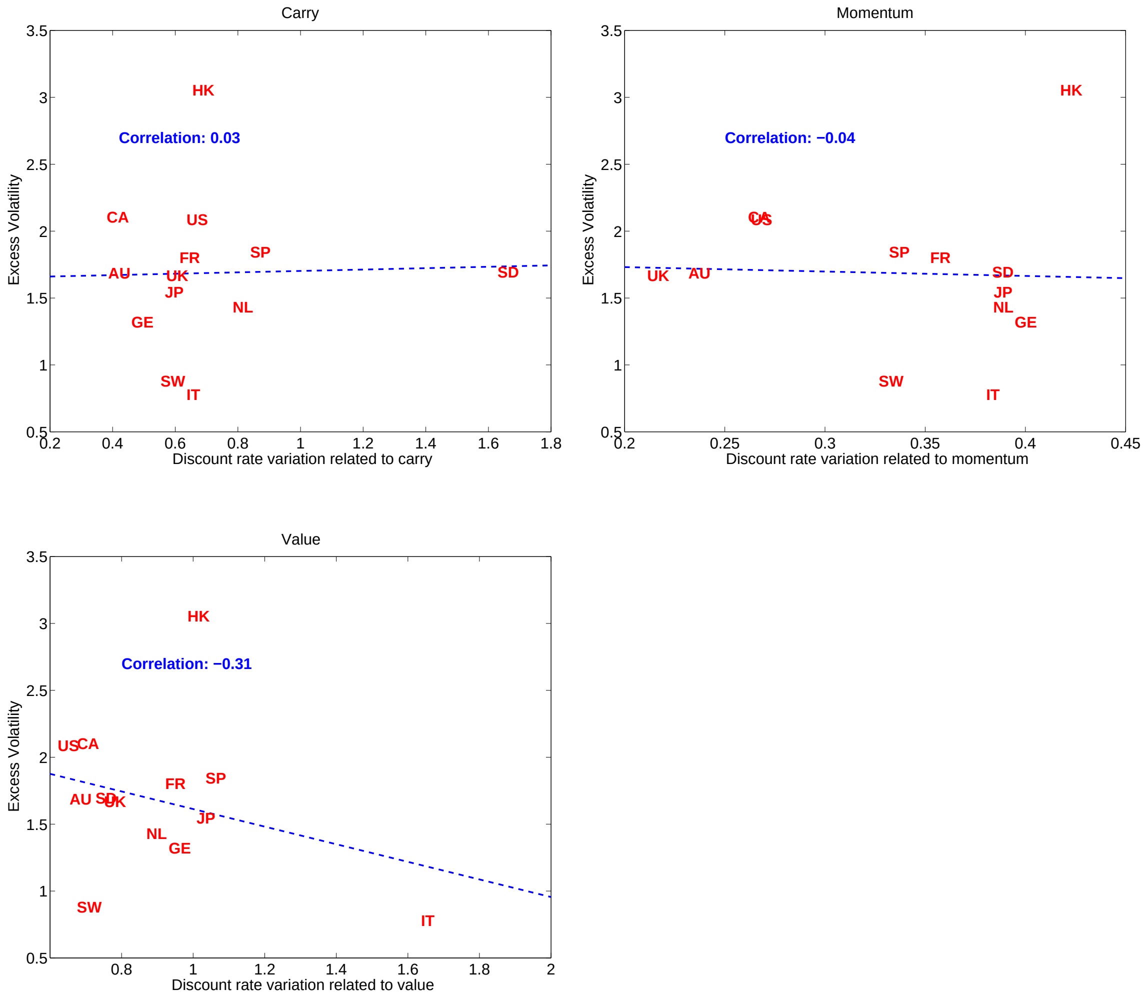


This figure is similar to Figure 7 but here we estimate the standard deviation of the predicted part based on a panel regression of returns on both lagged survey scores S and lagged cross-sectional rank weights $w^{XS}(1)$

$$R_{i,q+1} = \alpha + \beta_1 S_{i,q} + \beta_2 w^{XS}_{i,q}(1) + \varepsilon_{i,q+1}$$

and then compute the variation in discount rates related to survey expectations as $\sigma(E[R_{i,q+1} \mid S_{i,q}, w^{XS}_{i,q}])$ for each country i. The sample period is annual from 1998 – 2011 for excess volatility and quarterly from 1998Q2 – 2012Q3 for the panel regression.

Figure IA.2. Surveys and excess volatility: Carry, momentum, and value – levels and ranks



This figure is similar to Figure 8 but here we use lagged carry, momentum, or value signals ($X_{i,q}$) where X denotes either carry, momentum, or value) and lagged cross-sectional rank weights of carry, momentum, or value ($w_{i,q}^{XS}(1)$) in the panel regression

$$R_{i,q+1} = \alpha + \beta_1 X_{i,q} + \beta_2 w_{i,q}^{XS}(1) + \varepsilon_{i,q+1}$$

and then compute the variation in discount rates related to survey expectations as $\sigma(E[R_{i,q+1} \mid X_{i,q}, w_{i,q}^{XS}])$ for each country i. The sample period is annual from 1998 – 2011 for excess volatility and quarterly from 1998Q2 – 2012Q3 for the panel regression.