
**UCD GEARY INSTITUTE FOR PUBLIC POLICY**
**DISCUSSION PAPER SERIES**

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Geary WP2022/03
March 22, 2022

# The non-linear trade-off between return and risk and its determinants

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**Abstract**

We estimate a discrete approximation of the risk-return trade-off for the US market by using the whole universe of stocks from July 1963 to September 2017. We find the relationship between return and total risk to be time-varying and also dependent on the level of risk considered. The proposed positive trade-off is mainly observed during low volatility periods and when we move from low risk up to medium-high risk investments. However, the direction of the trade-off is inverted for the highest risk alternatives especially during high volatility periods. The temporal variation of the risk-return trade-off can be explained by a series of sentiment, macro, credit risk, liquidity and corporate variables. All these determinants suggest that the positive relationship between return and risk is more evident during periods where economic, financial and market conditions improve.

**Keywords:** time-varying risk-return trade-off, non-linear dependence, cyclical variation, panel regressions, asset pricing

**JEL Classification:** G10, G12, G15

*The authors would like to acknowledge the support of Science Foundation Ireland under Grants Numbers 16/SPP/3347 and 13/RC/2106 P2, the Spanish Ministry of Economy and Competitiveness under Grant Number ECO2017-85746-P and Universitat Jaume I under Grant Number UJI-B2017-14.

# 1 Introduction

The relation between expected return and risk has motivated many studies in the financial literature. Most asset pricing models are based on this fundamental trade-off, so understanding the dynamics of this relation is a key issue in finance. The first studies establishing a theoretical link between expected return and risk propose a positive linear relationship between returns and systematic risk (Sharpe, 1964; Merton, 1973). The traditional CAPM theory predicts that only systematic risk should be priced in equilibrium and any role for idiosyncratic risk is completely excluded through diversification. Following this model, asset pricing models in financial economics tend to predict that only systematic risk should affect returns. However, the role of idiosyncratic risk in asset pricing is important as investors are exposed to it for reasons such as portfolio constraints or transaction costs. Also, previous studies report that both individual investors' portfolios and mutual fund portfolios are surprisingly undiversified (Barber and Odean, 2000; Benartzi and Thaler, 2001). Therefore, subsequent research have considered idiosyncratic risk, besides systematic risk, when analysing the risk-return trade-off (Ang *et al.*, 2005; Jiang and Lee, 2006).

The empirical literature has tested the implications of the risk-return trade-off (using definitions of risk as systematic and idiosyncratic) in two dimensions: first, papers such as Brennan *et al.* (2004), Lo and Wang (2006) and Petkova (2008) focus on the cross-sections of excess stock returns. Most of these works include additional factors other than market returns to provide an improved description of the dispersion in excess portfolio returns in the cross-section. Second, studies such as Whitelaw (2000), Brandt and Kang (2004), Ghysels *et al.* (2005) and Guo *et al.* (2009) focus on the time-series aggregate of the risk-return trade-off. These papers try to unmask a fundamental relationship between return and risk in financial data using different time-series analysis techniques. Under this second line, many different settings of the risk-return relationship could be examined including the returns of assets and the risk of the market similar to a SML relation, the returns of the market on the risk of the market, and alternative specifications.

This study aims to shed light on the dynamics of the risk-return trade-off in the time-series dimension proposing an alternative methodology. More specifically, we are modelling the relationship between return and total risk, encompassing both systematic and idiosyncratic risk. Many previous studies analyzing the relationship between return and risk empirically obtain controversial results for the different definitions of risk. Campbell (1987), Glosten *et al.* (1993), Whitelaw (1994) and Brandt and Kang (2004) find a negative relation between these variables[1], while other authors such as Ghysels *et al.* (2005), Guo and Whitelaw (2006), Ludvigson and Ng (2007) and Lundblad (2007) find a positive trade-off. There are others studies, such as Baillie and De Gennaro (1990) and Campbell and Hentschel (1992), that find non-significant estimates for this risk-return trade-off.

Given the mixed and inconclusive evidence about the positive linear risk-return trade-off postulated by Sharpe (1964) and Merton (1973), recent studies have developed alternative models to define the dynamics of the risk-return trade-off. Mayfield (2004) defines the intertemporal component in the ICAPM model of Merton (1973), i.e., the shifts in the

[1]See Abel (1988) and Backus and Gregory (1992) for theoretical models that support a negative risk-return relation.

investment opportunity set, as changes in the level of market volatility. With this definition, he is able to generate periods of low volatility and high ex-post returns as well as periods of high volatility and low ex-post returns, with a higher risk premium in periods of high volatility. Whitelaw (2000) modifies the dynamics of consumption and allows for a state-dependent consumption-generating process. His model generates a complex, non-linear and time-varying relationship between return and risk, replicating most of the features of the risk-return trade-off observed in the data. There are also theoretical models that advance a step further and introduce a state-dependent dynamic in investors' behavior/preferences or their utility functions. Campbell and Cochrane (1999) develop a consumption-based model with external habit formation that is very successful in describing the characteristics of aggregated asset prices. A key feature of their model is a state-dependent risk aversion of the investor that increases when the levels of consumption approach the level of the habit. Bekaert and Engstrom (2015) propose an extension of the previous model through a more sophisticated consumption process introducing the BEGE (bad environment-good environment) model. This model facilitates reproduction of features of macro-economic data, stocks and option prices. Other authors, such as Cechetti *et al.* (2000), also consider the representative agents' risk aversion or the market risk aversion as time-varying.

Motivated by the literature that suggest that the relationship between return and risk is nonlinear and time-varying, we present a new flexible approach to describe the temporal dynamics of the total risk-return trade-off. Several assumptions have been taken as customary in previous studies to empirically analyze the aggregated risk-return trade-off in the time-series dimension. The most common is to consider constant prices of risk (Bali *et al.* 2005). The second, to assume specific dynamics for the sources of risk in the model. Finally, the empirical model is established in a discrete time economy instead of the continuous time economy used in the equilibrium model of the theoretical approach. Most of the empirical papers studying the risk-return trade-off use at least one of these assumptions with the GARCH-M framework being a heavily applied technique. Table 1 reports the estimates for the traditional GARCH-M model $r_t = \alpha + \beta\sigma_t^2 + \varepsilon_t$, where $\sigma_t^2$ is defined as a GARCH(1,1) model, for a variety of cases: return of market on risk of market, return of asset on risk of asset and return of asset on risk of market[2].

[INSERT TABLE 1]

Panel A displays the results when we use two common proxies for the market portfolio: the CRSP NYSE-NYSE MKT-NASDAQ Equally-Weighted Portfolio and the CRSP NYSE-NYSE MKT-NASDAQ Value-Weighted Portfolio. Evidence for a positive risk-return trade-off is obtained when using the Equally-Weighted Portfolio as a proxy for the market portfolio but the relationship turns out to be not significant for the Value-Weighted Portfolio. These results suggest that the aggregation method from individual stocks to form the market portfolio is relevant for the description of the risk-return trade-off. If we look at how the linear assumption of the risk-return trade-off works at the individual equity level, the picture is even more complex. Panel B shows results when we regress individual excess returns on individual volatility. From our set of 4,577 stocks with continuous return data, 880 of them display a linear positive risk-return trade-off. The largest part of the sample leads to a

[2]In this case, instead of a GARCH-M model we use a standard OLS regression.

rejection of the linear risk-return trade-off: 3,465 stocks fail to identify any linear pattern. Finally, only 212 stocks show a negative linear relationship between return and risk. The top plot in Figure 1 shows the estimated $\beta$ coefficients in the GARCH models for our 4,577 stocks with their associated t-stats. The majority of the densities of the estimated parameters remain around zero and the majority of the associated t-stats lie within the non-significant bounds $\pm 1.96$. Similar results are obtained when regressing individual excess returns on market volatility, as displayed in panel C. We observe that the majority of stocks (4,055 stocks) do not show a significant linear relationship between individual excess returns and market volatility while only 397 indicate the proposed linear positive relationship. The bottom plot in Figure 1 shows graphically how the majority of cases remain within the non-significant bounds while the significant results are more prominent on the positive side. Finally, Panel D displays the average estimated coefficients for the whole universe of stocks in the previous two cases: when using individual or market volatility as regressors. In any of these last cases, we also fail to find a significant linear pattern in the aggregated time-series of returns. Based on this pervasive evidence, it is not surprising that there are controversial conclusions for a linear risk-return trade-off in the literature.

[INSERT FIGURE 1]

In this paper we proceed to investigate further alternative specifications of the risk-return trade-off. Based on the general partial relation $\frac{\partial E(R)}{\partial V}$, we depart from two common assumptions made in previous empirical studies: first, the dynamics for the sources of risk are not defined by a time-series econometric model; instead, we take advantage of the cross-section of stocks to obtain different estimates of market risk across time. Second, we do not restrict the relationship between return and risk to be constant but we allow for time-variation. Our non-parametric approach allows a greater flexibility in the description of the risk-return trade-off not pre-defined by any functional form but just by the observed data itself. This allows us to uncover potential non-linearities intrinsic to the risk-return trade-off. To do so, we determine five levels of risk within the market at every point of time and we approximate the discrete partial relation $\frac{\Delta E(R)}{\Delta V}$ by using the difference between the portfolios with lower risk and higher risk. This allows for an analysis of the temporal implications of this relationship by using information embedded in the cross-section of stocks. We investigate large sample portfolios where considerable unique risk may have been diversified away. However, this diversification is far from perfect so we are analysing the relationship between return and total risk[3], including idiosyncratic risk and systematic risk.

Using monthly excess market return data from 1963 to 2017, we find a time-varying relationship between return and total risk across our sample period, with periods of positive and negative risk-return trade-off. We show that the consideration of different levels of risk in the market allows us to unmask this fundamental trade-off. However, this expected relationship between return and risk is not observed at all periods of time and for all levels of risk. Regarding the temporal dimension, the results show that there are periods in low-volatility states when a positive and significant relationship between return and risk exists, supporting most theoretical models. However, there are other periods in high-volatility states when this trade-off is not observed or is even negative. Thus, the assumption of a linear risk-return

[3]Along the paper, we refer to total risk when discussing our results for the risk-return trade-off.

trade-off may fail to uncover this fundamental relationship because this trade-off depends on the state of the market[4]. Also, the risk-return trade-off is clearly observed for investments between the categories of "low risk" up to "medium-high" risk. When increasing the level of risk within these categories we do observe a significant higher reward. However, investments classified as "high risk" not only do not pay the expected return according to the level of risk involved but also lead to lower returns than less risky counterparts.

Finally, we also analyse which are the key drivers of this non-linear risk-return trade-off and under which market conditions the risk-return trade-off is likely to be observed. The linkage between the time-varying risk-return trade-off and business cycles is mixed. We observe a clear negative relationship between return and risk during recessions, but there are certain periods of economic expansion that also show a negative relationship. Therefore, we cannot describe the evolution of the risk-return trade-off as pro-cyclical or counter-cyclical since it can be both. To gain a deeper understanding about what determines the time variation of the risk-return trade-off, we regress our discrete approximation on a battery of variables that have been shown to have some predictive power on expected returns[5]. We consider several variables from five groups of determinants: sentiment, macro, credit risk, liquidity and corporate.

We find that most of the variables included in the regressions covary significantly with our proxy of the risk-return trade-off. Corporate variables are the major determinants of our approximation of the risk-return trade-off followed (at a considerable distance) by liquidity and credit risk variables. We obtain a strong positive relationship between the risk-return trade-off and consumer sentiment, inflation, industrial production growth, the liquidity factor and the size factor. On the other hand, we uncover a consistent negative relationship between the risk-return trade-off and the default spread, the illiquidity factor, the operating profitability and the investment factor. These results support the idea that periods of time where we observe increases in consumer sentiment, production, liquidity and decreases in credit risk are the ones where we can get a good reward for the risk taken.

The rest of the paper is organized as follows. Section 2 develops the empirical framework used in the paper and provides a description of the data. Section 3 presents the main empirical results. Section 4 analyses which are the main determinants of the observed non-linear risk-return trade-off, and section 5 concludes.

[4]To illustrate, the use of a time frame with many periods corresponding to low-volatility states would result in a positive and significant risk-return trade-off. However, if, in the chosen time frame, there were a high number of high-volatility states, it would result in a negative and significant trade-off. Non-significant estimates for the relation between return and risk would likely be found in samples with a similar number of high and low-volatility periods.

[5]The literature about determinants of the risk-return trade-off is scarce. Liu (2017) tries to provide some evidence on this matter by analysing the links between the risk-return dynamics and a set of major macroeconomic variables. We extend the results in Liu (2017) by looking at other determinants beyond macro factors.

## 2 Methodology

Our starting point is the general partial relation between return and risk $\frac{\partial E(R_t)}{\partial V_t}$. Most papers analysing a linear risk-return trade-off proposed a regression of the expected returns on conditional volatilities as a test to validate a constant relationship between return and risk. These papers express this general partial relation $\frac{\partial E(R_t)}{\partial V_t}$ in discrete terms $\frac{\Delta E(R_t)}{\Delta V_t}$ and use a regression approach of the form $E(R_t) = \beta V_t + \gamma X_t$ to uncover a linear relation $\frac{\Delta E(R_t)}{\Delta V_t} = \beta$. Literature has used both univariate and multifactor frameworks (including a wide set of proxies for additional risk factors in $X_t$) to uncover a potential linear relationship between return and risk.

The methodology we propose in this paper is also based on the general partial relation between return and risk in discrete terms $\frac{\Delta E(R_t)}{\Delta V_t}$, but with different assumptions than previous studies. First, we allow for a time-varying relationship, so for every period $t$, the relationship can take a different value $\frac{\Delta E(R_t)}{\Delta V_t} = \beta_t$. Second, we do not impose a functional form on the risk-return trade-off, so we do not restrict the shape of this relation to be linear or to a certain type of non-linearity. Third, the estimation for market risk is not done by using a single aggregated market portfolio. We use the whole universe of stocks at every point of time to determine five levels of risk within the market[6]. Using these different portfolios we can observe at every point of time the value of the relation $\frac{\Delta E(R_t)}{\Delta V_t}$ just by looking at the difference between the portfolios with lower risk and the portfolios with higher risk. In this sense, we are visualising how the market rewards higher risks at different points in time.

The estimation of the risk-return trade-off at every point of time $\beta_t = \frac{\Delta E(R_t)}{\Delta V_t}$ is obtained by the difference between the returns of lower risk portfolios and higher risk portfolios. The interpretation of the magnitudes of our risk-return trade-off is more intuitive than in previous studies. Instead of defining how much is the change in expected return as an increase of an "*additional unit of risk*", our spread portfolio represent how much is the change in expected return as an increase in a higher category of risk. For example, the spread between level 5 and level 1 risk portfolios represent the expected return if we move from a low risk investment to a high risk investment; the spread between level 4 and level 1 risk portfolios represent the expected return if we move from a low risk investment to medium-high risk investment, and so on.

The construction of the portfolios for the five levels of total risk is as follows. We collect daily and monthly return data on all the NYSE, NYSE America, and NASDAQ stocks available within the CRSP (Center for Research in Security Prices) database. Our sample covers 29,746 stocks for the period ranging from July 1963 to September 2017. We drop observations for which the monthly returns exceeds 100%, so as to avoid outliers that could result from compiling errors in the dataset[7] (Lambert and Hubner, 2013). For every month $t$, we sort portfolios into five different quintiles based on each stock's daily total variance. We use a window of 60 days to compute the value of the variance that we use for sorting the stocks into the different portfolios. We rebalance the risk-sorted portfolios every month by updating the values of the estimated variances of every stock and creating again the five

[6]These categories of risk are similar to the ones used by analysts: Level 1: low risk; Level 2: medium-low risk, Level 3: medium risk; Level 4: medium-high risk; Level 5: high risk.

[7]We also drop from our sample stocks with no market equity data and missing variance of daily returns.

value-weighted quintiles[8]. We end up with five time-series of 651 observations reflecting different levels of risk in the market at every point in time.

Based on previous literature that showed strong evidence for a state-dependent risk-return trade-off (Nyberg (2012), Ghysels *et al.* (2014)), we also condition our time-varying risk-return trade-off to the state of the market, i.e. $\beta_{t,s_t} = \frac{\Delta E(R_t)}{\Delta V_t}|s_t$. The unobservable variable $s_t$ governing the shifts in the state is inferred by estimating a regime-switching GARCH model on the values of the market portfolio. In that way we can distinguish the periods where the market is in a low volatility state and the periods where the market is in a high volatility state.

# 3 Empirical results

## 3.1 Risk-sorted portfolios

Table 2 reports the summary statistics of the five risk-sorted portfolio returns. The column in the left shows the summary statistics for the low risk portfolio (Q1) returns and columns moving to the right represent the returns for the other portfolios when we increase its risk profile one category. Panel A displays the results for the full sample period July 1963 to September 2017. All portfolios show significant positive average values. The shape of the static relationship between return and risk during the whole sample period appears to be positive for low risk portfolios (Q1) until medium-high risk portfolios (Q4), where the observed average return increases as the level of risk in these portfolios increase. However, this positive relationship is not observed for the high risk portfolios (Q5). Despite being the riskiest investment during the sample period, this does not reward the investors with higher returns. In fact, the average return for this high risk portfolio is the lowest.

[INSERT TABLE 2]

Panel B and C of table 2 show the statistics of the risk-sorted portfolios during periods of high and low volatility. We discriminate between volatility periods by fitting a Regime-Switching GARCH model to the excess returns of the CRSP Value-Weighted Portfolio[9]. This model gives us an estimation of the probability of being in a state of low (high) volatility at each period of time. We use this probability to consider if each time point belongs to a low (high) volatility state. Results for the average returns of the risk-sorted portfolios are different when we condition them to the volatility state. For low volatility states, all average returns are positive and significant. In this case, the shape of the static relationship between return and risk is positive for the whole range of portfolios from low risk portfolios (Q1) to high risk portfolios (Q5). During low volatility periods, the high risk portfolios do reward investors with a higher average return. However, when we condition results to high-volatility states

[8] We also checked and confirmed that these variance quintile portfolios had correspondingly levels of covariances.

[9] We also conditioned our results on the states inferred by fitting a Markov-Switching model on the CRSP Value-Weighted portfolio, obtaining similar results for all analysis through the paper. Results available on request.

results suggest a different picture. For these periods, all portfolios show positive returns except for the high risk portfolios (Q5) where we find returns not significantly different from zero. This means that high risk investments available in the market do not reward investors with a positive return during these periods of high volatility. This preliminary evidence suggest the existence of a state-dependent risk-return trade-off, which we explore next in a greater detail.

### 3.2 Risk-sorted portfolio spreads

The purpose of analysing the risk-return trade-off is to measure the reward that higher risk options offer to investors. Our discrete approximation to the risk-return trade-off $\frac{\Delta E(R_t)}{\Delta V_t}$ is the following. The denominator of this relationship is given by the different risk-sorted portfolios: a change in risk implies a change in the category of a risk-sorted portfolio, where Q1 represents "low risk" and Q5 represents "high risk". The numerator of this relationship measures the expected return for the change in risk from one risk category to the other. Therefore, the difference in the returns of the risk-sorted portfolios gives us an estimate of this discrete risk-return relationship: how much is the return obtained by the investor if she chooses a higher risk alternative.

[INSERT TABLE 3]

Table 3 reports the statistics for all the possible combinations of risk-sorted portfolio spreads. Panel A shows the results for the full sample and we condition the estimates to low and high volatility periods in Panel B and C. If we consider the unconditional results, we observe two main features of the risk-return trade-off. First, the relationship between return and risk is significantly positive for all combinations from low levels of risk up to medium-high levels of risk. In terms of magnitude, an investor shifting from a low risk strategy to a medium-high risk investment has obtained an average monthly return 0.22% higher (average annual return of 2.64% higher). For the other levels of risk, an investor has also obtained a significant higher average return in riskier investments but the magnitude is lower. Second, the relationship between return and risk for high levels of risk is negative. This means that investors choosing high risk investments have earned significantly less returns than investors choosing less risky options. The magnitude for the negative returns is substantial: in the mildest case, when we compare the spread return of high risk portfolios to the low risk portfolios, an investor taking the riskiest alternative has obtained a lower monthly return of 0.22% (annual return of 2.64%); in the worst case, the average monthly return of the riskiest investment is 0.44% lower (5.28% lower in annual terms). These results give us a non-linear description of the risk-return trade-off similar to the one obtained by Rossi and Timmerman (2010): at low-medium levels of volatility, a positive risk-return trade-off is observed, but this relationship becomes inverted for high levels of risk.

When we condition the estimates to different volatility states, we uncover a state-dependent risk-return trade-off. For low-volatility states, the positive relationship between return and risk extends to all portfolios from the low risk to the high risk portfolios. During these periods of stability, an investor shifting to a riskier option is rewarded with a higher return in all

cases[10]. Opposite to the unconditional results where we got a negative premium for high risk portfolios, an investor holding the high risk portfolio during low volatility states would earn an average of 0.43% more than an investor choosing the low risk alternative (5.16% higher in annual terms). For high-volatility states, the shape of the risk-return trade-off is more complex. We observe again a significant negative relationship between high risk and the other lower risk alternatives: in the worst case, an investor choosing the risky investment during these periods would have earned a monthly average return of 0.61% less (7.32% in annual terms) than the same investor choosing a medium-high alternative. Obviously, the promised reward-to-risk is not holding in these investments. Also interestingly, the positive risk-return trade-off observed for the other levels of risk also vanishes during periods of high volatility. Only the spreads involving the low risk portfolio (Q1) show a significant positive reward.

The last row of each panel represents the level of risk aversion - assumed to be constant over the sample period (volatility states) - of the representative investor in the ICAPM model that can explain the observed portfolio spread returns. We estimate the risk aversion (RA) implied by each portfolio spread returns using the ratio between the difference in the average return and the difference in the standard deviation of each pairwise combination of risk-sorted portfolios $R_i, R_j$, i.e. $RA_{i,j} = \frac{E(R_i)-E(R_j)}{Var(R_i)-Var(R_j)}$. For instance, the risk aversion for the spread Q3-Q2 is computed using the average values and the standard deviations for the Q3 and Q2 portfolios, i.e. $RA_{3,2} = \frac{(0.0103-0.0098)}{(0.0507-0.0429)} \times 100 = 6.4164$.

For the unconditional estimates using the full sample, risk aversion levels range from 6.41 to 9.48 to explain the observed spreads of the low risk to medium-high risk portfolios. However, the ICAPM would need negative values for the risk aversion coefficient to explain the spreads with the high risk alternatives. Therefore, showing a linear positive relationship (even a positive) relationship between return and risk seems a challenging task given this evidence. Estimates of the parameters of risk aversion for periods of low and high volatility confirm this finding: the estimates for the parameter that explain the spreads of the low risk to medium-high risk portfolios stay in positive values (from 13.51 to 53.06 in the low volatility state and from 2.5 to 7.8 in the high volatility state). However, the coefficient of risk aversion for the spreads involving the high risk portfolios during high volatility states are very different, taking large negative values.

Moreover, the magnitude of the coefficients of risk aversion in low-volatility states is higher than those corresponding to the high-volatility states. This finding provides evidence for pro-cyclical risk aversion, already discussed in several previous studies. Using options on the S&P100 and the S&P500, Bliss and Panigirtzoglou (2004) find that risk aversion is higher during periods of low volatility. These authors do not give an explanation for this result; they simply recommend developing theoretical models to capture these effects. This interpretation is also in line with papers such as Salvador *et al.* (2014) and Ghysels *et al.* (2014) who document that the Merton model holds over samples excluding financial crises, considering these periods as "flight-to-quality" regimes. The separation of the traditional risk-return relation from financial crises leads to fundamental changes in the relation. Furthermore, other related papers, such as Kim and Lee (2008), have reported similar evidence in obtaining a significant risk-return trade-off during boom periods that is less clear during

[10]The only exception is for the case of medium-high risk portfolios and high risk portfolio where the spread returns are not different from zero.

crisis periods.

Figure 2 provides further evidence on this matter. It displays the annualized returns for all the combinations of spread returns over the sample period together with NBER business cycles (gray areas). We clearly observe that the risk-return relationship varies over time showing the time-varying nature of investment opportunities. However, the relationship with business cycles is not that clear. The negative trade-off obtained during recessions (evident for the recessions of the year 1981-82, the early 2000s recession and the Great Recession) is in line with a pro-cyclical risk-return trade-off. However, there are periods of economic boom where the observed relationship is also negative (the most evident during the 80s). Therefore, we cannot simplify the risk-return to be defined as pro-cyclical or counter-cyclical. These figures show evidence that the cyclical variation of the risk-return trade-off can be both. In this regard, section 4 performs a deeper analysis on the dynamics of the risk-return relation and its determinants.

[INSERT FIGURE 2]

### 3.3 Robustness checks

In this section we discuss the sensitivity of our results to two assumptions: the weighting scheme in the risk-sorted portfolios and the lag length to estimate stock volatility. Given the results obtained in the preliminary GARCH-M analysis (where data support the positive risk-return trade-off for equally-weighted stocks, but not for value-weighted stocks), we might think that stock-weighting matters in uncovering this trade-off. Panel A of Table 4 reports the summary statistics of the five risk-sorted portfolio returns when using equally-weighted portfolios. In general, the results under the equal weighting scheme are very similar to the case using value-weighted portfolios. All portfolios show significant positive average values and the average return increases with the level of risk except for the high risk portfolio (Q5), where the average return is the lowest among the risk-sorted portfolios. When looking at the results after conditioning to the volatility state, we do observe that the high risk portfolio (Q5) rewards investors with a higher average return during these periods. However, for high volatility periods, the high risk portfolio (Q5) offers a lower return than other portfolios, and is not statistically significant at a 5% level.

[INSERT TABLE 4]

The other sensitivity test relates to the window length used to estimate the volatility of individual stocks. In the baseline results, we use a 60-day truncation which sorts the individual stocks on relatively short-term variance. Past studies argued that stock volatility has long-memory dynamics (Corsi, 2009), so this truncation may not be enough to capture this persistence. Panel B of Table 4 reports the summary statistics of the five risk-sorted portfolio returns when we use one year of past daily observations to estimate stock volatility. Results are again qualitatively similar with small differences worth noting. All portfolios show positive average values but the high risk portfolio (Q5) average returns are not significant. We also observe that the direction of the risk-return trade-off is negative for the

medium-high (Q4) and high (Q5) risk-sorted portfolios. For the conditioned results on the volatility states, however, we obtain similar evidence to the main case. For low volatility states, we get a positive relationship between riskier investments and their average return, even for the high (Q5) risk-sorted portfolios. When we condition results to high volatility states, the medium-high (Q4) and high (Q5) risk-sorted portfolios do not reward investors with a significant positive return during these periods.

As a final robustness check, in Panel C of Table 4 we display the results for the five risk-sorted portfolio returns when using equally-weighted portfolios and one year of past daily observations to estimate stock volatility. All portfolios show positive average values but the high risk portfolio (Q5) average returns are significantly negative in this case. The observed positive risk-return trade-off during low volatility periods also blurs somewhat with an insignificant result for the high (Q5) risk-sorted portfolio. For high volatility periods, we also observe a more pronounced outperformance of low-risk investments while the high-risk portfolio (Q5) have significant negative returns.

# 4 Determinants of the risk-return trade-off

In this section we provide new insights about variables that can explain the time-varying dynamics of the risk-return trade-off. Our approach consists of regressing the time-series of spread returns of the risk-sorted portfolios (which we consider an estimate of the discrete risk-return trade-off) on a set of explanatory variables. This analysis is in line with previous studies (Liu, 2017) who have examined determinants of the risk-return relation, albeit in a different setting.

In incorporating the variables we tried to keep a balance between the number of variables in each one of the following categories: Sentiment, Macro, Credit risk, Liquidity and Corporate variables. All these categories have been proposed as potential determinants of the risk-return trade-off and introduced in many asset pricing models. Baker and Wurgler (2006) find that a wave of investor sentiment has larger effects on securities whose valuations are highly subjective and difficult to arbitrage. Ludvigson and Ng (2007) find that macroeconomic factors, when combined with other predictor variables, are also useful for estimating the risk-return trade-off. Also, in the literature on macro-finance, Cochrane (2017) looks to establish a link between asset prices and economic fluctuations. Pastor and Stambaugh (2003) and Amihud (2002) conclude that liquidity is a relevant state variable when determining expected returns. Finally, corporate variables are considered as key determinants of expected returns since the pioneer work of Fama and French (1993). The specific details for each explanatory variable included in this section are summarized in Table 5[11].

[INSERT TABLE 5]

We start our analysis by considering the following contemporaneous fixed-effects panel re-

[11] We examined summary statistics and pairwise correlations between these variables. The correlations are generally close to zero, thereby reflecting different sources of variation of the risk-return trade-off and minimising potential multicollinearity issues. Results available on request.

gression[12] using the ten combinations of spread returns and, as robustness, the spreads using each one of the five categories of risk:

$$\beta_{it} = \gamma_0 + \gamma_1 X_{it} + \varepsilon_{it} \tag{1}$$

where $\beta_{it}$ indicates a single spread portfolio and $X_t$ reflects an individual explanatory variable in Table 5.

Table 6 reports the R-squared of the panel regressions in (1) for each one of the explanatory variables as individual regressors. Panel A shows the results for the full sample where each row represent the spread portfolios included in the panel regression[13]. There are certain variables which provide higher R-squares for any spread portfolios included in the regression: consumer sentiment, default spread, Pastor liquidity and the corporate variables. Special mention to corporate variables who provide a higher fit for the spread portfolios returns than the other variables. Results are also reported for low and high volatility periods in panels B and C. Conditioning the panel regressions to the volatility states reveal further insights about the role of the explanatory variables on the dynamics of the risk-return trade-off. The picture during high volatility states is similar to the one described above, but additional variables such as inflation and the Amihud illiquidity measure also play a significant role. However, the results during low volatility periods seem quite different. Variables with little importance during high volatility periods such as investor sentiment and the term spread become relevant, besides the operating profitability factor.

[INSERT TABLE 6]

Our next analysis consists in regressing the combinations of spread returns on the different sub-groups of sentiment, macro, credit risk, liquidity and corporate variables as follows:

$$\text{Sentiment variables: } \beta_{it} = \gamma_0 + \gamma_1 \Delta IS_{it} + \gamma_2 \Delta CS_{it} + \varepsilon_{it} \tag{2a}$$

$$\text{Macro variables: } \beta_{it} = \gamma_0 + \gamma_1 INFL_{it} + \gamma_2 \Delta UNP_{it} + \gamma_3 \Delta IP_{it} + \varepsilon_{it} \tag{2b}$$

$$\text{Credit risk variables: } \beta_{it} = \gamma_0 + \gamma_1 \Delta DS_{it} + \gamma_2 \Delta TS_{it} + \gamma_3 \Delta TED_{it} + \varepsilon_{it} \tag{2c}$$

$$\text{Liquidity variables: } \beta_{it} = \gamma_0 + \gamma_1 LIQ_{it} + \gamma_2 \Delta ILLIQ_{it} + \varepsilon_{it} \tag{2d}$$

$$\text{Corporate variables: } \beta_{it} = \gamma_0 + \gamma_1 SMB_{it} + \gamma_2 HML_{it} + \gamma_3 RMW_{it} + \gamma_4 CMA_{it} + \varepsilon_{it} \tag{2e}$$

where $\beta_{it}$ indicates a single spread portfolio and the variables on the right-hand side of the equations are defined in Table 5.

[12]The Hausman test reject random effects in favor of fixed effects. Results available from authors upon request.

[13]The results in the row labeled as "all" include the 10 spread portfolios; the results in the row labeled as "Q5spreads" include the 4 spreads involving the returns of the Q5 portfolio, i.e: Q5-Q1, Q5-Q2, Q5-Q3 and Q5-Q4; the results in the row labeled as "Q4spreads" include the 4 spreads involving the returns of the Q4 portfolio, i.e: Q4-Q1, Q4-Q2, Q4-Q3 and Q5-Q4, and so on.

Table 7 confirms the previous findings when we run the panel regressions in (2a) to (2e). Corporate variables are the most relevant determinants that define the time-variation of the risk-return trade-off, independently of the volatility state. Also interestingly, all categories explain better the dynamics of the risk-return trade-off during high volatility periods. The improvement in the R-squared of liquidity and macro factors is noteworthy during these periods. On the other hand, credit and sentiment variables have a relatively higher impact compared to other groups during low-volatility periods.

[INSERT TABLE 7]

Our final model includes all explanatory variables in Table 5 as potential determinants of the risk-return trade-off as follows:

$$\beta_{it} = \gamma_0 + \gamma_1 \Delta IS_{it} + \gamma_2 \Delta CS_{it} + \gamma_3 INFL_{it} + \gamma_4 \Delta UNP_{it} + \gamma_5 \Delta IP_{it} + \gamma_6 \Delta DS_{it} + \gamma_7 \Delta TS_{it} + \gamma_8 \Delta TED_{it} + \gamma_9 LIQ_{it} + \gamma_{10} \Delta ILLQ_{it} + \gamma_{11} HML_{it} + \gamma_{12} RMW_{it} + \gamma_{13} CMA_{it} + \varepsilon_{it} \quad (3)$$

where $\beta_{it}$ indicates a single spread portfolio and the variables on the right-hand side of the equations are defined in Table 5.

Table 8 reports the estimates of the variable coefficients for the panel regressions in (3) along with the adjusted R-squared. Confirming the results presented above, there are certain main drivers whose relationship with the risk-return trade-off is robust in any volatility state: default spread, the two liquidity variables and three of the corporate variables (size, operating profitability and investment factors). The default spread has a significant negative covariance with the risk-return trade-off, so that the higher the default spread, the lower the observed risk-return trade-off. Impact for the two liquidity variables give the same conclusion: the higher liquidity, the higher observed risk-return trade-off. Note that there is a positive relation with the liquidity factor and a negative relation with the illiquidity factor. Also, the two corporate variables reflecting operating profitability and investment show a negative relationship with the risk-return trade-off while the size factor is positively related.

[INSERT TABLE 8]

Analysing other potential relevant variables, we observe that inflation and consumer sentiment covary positively with the risk-return trade-off for most of the cases analysed, although the evidence is weaker for the low risk spread portfolios during low-volatility states. Also, IP growth shows a significant positive co-movement with the risk-return trade-off for the high risk portfolio spreads during all volatility states. The rest of the determinants show a residual role and their significance is reduced to a small number of spreads during certain periods of time.

These results are confirmed when we obtain the estimates for each sub-group of explanatory variables as in equations (2a) to (2e) which are displayed in Table 9. Panel A shows that

the results for full sample regressions reinforce the positive relationship between all macro variables, consumer sentiment, Pastor liquidity and the size factor with the risk-return trade-off. On the other hand, there is a negative relationship between the default spread, Amihud illiquidity and the investment and operating profitability factors with the risk-return trade-off. These results also hold when we consider separately low and high-volatility states. Panel B and C of Table 9 show that the direction of these relationships is practically the same in all cases. Robustness results of tables 8 and 9 are summarised in Appendix A. In these results, we repeat the regression analysis excluding certain subgroups of determinants and we consider different spread combinations. We observe consistent patterns regardless of the specification proposed[14].

[INSERT TABLE 9]

Taking together all these interdependencies, we observe a higher reward to risk during periods of increases in the consumer sentiment, increases in the liquidity of the markets, increases in the production of the real economy and decreases in the levels of credit risk. Significant variables in each one of the five categories presented (Sentiment, Macro, Credit Risk, Liquidity and Corporate) point out to this direction. We argue that when all these ingredients are on the table, it is the best time to embrace risk; otherwise, and contrary to the misleading conception that higher risk implies a higher return, we are likely to get a reward that does not meet our expectations.

# 5 Conclusion

We empirically analyze the risk-return trade-off for the US market under a flexible framework that allows for time variation in the relationship. In contrast to previous studies who use a single market portfolio to compute risk, we take advantage of the whole cross-section of stocks to obtain estimates of five categories of risk at each point of time. Our definition of the discrete risk-return trade-off is obtained by the returns of the spread portfolios between higher risk alternatives and lower risk alternatives. Moreover, given the emerging debate in the literature about the direction of the state-dependent risk-return trade-off, we also condition our estimates to different volatility states observed in the market.

Our main results show that the proposed positive relationship between return and risk holds on average most of the time and for most risk categories. Regarding the temporal dimension, we uncover a positive and significant risk-return trade-off in the states governed by low volatility. However, this evidence is less clear during high-volatility states. Regarding the different levels of risk, the positive risk-return trade-off is observed for low risk investments up to medium-high risk investments. However, the relationship between return and risk for the high risk portfolios is less clear, with a significantly negative trade-off during high volatility states. The investments within the high risk category are likely to be the ones causing the controversy in the risk-return literature. If we assume a constant risk aversion

[14] Appendix B also summarises a regression analysis of the determinants of the raw risk-sorted portfolio returns in table 2 on the set of determinants of table 5. Results are similar to those encountered for the portfolio spreads but with a less important role played by macro factors.

coefficient (as in Merton's ICAPM model) to explain the returns of the spread portfolios, we need large negative values for the spreads including high risk alternatives. Moreover, our results also support the findings of previous papers that document that during low-volatility states the estimated risk aversion is higher than during high-volatility periods.

Finally, we conduct panel regressions to unmask potential determinants of the risk-return trade-off. We include a wide set of sentiment, macro, credit risk, liquidity and corporate variables. Corporate variables are the ones that covary more with our estimates of the risk-return trade-off. Also, all groups of determinants are more relevant in explaining the risk-return dynamics during high volatility states. Regarding the direction of the relationship, the proposed positive relation between return and risk is more evident during periods of increases in consumer sentiment, liquidity and production and decreases of credit risk.

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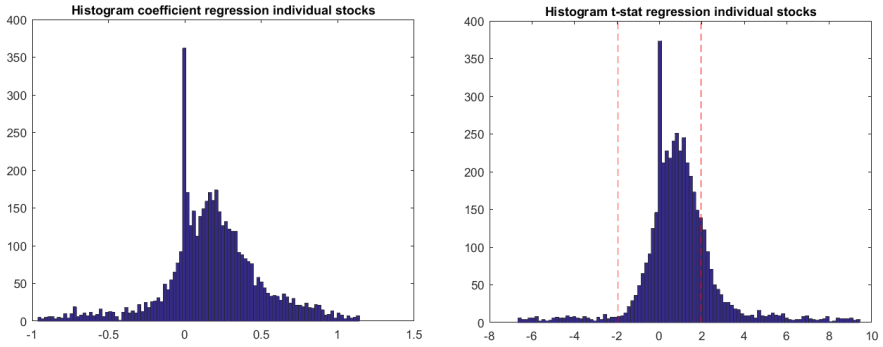
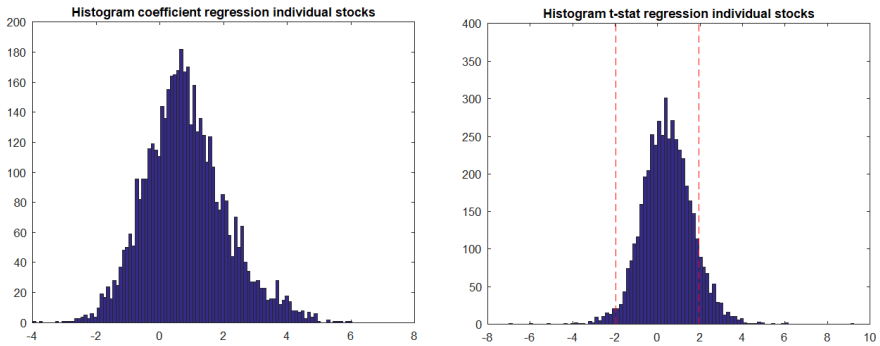
Figure 1: Histograms for estimated $\beta$ coefficients and t-stats of individual stocks

(a) Regressions of stock return on individual risk $r_{i,t} = a + \beta\sigma_{i,t} + \varepsilon_{i,t}$

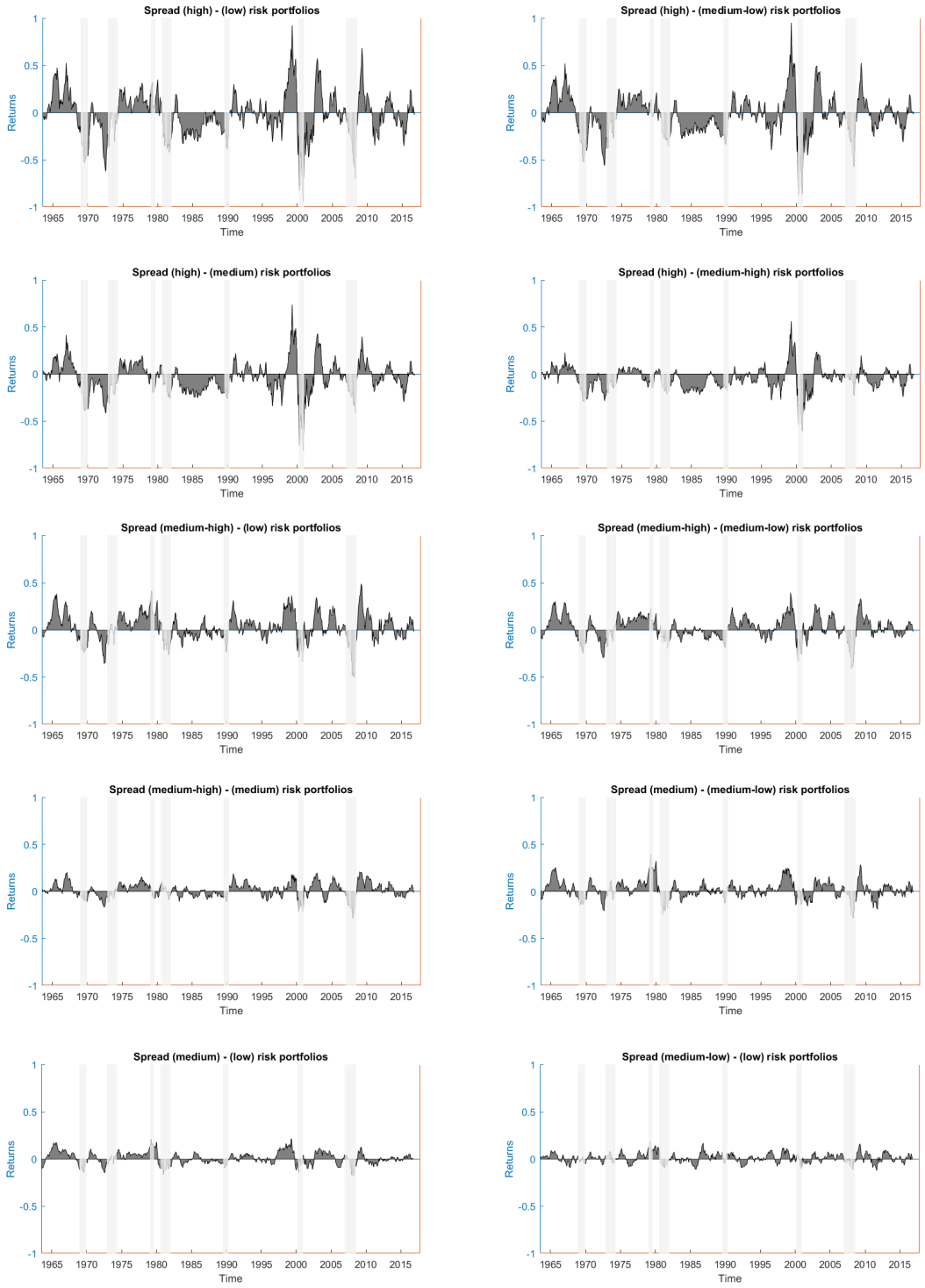



(b) Regressions of stock return on market risk $r_{i,t} = a + \beta\sigma_{m,t} + \varepsilon_{i,t}$




This figure shows the histogram of the estimated values of the betas and the associated t-stats (red dashed vertical lines represent significance at 5% level) for the 99% windsorised universe of stocks available in CRSP with at least 10 years of continuous data in the following two cases: when regressing individual stock returns on individual volatility in the GARCH-m model $r_{i,t} = \alpha + \beta\sigma^2_{i,t} + \varepsilon_t$ (top plot) and when regressing individual stock returns on market risk using a standard regression model $r_{i,t} = \alpha + \beta\sigma^2_{m,t} + \varepsilon_t$ (bottom plot).

Figure 2: Spread portfolios with different levels of volatility




This figure plots the annualized spread return between the different combinations of riskier portfolios and the less risky portfolios over the full sample period July 1963 to September 2017. The four top figures use the portfolio labeled as Q5 for the high risk portfolio and the four spreads using combinations with the other less risky portfolios. The next three figures use the portfolio labeled as Q4 for the medium-high risk portfolio and the three spreads using combinations with the other less risky portfolios. The next two figures below use the portfolio labeled as Q3 for the medium risk portfolio and the two spreads using combinations with the other less risky portfolios. The last figure uses the portfolio labeled as Q2 for the medium-low risk portfolio and its spread with the low-risk portfolio. Shaded areas correspond to recession periods according to NBER.

Table 1: **Regression results risk-return trade-off full sample**

This table reports the estimates for the GARCH-M regressions (robust standard errors in parenthesis) using the whole universe of stocks available in CRSP with at least 10 years of continuous data. The top panel shows the estimates of market excess returns on conditional volatility in a GARCH-M framework $r_{m,t} = \alpha + \beta\sigma^2_{m,t} + \varepsilon_t$ for two aggregated indexes: the CRSP NYSE/NYSE MKT/NASDAQ Equally-Weighted Portfolio and the CRSP NYSE/NYSE MKT/NASDAQ Value-Weighted Portfolio. Panel B panel displays the number of stocks that shows a significant negative risk-return trade-off, no significant risk-return trade-off and a significant positive risk-return trade-off in regressions of individiual excess returns on individual conditional volatilities $r_{i,t} = \alpha + \beta\sigma^2_{i,t} + \varepsilon_t$. Panel C shows the number of stocks that shows a significant negative risk-return trade-off, no significant risk-return trade-off and a significant positive risk-return trade-off in regressions of individiual excess returns on market volatility $r_{i,t} = \alpha + \beta\sigma^2_{m,t} + \varepsilon_t$. The bottom panel reports the average values of the coefficients for the 4,577 individual stocks in both cases: when using individual volatility as a regressor ($r_{i,t} = \alpha + \beta\sigma^2_{i,t} + \varepsilon_t$) and when using market volatility as a regressor ($r_{i,t} = \alpha + \beta\sigma^2_{m,t} + \varepsilon_t$). The symbols ***, ** and * represents significance at 1%, 5% and 10%, respectively.

| Panel A.- Regression results aggregated portfolios $r_{m,t} = \alpha + \beta\sigma^2_{m,t} + \varepsilon_t$ | | | | |
|---|---|---|---|---|
| | Equally-Weighted | | Value-Weighted | |
| | $\alpha$ | $\beta$ | $\alpha$ | $\beta$ |
| Coefficient | -0.0077 | 0.4505*** | 0.0022 | 0.2098 |
| *(std. error)* | *(0.0082)* | *(0.1805)* | *(0.0057)* | *(0.1493)* |

| Panel B.- Number of stocks with significant coefficient $r_{i,t} = \alpha + \beta\sigma^2_{i,t} + \varepsilon_t$ | | | |
|---|---|---|---|
| | t-stat $<$ 1.96 | -1.96 $<$ t-stat $<$ 1.96 | t-stat $>$ 1.96 |
| | significant negative | non significant | significant positive |
| Number of stocks (total of 4,557) | 212 | 3,465 | 880 |

| Panel C.- Number of stocks with significant coefficient $r_{i,t} = \alpha + \beta\sigma^2_{m,t} + \varepsilon_t$ | | | |
|---|---|---|---|
| | t-stat $<$ 1.96 | -1.96 $<$ t-stat $<$ 1.96 | t-stat $>$ 1.96 |
| | significant negative | non significant | significant positive |
| Number of stocks (total of 4,557) | 105 | 4,055 | 397 |

| Panel D.- Regression results individual stocks (average values) | | | | |
|---|---|---|---|---|
| | $r_{i,t} = \alpha + \beta\sigma^2_{i,t} + \varepsilon_t$ | | $r_{i,t} = \alpha + \beta\sigma^2_{m,t} + \varepsilon_t$ | |
| | $\alpha$ | $\beta$ | $\alpha$ | $\beta$ |
| Coefficient | -0.0049 | 0.1802 | -0.0229 | 0.4158 |
| *(std. error)* | *(0.0252)* | *(0.2334)* | *(0.1492)* | *(0.4443)* |

Table 2: **Summary statistics for the risk-sorted portfolios**

This table shows monthly summary statistics for five different portfolios according to the level of risk (portfolios are labeled as Q1, Q2, Q3, Q4 and Q5 depending on the level of risk: least risky portfolio is labeled as Q1 and riskiest portfolio as Q5) over the period of July 1963 to September 2017. The portfolios are formed monthly on the variance of daily returns using NYSE breakpoints. The variance is estimated using 60 days of lagged returns. Panel A reports results for the full sample period of 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Regime-Switching GARCH model to the market portfolio. The p-value for the mean is obtained through the t-test statistic $\frac{\hat{\mu}}{\hat{s}/\sqrt{n}}$ where $\hat{\mu}$ is the estimated mean and $\hat{s}$ is the estimated long-run variance of the risk-sorted portfolio (adjusted for heteroskedasticity and serial correlation using an AR(1)-GARCH(1,1) model) and $n$ is the sample size. The symbols ***, ** and * represent significance at 1%, 5% and 10%, respectively.

| Panel A.- Risk-sorted returns: Full sample | | | | | |
|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 |
| Mean | 0.0091*** | 0.0098*** | 0.0103*** | 0.0133*** | 0.0069** |
| *(p-value)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0218)* |
| Median | 0.0115 | 0.0124 | 0.0133 | 0.0121 | 0.0073 |
| Maximum | 0.1309 | 0.1558 | 0.1977 | 0.2553 | 0.2895 |
| Minimum | -0.1636 | -0.2146 | -0.2499 | -0.2969 | -0.3085 |
| Std. Dev | 0.0340 | 0.0429 | 0.0507 | 0.0612 | 0.0792 |
| Observations | 651 | 651 | 651 | 651 | 651 |
| Panel B.- Risk-sorted returns: Low volatility periods | | | | | |
| | Q1 | Q2 | Q3 | Q4 | Q5 |
| Mean | 0.0120*** | 0.0125*** | 0.0137*** | 0.0163*** | 0.0163*** |
| *(p-value)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0011)* |
| Median | 0.0138 | 0.0157 | 0.0171 | 0.0177 | 0.0221 |
| Maximum | 0.0606 | 0.0750 | 0.0875 | 0.1152 | 0.1716 |
| Minimum | -0.0418 | -0.0788 | -0.0790 | -0.1030 | -0.1166 |
| Std. Dev | 0.0204 | 0.0241 | 0.0297 | 0.0346 | 0.0489 |
| Observations | 177 | 177 | 177 | 177 | 177 |
| Panel C.- Risk-sorted returns: High volatility periods | | | | | |
| | Q1 | Q2 | Q3 | Q4 | Q5 |
| Mean | 0.0080*** | 0.0088*** | 0.0090*** | 0.0094*** | 0.0034 |
| *(p-value)* | *(0.0000)* | *(0.0000)* | *(0.0002)* | *(0.0016)* | *(0.3633)* |
| Median | 0.0095 | 0.0111 | 0.0108 | 0.0070 | 0.0006 |
| Maximum | 0.1309 | 0.1558 | 0.1977 | 0.2553 | 0.2895 |
| Minimum | -0.1636 | -0.2146 | -0.2499 | -0.2969 | -0.3085 |
| Std. Dev | 0.0378 | 0.0480 | 0.0565 | 0.0685 | 0.0876 |
| Observations | 474 | 474 | 474 | 474 | 474 |

Table 3: **Summary statistics for the spread portfolios**

This table shows monthly summary statistics for the spreads (differences) of five different portfolios according to the level of risk (portfolios are labeled as Q1, Q2, Q3, Q4 and Q5 depending on the level of risk: least risky portfolio is labeled as Q1 and riskiest portfolio as Q5) over the period of July 1963 to September 2017. The portfolios are formed monthly on the variance of daily returns using NYSE breakpoints. The variance is estimated using 60 days of lagged returns. Panel A reports results for the full sample period of 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Regime-Switching GARCH model to the market portfolio. The p-value for the mean is obtained through the t-test statistic $\frac{\hat{\mu}}{\hat{s}/\sqrt{n}}$ where $\hat{\mu}$ is the estimated mean and $\hat{s}$ is the estimated long-run standard deviation of the spread portfolio (adjusted for heteroskedasticity and serial correlation using an AR(1)-GARCH(1,1) model) and $n$ is the sample size. The symbols ***, ** and * represent significance at 1%, 5% and 10%, respectively.

| Panel A.- Spread returns: Full sample | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Q5-Q1 | Q5-Q2 | Q5-Q3 | Q5-Q4 | Q4-Q1 | Q4-Q2 | Q4-Q3 | Q3-Q1 | Q3-Q2 | Q2-Q1 |
| Mean | -0.0022*** | -0.0029*** | -0.0035*** | -0.0044*** | 0.0022*** | 0.0015*** | 0.0010*** | 0.0013*** | 0.0005*** | 0.0007*** |
| *(p-value)* | *(0.0009)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0001)* | *(0.0000)* | *(0.000)* | *(0.0000)* |
| Median | -0.0045 | -0.0041 | -0.0040 | -0.0051 | 0.0015 | 0.0012 | 0.0001 | 0.0013 | 0.0008 | -0.0006 |
| Maximum | 0.2969 | 0.3561 | 0.2844 | 0.1648 | 0.2255 | 0.1913 | 0.1196 | 0.1500 | 0.0717 | 0.0825 |
| Minimum | -0.2851 | -0.2698 | -0.2615 | -0.2226 | -0.1634 | -0.1057 | -0.1148 | -0.1017 | -0.0837 | -0.0749 |
| Std.Dev | 0.0633 | 0.0548 | 0.0454 | 0.0328 | 0.0414 | 0.0312 | 0.0221 | 0.0285 | 0.0180 | 0.0187 |
| Risk aversion | -4.8698 | -7.9911 | -12.2816 | -24.5093 | 8.0810 | 8.1796 | 9.4826 | 7.7944 | 6.4164 | 7.8775 |
| Panel B.- Spread returns: Low volatility periods | | | | | | | | | | |
| | Q5-Q1 | Q5-Q2 | Q5-Q3 | Q5-Q4 | Q4-Q1 | Q4-Q2 | Q4-Q3 | Q3-Q1 | Q3-Q2 | Q2-Q1 |
| Mean | 0.0043*** | 0.0036*** | 0.0026*** | 0.0000 | 0.0043*** | 0.0038*** | 0.0025*** | 0.0017*** | 0.0012*** | 0.0005* |
| *(p-value)* | *(0.0004)* | *(0.0003)* | *(0.0034)* | *(0.9654)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0015)* | *(0.0022)* | *(0.0918)* |
| Median | 0.0026 | 0.0032 | 0.0022 | -0.0016 | 0.0058 | 0.0029 | 0.0027 | 0.0049 | 0.0022 | -0.0012 |
| Maximum | 0.1324 | 0.1401 | 0.1103 | 0.0881 | 0.0786 | 0.0713 | 0.0554 | 0.0524 | 0.0477 | 0.0438 |
| Minimum | -0.1026 | -0.0850 | -0.0703 | -0.0635 | -0.0618 | -0.0547 | -0.0709 | -0.0679 | -0.0437 | -0.0437 |
| Std.Dev | 0.0429 | 0.0365 | 0.0299 | 0.0255 | 0.0288 | 0.0224 | 0.0175 | 0.0211 | 0.0138 | 0.0144 |
| Risk aversion | 15.0877 | 15.3226 | 13.5417 | 0.0000 | 30.2817 | 36.1905 | 53.0612 | 18.2796 | 21.4286 | 13.5135 |
| Panel C.- Spread returns: High volatility periods | | | | | | | | | | |
| | Q5-Q1 | Q5-Q2 | Q5-Q3 | Q5-Q4 | Q4-Q1 | Q4-Q2 | Q4-Q3 | Q3-Q1 | Q3-Q2 | Q2-Q1 |
| Mean | -0.0046*** | -0.0055*** | -0.0057*** | -0.0061*** | 0.0014*** | 0.0006 | 0.0004 | 0.0011*** | 0.0003** | 0.0008*** |
| *(p-value)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0023)* | *(0.1050)* | *(0.4924)* | *(0.0000)* | *(0.0320)* | *(0.0000)* |
| Median | -0.0075 | -0.0076 | -0.0080 | -0.0066 | -0.0000 | -0.0005 | -0.0007 | -0.0002 | -0.0003 | -0.0004 |
| Maximum | 0.2969 | 0.3561 | 0.2844 | 0.1648 | 0.2255 | 0.1913 | 0.1196 | 0.1500 | 0.0717 | 0.0825 |
| Minimum | -0.2851 | -0.2698 | -0.2615 | -0.2226 | -0.1634 | -0.1057 | -0.1148 | -0.1017 | -0.0837 | -0.0749 |
| Std.Dev | 0.0693 | 0.0601 | 0.0498 | 0.0358 | 0.0452 | 0.0338 | 0.0235 | 0.0308 | 0.0194 | 0.0201 |
| Risk aversion | -9.2369 | -13.6364 | -18.3280 | -31.4136 | 4.5603 | 2.9268 | 2.5000 | 5.8824 | 3.5294 | 7.8431 |

Table 4: **Sensitivity of results to the weighting scheme and lag selection**

This table shows monthly summary statistics for five different portfolios according to the level of risk (portfolios are labeled as Q1, Q2, Q3, Q4 and Q5 depending on the level of risk: least risky portfolio is labeled as Q1 and riskiest portfolio as Q5) over the period of July 1963 to September 2017. In Panel A we show the results where we consider equally-weighted portfolios formed monthly on the variance of daily returns using NYSE breakpoints and the variance is estimated using 60 days of lagged returns. In Panel B we show the results where we consider value-weighted portfolios formed monthly on the variance of daily returns using NYSE breakpoints and the variance is estimated using one year of lagged returns. In Panel C we show the results where we consider equally-weighted portfolios formed monthly on the variance of daily returns using NYSE breakpoints and the variance is estimated using one year of lagged returns. The first 5 columns within each panel report results for the full sample period of 1963:07 to 2017:09. The remaining columns display the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model of the market portfolio. The p-value for the mean is obtained through the t-test statistic $\frac{\hat{\mu}}{\hat{s}/\sqrt{n}}$ where $\hat{\mu}$ is the estimated mean and $\hat{s}$ is the estimated long-run standard deviation of the risk-sorted portfolio (adjusted for heteroskedasticity and serial correlation using an AR(1)-GARCH(1,1) model) and $n$ is the sample size. The symbols ***, ** and * represent significance at 1%, 5% and 10%, respectively.

| EW Portfolios | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All Portfolios | | | | | LV States | | | | | HV States | | | | |
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q1 | Q2 | Q3 | Q4 | Q5 | Q1 | Q2 | Q3 | Q4 | Q5 |
| Mean | 0.0116*** | 0.0128*** | 0.0138*** | 0.0144*** | 0.0103*** | 0.0138*** | 0.0156*** | 0.0169*** | 0.0183*** | 0.0174*** | 0.0108*** | 0.0117*** | 0.0127*** | 0.0129*** | 0.0077* |
| *(p-value)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0006)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0005)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0593)* |
| Median | 0.0141 | 0.0172 | 0.0176 | 0.0176 | 0.0088 | 0.0141 | 0.0188 | 0.0197 | 0.0222 | 0.0170 | 0.0141 | 0.0150 | 0.0165 | 0.0153 | 0.0049 |
| Maximum | 0.1754 | 0.2434 | 0.2673 | 0.3049 | 0.4171 | 0.0843 | 0.0962 | 0.1005 | 0.1053 | 0.2311 | 0.1754 | 0.2434 | 0.2673 | 0.3049 | 0.4171 |
| Minimum | -0.1839 | -0.2464 | -0.2686 | -0.2878 | -0.3047 | -0.0457 | -0.0592 | -0.0759 | -0.0821 | -0.1078 | -0.1839 | -0.2464 | -0.2686 | -0.2878 | -0.3047 |
| Std. Dev. | 0.0321 | 0.0426 | 0.0497 | 0.0581 | 0.0797 | 0.0188 | 0.0236 | 0.0285 | 0.0322 | 0.0493 | 0.0358 | 0.0478 | 0.0555 | 0.0650 | 0.0883 |
| Observations | 651 | 651 | 651 | 651 | 651 | 177 | 177 | 177 | 177 | 177 | 474 | 474 | 474 | 474 | 474 |
| VW Portfolios lag 1 year | | | | | | | | | | | | | | | |
| | All Portfolios | | | | | LV States | | | | | HV States | | | | |
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q1 | Q2 | Q3 | Q4 | Q5 | Q1 | Q2 | Q3 | Q4 | Q5 |
| Mean | 0.0091*** | 0.0100*** | 0.0098*** | 0.0085*** | 0.0044 | 0.0115*** | 0.0134*** | 0.0153*** | 0.0166*** | 0.0172*** | 0.0082*** | 0.0087*** | 0.0077*** | 0.0055 | -0.0004 |
| *(p-value)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0039)* | *(0.2094)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0006)* | *(0.0031)* | *(0.0000)* | *(0.0001)* | *(0.0083)* | *(0.1324)* | *(0.9240)* |
| Median | 0.0103 | 0.0134 | 0.0127 | 0.0122 | 0.0096 | 0.0130 | 0.0147 | 0.0200 | 0.0177 | 0.0205 | 0.0082 | 0.0111 | 0.0081 | 0.0094 | 0.0046 |
| Maximum | 0.1386 | 0.1712 | 0.1721 | 0.2502 | 0.2961 | 0.0604 | 0.0661 | 0.1079 | 0.1278 | 0.2035 | 0.1386 | 0.1712 | 0.1721 | 0.2502 | 0.2961 |
| Minimum | -0.1726 | -0.2588 | -0.3119 | -0.3603 | -0.4351 | -0.0414 | -0.0626 | -0.1073 | -0.1259 | -0.1557 | -0.1726 | -0.2588 | -0.3119 | -0.3603 | -0.4351 |
| Std. Dev. | 0.0342 | 0.0477 | 0.0598 | 0.0769 | 0.0946 | 0.0199 | 0.0241 | 0.0339 | 0.0451 | 0.0557 | 0.0382 | 0.0503 | 0.0668 | 0.0857 | 0.1048 |
| Observations | 651 | 651 | 651 | 651 | 651 | 177 | 177 | 177 | 177 | 177 | 474 | 474 | 474 | 474 | 474 |
| EW Portfolios lag 1 year | | | | | | | | | | | | | | | |
| | All Portfolios | | | | | LV States | | | | | HV States | | | | |
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q1 | Q2 | Q3 | Q4 | Q5 | Q1 | Q2 | Q3 | Q4 | Q5 |
| Mean | 0.0097*** | 0.0105*** | 0.0100*** | 0.0058* | -0.0097** | 0.0116*** | 0.0133*** | 0.0164*** | 0.0133*** | 0.0051 | 0.0090*** | 0.0094*** | 0.0076** | 0.0030 | -0.0152*** |
| *(p-value)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0645)* | *(0.0140)* | *(0.0000)* | *(0.0000)* | *(0.0000)* | *(0.0085)* | *(0.4238)* | *(0.0000)* | *(0.0000)* | *(0.0105)* | *(0.4445)* | *(0.0020)* |
| Median | 0.0118 | 0.0142 | 0.0140 | 0.0080 | -0.0039 | 0.0124 | 0.0164 | 0.0220 | 0.0154 | 0.0067 | 0.0102 | 0.0120 | 0.0111 | 0.0053 | -0.0078 |
| Maximum | 0.1047 | 0.1666 | 0.1862 | 0.2775 | 0.3681 | 0.0514 | 0.0852 | 0.1085 | 0.1813 | 0.2691 | 0.1047 | 0.1666 | 0.1862 | 0.2775 | 0.3681 |
| Minimum | -0.1583 | -0.2308 | -0.2862 | -0.3486 | -0.4802 | -0.0409 | -0.0650 | -0.1007 | -0.1253 | -0.1969 | -0.1583 | -0.2308 | -0.2862 | -0.3486 | -0.4802 |
| Std. Dev. | 0.0314 | 0.0447 | 0.0614 | 0.0824 | 0.1095 | 0.0188 | 0.0251 | 0.0365 | 0.0512 | 0.0676 | 0.0349 | 0.0501 | 0.0684 | 0.0912 | 0.1211 |
| Observations | 651 | 651 | 651 | 651 | 651 | 177 | 177 | 177 | 177 | 177 | 474 | 474 | 474 | 474 | 474 |

Table 5: **Summary details of determinants of the risk-return trade-off**

This table contains summary details of the independent variables employed for the regression-based analysis of Section 4. The variables include sentiment variables (investor, consumption), real economy series (inflation, unemployment and IP growth), credit risk proxies (default, term and TED spreads), (il)liquidity variables (based on Pástor and Stambaugh (2003) and Amihud (2002)) and corporate variables (size, book-to-market, investment and profitability factors). All variables are computed at monthly frequency for the sample period 1963:07 to 2017:09. Variable definitions are presented, with FRED series codes given in parenthesis.

| Sentiment variables | |
|---|---|
| Variables | Definition and construction |
| Investor sentiment ($\Delta IS_t$) | Investor sentiment index of Baker and Wurgler (2006) in units of original index, with higher values corresponding to more positive investor outlook (obtained from authors' website) |
| Consumer sentiment ($\Delta CS_t$) | Consumer sentiment index of University of Michigan in units of original index, with higher values corresponding to more positive consumer outlook (obtained from FRED) |
| **Macro variables** | |
| Inflation ($INLF_t$) | Level of US CPI inflation expressed as monthly percentage (series CPIAUCSL from FRED) |
| Unemployment ($\Delta UNP_t$) | National US unemployment rate expressed as a percentage (series UNRATE from FRED) |
| IP growth($\Delta IP_t$) | Month-on-month percentage growth rate of US industrial production (transformation of series INDPRO from FRED) |
| **Credit risk variables** | |
| Default spread ($\Delta DS_t$) | Difference between Moody's Seasoned BAA and AAA corporate bond yields (series BAA and AAA from FRED) |
| Term spread ($\Delta TS_t$) | Difference between 10-year and 3-month US Treasury yields expressed in percentage points (series GS10 minus TB3MS, both obtained from FRED) |
| TED spread ($\Delta TED_t$) | Difference between the interest rates for three-month U.S. Treasuries contracts and the three-month Eurodollars contract as represented by the London Interbank Offered Rate (LIBOR) (series TEDRATE obtained from FRED) |
| **Liquidity variables** | |
| Pastor liquidity ($LIQ_t$) | Liquidity factor of Pástor and Stambaugh (2003) in units of original index (obtained from authors' website) |
| Amihud illiquidity ($\Delta ILLIQ_t$) | Changes in the illiquidity factor of Amihud (2002) obtained using the whole universe of stocks in CRSP. |
| **Corportate variables** | |
| SMB ($SMB_t$) | Size factor of Fama and French (1993) in units of original index (obtained from authors' website) |
| HML ($HML_t$) | Book-to-market factor of Fama and French (1993) in units of original index (obtained from authors' website) |
| RMW ($RMW_t$) | Profitability factor of Fama and French (2015) in units of original index (obtained from authors' website) |
| CMA ($CMA_t$) | Investment factor of Fama and French (2015) in units of original index (obtained from authors' website) |

Table 6: **Explanatory power of individual determinants of the risk-return trade-off**

This table reports the explanatory power of each factor by regressing the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and an individual regressor from the sentiment variables (investor, consumption), real economy series (inflation, unemployment and IP growth), credit risk proxies (default, term and TED spreads), (il)liquidity variables (based on Pástor and Stambaugh (2003) and Amihud (2002)) and corportate variables (book-to-market, investment and profitability factors) using panel-regressions. Values reported are the adjusted R-squared obtained from each regression. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A.- Full sample regression** | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA |
| All | 0.0029 | 0.0242 | 0.0148 | 0.0017 | 0.0022 | 0.0294 | 0.0001 | 0.0026 | 0.0271 | 0.0124 | 0.3141 | 0.0817 | 0.1704 | 0.1234 |
| Q5 spreads | 0.0016 | 0.0278 | 0.0146 | 0.0017 | 0.0033 | 0.0299 | 0.0003 | 0.0004 | 0.0220 | 0.0147 | 0.4531 | 0.1136 | 0.2895 | 0.1556 |
| Q4 spreads | 0.0052 | 0.0245 | 0.0167 | 0.0024 | 0.0022 | 0.0313 | 0.0001 | 0.0029 | 0.0278 | 0.0132 | 0.3355 | 0.0836 | 0.1764 | 0.1254 |
| Q3 spreads | 0.0030 | 0.0210 | 0.0137 | 0.0017 | 0.0019 | 0.0255 | 0.0001 | 0.0025 | 0.0247 | 0.0112 | 0.2744 | 0.0690 | 0.1468 | 0.1048 |
| Q2 spreads | 0.0024 | 0.0216 | 0.0150 | 0.0016 | 0.0019 | 0.0249 | 0.0001 | 0.0028 | 0.0283 | 0.0121 | 0.2705 | 0.0654 | 0.1429 | 0.1026 |
| Q1 spreads | 0.0041 | 0.0284 | 0.0170 | 0.0016 | 0.0018 | 0.0400 | 0.0009 | 0.0079 | 0.0393 | 0.0125 | 0.2677 | 0.0821 | 0.1149 | 0.1375 |
| **Panel B.- Low-volatility regime regressions** | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA |
| All | 0.0170 | 0.0035 | 0.0009 | 0.0008 | 0.0030 | 0.0015 | 0.0206 | 0.0003 | 0.0151 | 0.0023 | 0.3903 | 0.0085 | 0.1111 | 0.0141 |
| Q5 spreads | 0.0203 | 0.0041 | 0.0009 | 0.0010 | 0.0028 | 0.0012 | 0.0244 | 0.0001 | 0.0149 | 0.0061 | 0.5336 | 0.0238 | 0.1688 | 0.0196 |
| Q4 spreads | 0.0200 | 0.0023 | 0.0013 | 0.0005 | 0.0023 | 0.0018 | 0.0134 | 0.0001 | 0.0119 | 0.0032 | 0.3778 | 0.0047 | 0.1004 | 0.0090 |
| Q3 spreads | 0.0165 | 0.0027 | 0.0008 | 0.0006 | 0.0030 | 0.0015 | 0.0153 | 0.0002 | 0.0127 | 0.0023 | 0.3294 | 0.0049 | 0.0929 | 0.0093 |
| Q2 spreads | 0.0194 | 0.0032 | 0.0007 | 0.0008 | 0.0052 | 0.0019 | 0.0166 | 0.0007 | 0.0156 | 0.0026 | 0.3366 | 0.0028 | 0.0995 | 0.0077 |
| Q1 spreads | 0.0117 | 0.0057 | 0.0008 | 0.0009 | 0.0028 | 0.0014 | 0.0351 | 0.0001 | 0.0221 | 0.0001 | 0.3873 | 0.0090 | 0.0979 | 0.0266 |
| **Panel C.- High-volatility regime regressions** | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA |
| All | 0.0019 | 0.0331 | 0.0224 | 0.0024 | 0.0015 | 0.0349 | 0.0005 | 0.0043 | 0.0288 | 0.0253 | 0.3028 | 0.1057 | 0.1805 | 0.1527 |
| Q5 spreads | 0.0007 | 0.0375 | 0.0216 | 0.0019 | 0.0024 | 0.0346 | 0.0001 | 0.0007 | 0.0217 | 0.0260 | 0.4433 | 0.1399 | 0.3091 | 0.1885 |
| Q4 spreads | 0.0038 | 0.0353 | 0.0252 | 0.0036 | 0.0017 | 0.0375 | 0.0004 | 0.0048 | 0.0310 | 0.0259 | 0.3287 | 0.1129 | 0.1929 | 0.1615 |
| Q3 spreads | 0.0019 | 0.0292 | 0.0209 | 0.0025 | 0.0013 | 0.0304 | 0.0005 | 0.0042 | 0.0268 | 0.0255 | 0.2659 | 0.0917 | 0.1565 | 0.1329 |
| Q2 spreads | 0.0013 | 0.0296 | 0.0229 | 0.0025 | 0.0010 | 0.0293 | 0.0007 | 0.0050 | 0.0304 | 0.0241 | 0.2603 | 0.0884 | 0.1508 | 0.1306 |
| Q1 spreads | 0.0034 | 0.0380 | 0.0259 | 0.0027 | 0.0014 | 0.0484 | 0.0032 | 0.0032 | 0.0431 | 0.0322 | 0.2477 | 0.1058 | 0.1174 | 0.1661 |

Table 7: **Explanatory power of sub-groups of determinants to the risk-return trade-off**

This table reports the explanatory power of each category of factors by regressing the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and all sentiment variables (investor, consumption), all real economy series (inflation, unemployment and IP growth), all credit risk proxies (default, term and TED spreads), all (il)liquidity variables (based on Pástor and Stambaugh (2003) and Amihud (2002)) or all corportate variables (book-to-market, investment and profitability factors) using panel regressions. Values reported are the adjusted R-squared obtained from each regression. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on.

| **Panel A.- Full sample** | | | | | |
|---|---|---|---|---|---|
| | Sentiment | Macro | Credit | Liquidity | Corporate |
| All | 0.0264 | 0.0176 | 0.0297 | 0.0347 | 0.4398 |
| Q5 spreads | 0.0289 | 0.0183 | 0.0307 | 0.0320 | 0.6462 |
| Q4 spreads | 0.0288 | 0.0198 | 0.0316 | 0.0359 | 0.4617 |
| Q3 spreads | 0.0234 | 0.0161 | 0.0257 | 0.0315 | 0.3808 |
| Q2 spreads | 0.0234 | 0.0174 | 0.0253 | 0.0355 | 0.3737 |
| Q1 spreads | 0.0317 | 0.0194 | 0.0427 | 0.0462 | 0.3814 |
| **Panel B.- Low volatilty regime** | | | | | |
| | Sentiment | Macro | Credit | Liquidity | Corporate |
| All | 0.0225 | 0.0056 | 0.0219 | 0.0170 | 0.4230 |
| Q5 spreads | 0.0268 | 0.0056 | 0.0258 | 0.0203 | 0.5927 |
| Q4 spreads | 0.0240 | 0.0050 | 0.0151 | 0.0147 | 0.3995 |
| Q3 spreads | 0.0209 | 0.0054 | 0.0167 | 0.0147 | 0.3531 |
| Q2 spreads | 0.0246 | 0.0080 | 0.0185 | 0.0177 | 0.3612 |
| Q1 spreads | 0.0195 | 0.0054 | 0.0363 | 0.0221 | 0.4299 |
| **Panel C.- High volatilty regime** | | | | | |
| | Sentiment | Macro | Credit | Liquidity | Corporate |
| All | 0.0339 | 0.0244 | 0.0355 | 0.0437 | 0.4461 |
| Q5 spreads | 0.0377 | 0.0241 | 0.0351 | 0.0385 | 0.6571 |
| Q4 spreads | 0.0375 | 0.0280 | 0.0385 | 0.0460 | 0.4790 |
| Q3 spreads | 0.0302 | 0.0228 | 0.0311 | 0.0398 | 0.3894 |
| Q2 spreads | 0.0301 | 0.0247 | 0.0305 | 0.0441 | 0.3801 |
| Q1 spreads | 0.0399 | 0.0280 | 0.0545 | 0.0610 | 0.3783 |

Table 8: **Panel regressions for the risk-return trade-off on the full set of determinants**

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on. In the last column we display the adjusted R-squared of the corresponding regression

| **Panel A.- Full sample regressions** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0085** | 0.0187*** | 0.5404*** | 0.3200*** | 0.2080*** | -1.2544*** | -0.1261 | -0.0633 | 0.0300*** | -0.4289*** | 0.5039*** | 0.0140 | -0.4663*** | -0.5069*** | 0.4515 |
| Q5 spreads | -0.0033 | 0.0197* | 0.6046** | 0.5624** | 0.3675*** | -1.0193 | 0.6394 | 0.1287 | 0.0130 | -0.6425*** | 0.7867*** | -0.0664*** | -0.8362*** | -0.7252*** | 0.6538 |
| Q4 spreads | -0.0120 | 0.0116 | 0.4998** | 0.0651 | 0.1616** | -1.1110 | -0.1666 | -0.0665 | 0.0244 | -0.3691** | 0.4495*** | -0.0097 | -0.3955** | -0.4248** | 0.4754 |
| Q3 spreads | -0.0075 | 0.0127 | 0.4331*** | 0.1830 | 0.1473* | -0.8779 | -0.1283 | -0.0645 | 0.0240 | -0.3263** | 0.3737** | -0.0057 | -0.3392 | -0.3689** | 0.3919 |
| Q2 spreads | -0.0073 | 0.0158** | 0.5571** | 0.2669 | 0.1676 | -0.8327 | -0.1889 | -0.1086 | 0.0341*** | -0.4002* | 0.4153 | 0.0045 | -0.3782 | -0.4172* | 0.3867 |
| Q1 spreads | -0.0125* | 0.0336*** | 0.6071* | 0.5221** | 0.1963 | -2.4312*** | -0.7863** | -0.2207** | 0.0546** | -0.4061* | 0.4943* | 0.0071 | -0.3824 | -0.5988** | 0.4062 |
| **Panel B.- Low volatility state regressions** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0149* | 0.0048** | 0.0658* | 0.0639 | 0.0739 | -2.1810*** | -0.1558 | -0.2289 | 0.0037 | 0.0136 | 0.6914*** | -0.0047 | -0.3632*** | -0.3525*** | 0.4539 |
| Q5 spreads | -0.0059 | -0.0081** | 0.1839*** | 0.2462** | 0.2548** | -2.5062* | -1.5724* | -0.6369 | -0.0124 | -0.1571* | 0.9977** | -0.1513** | -0.6364*** | -0.4204* | 0.6305 |
| Q4 spreads | -0.0251 | -0.0065** | 0.0177 | -0.0189 | -0.1208 | -1.3822 | -0.5597 | -0.5801 | -0.0106 | 0.0110 | 0.6411*** | -0.0067 | -0.2173 | -0.2325 | 0.4413 |
| Q3 spreads | -0.0151 | -0.0041 | 0.0333 | 0.0131 | -0.0460 | -1.4884 | -0.1275 | -0.2997 | -0.0025 | 0.0072 | 0.5194** | 0.0035 | -0.2407 | -0.2376 | 0.3734 |
| Q2 spreads | -0.0168 | -0.0038 | 0.0332 | -0.0081 | 0.0292 | -1.8454** | 0.2442 | -0.3324 | 0.0051 | 0.0011 | 0.5723* | 0.0266 | -0.2917 | -0.2773** | 0.3908 |
| Q1 spreads | -0.0116 | -0.0015 | 0.0610 | 0.0870 | 0.0230 | -3.6829*** | 1.2363 | 0.7046 | 0.0021 | -0.2055** | 0.7264 | 0.1042 | -0.4297* | -0.5947*** | 0.4817 |
| **Panel C.- High volatility state regressions** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0064* | 0.0241*** | 0.6844*** | 0.4348*** | 0.2379*** | -1.0276*** | -0.1536 | -0.0358 | 0.0322** | -0.7882*** | 0.4770*** | 0.0154 | -0.4659*** | -0.5269*** | 0.4556 |
| Q5 spreads | -0.0017 | 0.0239* | 0.7404* | 0.9137** | 0.4628*** | -0.7779 | 0.7340 | 0.2232 | 0.0124 | -0.9552** | 0.7686*** | -0.0644*** | -0.8342*** | -0.7519*** | 0.6607 |
| Q4 spreads | -0.0098 | 0.0170 | 0.6516* | 0.1383 | 0.1909** | -0.9108 | -0.1635 | -0.0100 | 0.0279 | -0.6515** | 0.4244*** | -0.0096 | -0.4021** | -0.4463** | 0.4866 |
| Q3 spreads | -0.0057 | 0.0172 | 0.5589*** | 0.2539 | 0.1657 | -0.6977 | -0.1457 | -0.0339 | 0.0261 | -0.5933** | 0.3528** | -0.0062 | -0.3407 | -0.3857** | 0.3995 |
| Q2 spreads | -0.0049 | 0.0214*** | 0.7288* | 0.3337 | 0.1745 | -0.5957 | -0.2274 | -0.0810 | 0.0362*** | -0.7367* | 0.3904 | 0.0040 | -0.3782 | -0.4381* | 0.3915 |
| Q1 spreads | -0.0101* | 0.0414*** | 0.7425* | 0.5343 | 0.1956 | -2.1557*** | -0.9653** | -0.2771** | 0.0582** | -1.0040** | 0.4491 | -0.0007 | -0.3747 | -0.6114** | 0.4064 |

Table 9: **Regression analysis sub-groups of determinants of the risk-return tradeoff**

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor) and specific subsets of determinants including all the sentiment, macro, credit risk, liquidity and corporate determinants. Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all determinants in the panel regression while other rows results when we include a specific subgroup of determinants. In the last column we display the adjusted R-squared of the corresponding regression.

| **Panel A.- Full sample regressions all spreads** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0085** | 0.0187*** | 0.5404*** | 0.3200*** | 0.2080*** | -1.2544*** | -0.1261 | -0.0633 | 0.0300*** | -0.4289*** | 0.5039*** | 0.0140 | -0.4663*** | -0.5069*** | 0.4515 |
| Sentiment | -0.0127*** | 0.1337*** | | | | | | | | | | | | | 0.0264 |
| Macro | | | 1.6979*** | -0.4069*** | 0.2184*** | | | | | | | | | | 0.0176 |
| Credit risk | | | | | | -5.5698*** | -0.3443*** | 0.0227 | | | | | | | 0.0297 |
| Liquidity | | | | | | | | | 0.1050*** | -1.0231*** | | | | | 0.0347 |
| Corporate | | | | | | | | | | | 0.5324*** | -0.0136 | -0.4702*** | -0.5307*** | 0.4398 |
| **Panel B.- Low volatility state regressions all spreads** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0149* | 0.0048** | 0.0658* | 0.0639 | 0.0739 | -2.1810*** | -0.1558 | -0.2289 | 0.0037 | 0.0136 | 0.6914*** | -0.0047 | -0.3632*** | -0.3525*** | 0.4539 |
| Sentiment | -0.0624*** | 0.0847*** | | | | | | | | | | | | | 0.0225 |
| Macro | | | 0.5818*** | 1.5991** | 0.3153** | | | | | | | | | | 0.0056 |
| Credit risk | | | | | | -4.1648*** | 1.5172*** | 1.2983*** | | | | | | | 0.0219 |
| Liquidity | | | | | | | | | 0.0564** | -0.1430 | | | | | 0.0170 |
| Corporate | | | | | | | | | | | 0.6820*** | -0.0031 | -0.4006*** | -0.3565*** | 0.4230 |
| **Panel C.- High volatility state regressions all spreads** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0064* | 0.0241*** | 0.6844*** | 0.4348*** | 0.2379*** | -1.0276*** | -0.1536 | -0.0358 | 0.0322** | -0.7882*** | 0.4770*** | 0.0154 | -0.4659*** | -0.5269*** | 0.4556 |
| Sentiment | -0.0075*** | 0.1519*** | | | | | | | | | | | | | 0.0339 |
| Macro | | | 2.0329*** | -0.7128*** | 0.1363*** | | | | | | | | | | 0.0244 |
| Credit risk | | | | | | -5.5196*** | -0.0593 | -0.5318 | | | | | | | 0.0355 |
| Liquidity | | | | | | | | | 0.0999*** | -2.0312*** | | | | | 0.0437 |
| Corporate | | | | | | | | | | | 0.5112*** | -0.0165 | -0.4655*** | -0.5535*** | 0.4461 |

# Appendix A - Robustness determinants risk-return trade-off

**Table A1. Regression analysis determinants of the risk-return trade-off excluding sentiment variables**

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and the complete set of determinants except the sentiment variables (inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on. In the last column we display the adjusted R-squared of the corresponding regression.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A.- Full sample regressions** | | | | | | | | | | | | | |
| | Inflat. | Unemp. | IP growth | Default Spread | TED Spread | Term Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | 0.5865*** | 0.3909*** | 0.2248*** | -1.3148*** | -0.1076 | -0.0902 | 0.0294** | -0.4331*** | 0.5059*** | -0.0153 | -0.4692*** | -0.5133*** | 0.4500 |
| Q5 spreads | 0.6301* | 0.5817** | 0.3816*** | -1.1058 | 0.6462 | 0.1034 | 0.0131 | -0.6440** | 0.7911*** | -0.0648*** | -0.8373*** | -0.7290*** | 0.6535 |
| Q4 spreads | 0.5559* | 0.1749 | 0.1762** | -1.1215 | -0.1400 | -0.0810 | 0.0232 | -0.3754** | 0.4481*** | -0.0140 | -0.3994** | -0.4322** | 0.4724 |
| Q3 spreads | 0.4714*** | 0.2478 | 0.1598* | -0.9121 | -0.1119 | -0.0807 | 0.0233 | -0.3301** | 0.3743* | -0.0074 | -0.3417 | -0.3741** | 0.3903 |
| Q2 spreads | 0.5965** | 0.3278* | 0.1818 | -0.8835 | -0.1730 | -0.1288 | 0.0336*** | -0.4038* | 0.4169 | 0.0034 | -0.3808 | -0.4226* | 0.3853 |
| Q1 spreads | 0.6787** | 0.6222** | 0.2247* | -2.5512*** | -0.7593** | -0.2637** | 0.0538** | -0.4112* | 0.4990* | 0.0062 | -0.3869 | -0.6088** | 0.4031 |
| **Panel B.- Low volatility sstate regressions** | | | | | | | | | | | | | |
| | Inflat. | Unemp. | IP growth | Default Spread | TED Spread | Term Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | 0.0164 | 0.1906* | -0.0925 | -1.8655*** | -0.6059 | 0.1419 | 0.0083 | -0.1457 | 0.6514*** | -0.0141 | -0.3260*** | -0.2924*** | 0.4275 |
| Q5 spreads | 0.1206 | 0.3359* | -0.1697* | -2.2202** | -1.6203** | 0.0501 | 0.0065 | -0.3624** | 0.9456** | -0.1382** | -0.5431*** | -0.3426*** | 0.6023 |
| Q4 spreads | 0.0917 | 0.0564 | -0.1138 | -1.7191** | -0.7128* | -0.1910 | 0.0028 | -0.1686 | 0.5997*** | 0.0040 | -0.2408* | -0.2207* | 0.4055 |
| Q3 spreads | 0.0299 | 0.1423 | -0.0547 | -1.4289*** | -0.4189 | 0.0072 | 0.0056 | -0.1279 | 0.4885** | 0.0020 | -0.2303* | -0.2066* | 0.3569 |
| Q2 spreads | 0.0074 | 0.2745 | 0.0108 | -1.6649** | -0.2055 | 0.0426 | 0.0151 | -0.1609 | 0.5400* | 0.0215 | -0.2728 | -0.2402** | 0.3652 |
| Q1 spreads | -0.1678* | 0.1439 | -0.1351 | -2.2943** | -0.0689 | 0.8007 | 0.0301** | -0.0913 | 0.6832* | 0.0403 | -0.3430* | -0.4520** | 0.4378 |
| **Panel C.- High volatility sstate regressions** | | | | | | | | | | | | | |
| | Inflat. | Unemp. | IP growth | Default Spread | TED Spread | Term Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | 0.7948*** | 0.5174** | 0.2907*** | -1.2181*** | -0.0184 | -0.0841 | 0.0315*** | -0.6645*** | 0.4762*** | -0.0062 | -0.4806 | -0.5587 | 0.4592 |
| Q5 spreads | 0.8824* | 1.0030*** | 0.5231*** | -0.9979 | 1.0752 | 0.1649 | 0.0120 | -0.8054** | 0.7733*** | -0.0485** | -0.8587*** | -0.7870** | 0.6669 |
| Q4 spreads | 0.7354* | 0.2300 | 0.2357** | -1.0454 | -0.0316 | -0.0406 | 0.0273 | -0.5073* | 0.4186*** | -0.0094 | -0.4130** | -0.4752** | 0.4929 |
| Q3 spreads | 0.6360*** | 0.2974 | 0.2002 | -0.8283 | -0.0535 | -0.0676 | 0.0257 | -0.4832* | 0.3507* | -0.0019 | -0.3508 | -0.4091** | 0.4016 |
| Q2 spreads | 0.8150* | 0.3129 | 0.2017 | -0.7451 | -0.1593 | -0.1247 | 0.0361*** | -0.5950** | 0.3890 | 0.0097 | -0.3895 | -0.4629* | 0.3945 |
| Q1 spreads | 0.9054* | 0.7436** | 0.2927* | -2.4738*** | -0.9229** | -0.3527** | 0.0564** | -0.9316*** | 0.4496 | 0.0191 | -0.3909 | -0.6595** | 0.4081 |

## Table A2. Regression analysis determinants of the risk-return trade-off excluding macro variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and the complete set of determinants except the sentiment variables (inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on. In the last column we display the adjusted R-squared of the corresponding regression.

| **Panel A.- Full sample regressions** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Investor Sentim. | Consumer Sentim. | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0094** | 0.0229*** | -1.4749*** | -0.0775 | -0.1165* | 0.0312** | -0.4251*** | 0.5070** | -0.0158 | -0.4654*** | -0.5053*** | 0.4489 |
| Q5 spreads | -0.0044 | 0.0264* | -1.3134 | 0.7529 | 0.0414 | 0.0142 | -0.6312** | 0.7895*** | -0.0665*** | -0.8362*** | -0.7240** | 0.6507 |
| Q4 spreads | -0.0126 | 0.0156 | -1.3357 | -0.0128 | -0.0116 | 0.0261 | -0.3709** | 0.4523*** | -0.0109 | -0.3949** | -0.4242** | 0.4726 |
| Q3 spreads | -0.0081 | 0.0159 | -1.0554* | -0.0961 | -0.1027 | 0.0251 | -0.3252** | 0.3762* | -0.0072 | -0.3384 | -0.3678** | 0.3895 |
| Q2 spreads | -0.0082 | 0.0194** | -1.0421* | -0.1597 | -0.1491** | 0.0354*** | -0.3986* | 0.4187 | 0.0020 | -0.3770 | -0.4152* | 0.3839 |
| Q1 spreads | -0.0138** | 0.0371*** | -2.6283*** | -0.7568* | -0.2563** | 0.0554** | -0.3995* | 0.4984* | 0.0034 | -0.3806 | -0.5954** | 0.4038 |
| **Panel B.- Low volatility state regressions** | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0113** | -0.0077 | -1.9150*** | -0.6394* | 0.1213 | 0.0084 | -0.1359 | 0.6531*** | -0.0117 | -0.3046*** | -0.2837*** | 0.4285 |
| Q5 spreads | -0.0092 | -0.0140* | -2.3235** | -1.6211** | 0.0215 | -0.0046 | -0.3430** | 0.9456** | -0.1359** | -0.5263*** | -0.3385** | 0.6019 |
| Q4 spreads | -0.0161 | -0.0128* | -1.8493** | -0.7706* | -0.2027 | -0.0016 | -0.1540 | 0.6024*** | 0.0078 | -0.2105* | -0.2060 | 0.4087 |
| Q3 spreads | -0.0115* | -0.0068 | -1.4894*** | -0.4549 | -0.0053 | 0.0056 | -0.1180 | 0.4917** | 0.0050 | -0.2076 | -0.1975* | 0.3590 |
| Q2 spreads | -0.0156 | -0.0045 | -1.7144** | -0.2494 | 0.0301 | 0.0133 | -0.1482 | 0.5478* | 0.0271 | -0.2390 | -0.2285** | 0.3683 |
| Q1 spreads | -0.0044 | -0.0006 | -2.1985** | -0.1014 | 0.7627** | 0.0295** | 0.0840 | 0.6781* | 0.0374 | -0.3395* | -0.4469*** | 0.4370 |
| **Panel C.- High volatility state regressions** | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Default Spread | Term Spread | TED Spread | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0085** | 0.0338*** | -1.3864*** | -0.0537 | -0.1191 | 0.0338** | -0.6620*** | 0.4724*** | -0.0416 | -0.4806*** | -0.5420*** | 0.4570 |
| Q5 spreads | -0.0041 | 0.0362* | -1.2447 | 1.1439 | 0.0777 | 0.0131 | -0.8053** | 0.7646*** | -0.0599 | -0.8619*** | -0.7697** | 0.6622 |
| Q4 spreads | -0.0116 | 0.0269* | -1.2609 | -0.0726 | -0.0855 | 0.0308 | -0.5104* | 0.4187*** | -0.0126 | -0.4125*** | -0.4596*** | 0.4918 |
| Q3 spreads | -0.0072 | 0.0248* | -0.9740 | -0.0916 | -0.0947 | 0.0278 | -0.4859* | 0.3490* | -0.0078 | -0.3504 | -0.3963** | 0.3997 |
| Q2 spreads | -0.0064 | 0.0300*** | -0.9021 | -0.2279 | -0.1446 | 0.0382*** | -0.6057** | 0.3867 | -0.0005 | -0.3882 | -0.4480* | 0.3919 |
| Q1 spreads | -0.0132** | 0.0511*** | -2.5502*** | -1.0152* | -0.3483** | 0.0592** | -0.9029** | 0.4432 | 0.0079 | -0.3901 | -0.63662** | 0.4083 |

## Table A3. Regression analysis determinants of the risk-return trade-off excluding credit risk variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and the complete set of determinants except credit risk variables (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on. In the last column we display the adjusted R-squared of the corresponding regression.

| **Panel A.- Full sample regressions** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp | IP growth | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0080** | 0.0241*** | 0.6084*** | 0.2370* | 0.2173*** | 0.0332** | -0.4671*** | 0.5064*** | -0.0125 | -0.4716*** | -0.5103*** | 0.4500 |
| Q5 spread | -0.0032 | 0.0211 | 0.6243* | 0.5413** | 0.3821*** | 0.0118 | -0.6651** | 0.7933*** | -0.0572*** | -0.8400*** | -0.7294** | 0.6529 |
| Q4 spreads | -0.0115 | 0.0165 | 0.5626* | -0.0101 | 0.1689** | 0.0275 | -0.4036** | 0.4515*** | -0.0088 | -0.4003** | -0.4277** | 0.4737 |
| Q3 spreads | -0.0071 | 0.0167 | 0.4828** | 0.1214 | 0.1539* | 0.0264 | -0.3535** | 0.3751* | -0.0051 | -0.3428 | -0.3712** | 0.3907 |
| Q2 spreads | -0.0069 | 0.0202** | 0.6080** | 0.2001 | 0.1750 | 0.0369*** | -0.4268* | 0.4158 | 0.0037 | -0.3816 | -0.4192* | 0.3856 |
| Q1 spreads | -0.0112* | 0.0457*** | 0.7643** | 0.3331 | 0.2064 | 0.0633*** | -0.4863* | 0.4963* | 0.0051 | -0.3933 | -0.6041** | 0.3998 |
| **Panel B.- Low volatility state regressions** | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp | IP growth | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0110* | -0.0014 | 0.0227 | 0.0159 | -0.0832 | 0.0133* | -0.1584* | 0.6498*** | -0.0007 | -0.3128*** | -0.2876*** | 0.4261 |
| Q5 spreads | -0.0080 | -0.0031 | 0.0559 | 0.1161 | -0.1611* | 0.0079 | -0.3765** | 0.9315** | -0.1159** | -0.5434*** | -0.3529** | 0.5969 |
| Q4 spreads | -0.0161 | -0.0064 | 0.0828 | -0.1544 | -0.1096 | 0.0032 | -0.1730* | 0.5934*** | 0.0205 | -0.2180* | -0.2127* | 0.4053 |
| Q3 spreads | -0.0113* | -0.0021 | 0.0364 | -0.0090 | -0.0489 | 0.0090 | -0.1358 | 0.4869** | 0.0130 | -0.2143 | -0.1998* | 0.3568 |
| Q2 spreads | -0.0153 | -0.0002 | 0.0344 | 0.0983 | 0.0180 | 0.0160** | -0.1721 | 0.5418* | 0.0324 | -0.2481 | -0.2269** | 0.3664 |
| Q1 spreads | -0.0043 | 0.0045 | -0.0960 | 0.0283 | -0.1140 | 0.0304** | 0.0655 | 0.6958* | 0.0464 | -0.3403* | -0.4455*** | 0.4330 |
| **Panel C.- High volatility state regressions** | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp | IP growth | Pastor Liquid. | Amihud Illiquid. | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0064* | 0.0354*** | 0.8330*** | 0.3721* | 0.2683*** | 0.0355** | -0.6646*** | 0.4739*** | -0.0054 | -0.4841*** | -0.5543*** | 0.4597 |
| Q5 spreads | -0.0024 | 0.0277 | 0.8250* | 0.9944*** | 0.5195*** | 0.0104 | -0.7751** | 0.7733 | -0.0347** | -0.8629*** | -0.7911*** | 0.6658 |
| Q4 spreads | -0.0101 | 0.0267 | 0.7423* | 0.0567 | 0.2123* | 0.0318 | -0.5098* | 0.4198*** | -0.0048 | -0.4164** | -0.4691** | 0.4947 |
| Q3 spreads | -0.0057 | 0.0252 | 0.6582** | 0.1826 | 0.1818 | 0.0288 | -0.4806* | 0.3490* | -0.0014 | -0.3531 | -0.4049** | 0.4024 |
| Q2 spreads | -0.0045 | 0.0310*** | 0.8493** | 0.2087 | 0.1796 | 0.0393*** | -0.5820** | 0.3838 | 0.0059 | -0.3908 | -0.4577* | 0.3953 |
| Q1 spreads | -0.0095* | 0.0618*** | 1.0904** | 0.4182 | 0.2485 | 0.0673** | -0.9755** | 0.4433 | 0.0083 | -0.3974 | -0.6486** | 0.4046 |

## Table A4. Regression analysis determinants of the risk-return trade-off excluding liquidity variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and the complete set of determinants except liquidity variables (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on. In the last column we display the adjusted R-squared of the corresponding regression.

| **Panel A.- Full sample regressions** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0080*** | 0.0200*** | 0.5828*** | 0.1701 | 0.1977*** | -1.4897*** | -0.2568 | -0.0761 | 0.5156*** | -0.0146 | -0.4615*** | -0.5158*** | 0.4481 |
| Q5 spreads | -0.0032 | 0.0203 | 0.6344* | 0.4449** | 0.3563*** | -1.2509 | 0.5664 | 0.1232 | 0.7959*** | -0.0674*** | -0.8333 | -0.7299** | 0.6518 |
| Q4 spreads | -0.0117 | 0.0127 | 0.5348* | -0.0551 | 0.1529** | -1.3083 | -0.2737 | -0.0745 | 0.4593*** | -0.0102 | -0.3916** | -0.4320** | 0.4721 |
| Q3 spreads | -0.0071 | 0.0138 | 0.4666** | 0.0691 | 0.1393 | -1.0613 | -0.2322 | -0.0723 | 0.3829* | -0.0061 | -0.3354 | -0.3759** | 0.3886 |
| Q2 spreads | -0.0067 | 0.0173** | 0.6031** | 0.1129 | 0.1570 | -1.0750* | -0.3341 | -0.1195 | 0.4278 | 0.0040 | -0.3730 | -0.4270* | 0.3820 |
| Q1 spreads | -0.0116* | 0.0360*** | 0.6750** | 0.3034 | 0.1829 | -2.7528*** | -1.0105** | -0.2373** | 0.5122* | 0.0066 | -0.3743 | -0.6140** | 0.3999 |
| **Panel B.- Low volatility state regressions** | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0113** | -0.0096 | 0.0493 | 0.0386 | -0.1009 | -2.0357*** | -0.7461** | 0.1367 | 0.6631*** | -0.0117 | -0.2986*** | -0.2780*** | 0.4284 |
| Q5 spreads | -0.0084 | -0.0204* | 0.1333 | 0.1957 | -0.1792* | -2.5841** | -1.6841*** | 0.0383 | 0.9754** | -0.1440** | -0.5175*** | -0.3182* | 0.6011 |
| Q4 spreads | -0.0163 | -0.0163* | 0.1262 | -0.1181 | -0.1171 | -1.9487** | -0.8018** | -0.2069 | 0.6105*** | 0.0048 | -0.2033 | -0.1984 | 0.4090 |
| Q3 spreads | -0.0115* | -0.0086 | 0.0584 | -0.0009 | -0.0612 | -1.5778** | -0.5321 | 0.0008 | 0.4986** | 0.0041 | -0.2031 | -0.1922 | 0.3586 |
| Q2 spreads | -0.0157 | -0.0061 | 0.0457 | 0.0660 | -0.0016 | -1.8178* | -0.3941 | 0.0393 | 0.5551* | 0.0263 | -0.2359 | -0.2230** | 0.3670 |
| Q1 spreads | -0.0047 | 0.0033 | -0.1167 | 0.0507 | -0.1454 | -2.2408* | -0.3134 | 0.8118 | 0.6939* | 0.0504 | -0.3330* | -0.4580*** | 0.4361 |
| **Panel C.- High volatility state regressions** | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0060* | 0.0341*** | 0.8356*** | 0.3382 | 0.2512*** | -1.3782*** | -0.1823 | -0.0484 | 0.4820*** | -0.0093 | -0.4733*** | -0.5640*** | 0.4570 |
| Q5 spreads | -0.0016 | 0.0321 | 0.9468* | 0.9173*** | 0.4904*** | -1.0923 | 0.9778 | 0.2028 | 0.7731*** | -0.0509** | -0.8560*** | -0.7936** | 0.6658 |
| Q4 spreads | -0.0098 | 0.0263 | 0.7369* | 0.0273 | 0.2007* | -1.2042 | -0.1854 | -0.0150 | 0.4265*** | -0.0092 | -0.4063** | -0.4768** | 0.4922 |
| Q3 spreads | -0.0053 | 0.0252 | 0.6622** | 0.1494 | 0.1701 | -0.9598 | -0.1843 | -0.0419 | 0.3561* | -0.0040 | -0.3449 | -0.4128** | 0.3995 |
| Q2 spreads | -0.0039 | 0.0318*** | 0.8671** | 0.1477 | 0.1656 | -0.9122 | -0.3238 | -0.0924 | 0.3952 | 0.0048 | -0.3814 | -0.4695 | 0.3908 |
| Q1 spreads | -0.0096* | 0.0552*** | 0.9651** | 0.4493 | 0.2292 | -2.7223*** | -1.1960** | -0.2955*** | 0.4593 | 0.0126 | -0.3780 | -0.6672** | 0.4032 |

## Table A5. Regression analysis determinants of the risk-return trade-off excluding corporate variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of returns spreads of the risk-sorted portfolios over time) on a constant and the complete set of determinants except corporate variables (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all spread portfolios in the panel regression. The second row only includes the four spreads involving the portfolio labeled as Q5. The third row only includes the four spreads involving the portfolio labeled as Q4, and so on. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0152*** | 0.0956*** | 1.0958*** | 0.3242** | 0.1446*** | -3.7457*** | 0.0114 | 0.2424 | 0.0854*** | -0.8229*** | 0.0777 |
| Q5 spreads | -0.0141 | 0.1416** | 1.4867** | 0.5861** | 0.2699*** | -5.0964** | 0.8140 | 0.6482 | 0.0978** | -1.2721*** | 0.0803 |
| Q4 spreads | -0.0173 | 0.0797** | 0.9849** | 0.0758 | 0.1073* | -3.2884 | -0.0325 | 0.2162 | 0.0725* | -0.7141** | 0.0837 |
| Q3 spreads | -0.0121* | 0.0696** | 0.8393** | 0.1868 | 0.1016 | -2.7139** | -0.0192 | 0.1697 | 0.0646** | -0.6159** | 0.0696 |
| Q2 spreads | -0.0123* | 0.0796* | 1.0023* | 0.2662 | 0.1183 | -2.8850* | -0.0584 | 0.1598 | 0.0790** | -0.7207* | 0.0729 |
| Q1 spreads | -0.0199** | 0.1074* | 1.1658* | 0.5061** | 0.1261 | -4.7446** | -0.6470* | 0.0179 | 0.1129** | -0.7915* | 0.0999 |

**Panel B.- Low volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0374*** | 0.0401*** | 0.0878 | 0.6448*** | 0.2592*** | -0.9322*** | 0.5693** | 1.7415*** | 0.0709*** | -0.3074** | 0.0615 |
| Q5 spreads | -0.0517** | 0.0568** | 0.1507 | 0.9343** | 0.3163* | -0.7269 | 0.2353 | 2.4316*** | 0.0820** | -0.6200*** | 0.0719 |
| Q4 spreads | -0.0369** | 0.0293* | 0.1897 | 0.4431* | 0.2170* | -1.0349 | 0.3267 | 1.2313* | 0.0543* | -0.3161** | 0.0536 |
| Q3 spreads | -0.0299** | 0.0286* | 0.0952 | 0.4611* | 0.2123* | -0.8144*** | 0.4430 | 1.1802* | 0.0525* | -0.2482 | 0.0529 |
| Q2 spreads | -0.0360 | 0.0351** | 0.0813 | 0.5954** | 0.3082 | -1.0576* | 0.7336** | 1.3487** | 0.0673** | -0.2924 | 0.0640 |
| Q1 spreads | -0.0324 | 0.0507** | -0.0777 | 0.7904** | 0.2420 | -1.0273* | 1.1078** | 2.5068** | 0.0982** | -0.0600 | 0.0755 |

**Panel C.- High volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0099** | 0.1238*** | 1.5161*** | 0.1631 | 0.0240 | -3.5323*** | -0.0779 | 0.1364 | 0.0820*** | -1.3181*** | 0.0927 |
| Q5 spreads | -0.0056 | 0.1829** | 2.1365** | 0.6162** | 0.1317*** | -4.9223** | 0.9854* | 0.5519** | 0.0883* | -1.8828** | 0.0932 |
| Q4 spreads | -0.0128 | 0.1057** | 1.3384** | -0.1249 | 0.0021 | -3.0967** | -0.0892 | 0.1542 | 0.0721* | -1.0736** | 0.1015 |
| Q3 spreads | -0.0081 | 0.0913** | 1.1570** | 0.0263 | 0.0040 | -2.5324* | -0.0994 | 0.0987 | 0.0628** | -0.9612** | 0.0836 |
| Q2 spreads | -0.0071 | 0.1046* | 1.3944* | 0.0262 | -0.0159 | -2.6174* | -0.1912 | 0.0700 | 0.0766** | -1.1234* | 0.0874 |
| Q1 spreads | -0.0160** | 0.1348* | 1.5543* | 0.2718 | -0.0018 | -4.4931** | -1.0003* | -0.1928 | 0.1103** | -1.5499** | 0.1232 |

## Table A6. Regression analysis sub-groups of determinants of the risk-return trade-off for Q5 spreads

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of the returns spreads involving the highest risk-sorted portfolios Q5 over time) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor) and specific subsets of determinants including all the sentiment, macro, credit risk, liquidity and corporate determinants. Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all determinants in the panel regression while other rows results when we include a specific subgroup of determinants. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions Q5 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0033 | 0.0197* | 0.6046** | 0.5624** | 0.3675*** | -1.0193 | 0.6394 | 0.1287 | 0.0130 | -0.6425*** | 0.7867*** | -0.0664*** | -0.8362*** | -0.7252*** | 0.6538 |
| Sentiment | -0.0116 | 0.1888** | | | | | | | | | | | | | 0.0289 |
| Macro | | | 2.2141** | -0.3553 | 0.3774** | | | | | | | | | | 0.0183 |
| Credit risk | | | | | | -7.6694** | 0.4269 | 0.3311 | | | | | | | 0.0307 |
| Liquidity | | | | | | | | | 0.1211** | -1.5322** | | | | | 0.0320 |
| Corporate | | | | | | | | | | | 0.8158*** | -0.0541*** | -0.8407*** | -0.7429** | 0.6462 |

**Panel B.- Low volatility state regressions Q5 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0085 | -0.0157* | 0.1631 | 0.2534 | -0.1686* | -2.3716** | -1.7176** | 0.0388 | -0.0067 | -0.3433** | 0.9525** | -0.1360** | -0.5242*** | -0.3336** | 0.6023 |
| Sentiment | -0.0555** | 0.0633** | | | | | | | | | | | | | 0.0268 |
| Macro | | | 0.4706** | 0.8392** | 0.3462* | | | | | | | | | | 0.0056 |
| Credit risk | | | | | | -1.7626** | -0.4298* | 2.6839** | | | | | | | 0.0258 |
| Liquidity | | | | | | | | | 0.0907** | -0.5426*** | | | | | 0.0203 |
| Corporate | | | | | | | | | | | 0.9303** | -0.1251** | -0.5572*** | -0.3480*** | 0.5927 |

**Panel C.- High volatility state regressions Q5 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0021 | 0.0271 | 0.8721** | 0.9887*** | 0.4994*** | -0.8777 | 1.0487 | 0.2016 | 0.1239 | -0.7617** | 0.7659*** | -0.0519** | -0.8584*** | -0.7828** | 0.6673 |
| Sentiment | -0.0039 | 0.2417*** | | | | | | | | | | | | | 0.0377 |
| Macro | | | 2.9514** | -0.4841 | 0.2851*** | | | | | | | | | | 0.0241 |
| Credit risk | | | | | | -8.0422*** | 0.5458 | 0.1613 | | | | | | | 0.0351 |
| Liquidity | | | | | | | | | 0.1098** | -2.8543** | | | | | 0.0385 |
| Corporate | | | | | | | | | | | 0.7960*** | -0.0364*** | -0.8659*** | -0.8010** | 0.6571 |

## Table A7. Regression analysis sub-groups of determinants of the risk-return trade-off for Q4 spreads

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of the returns spreads involving the medium-high risk-sorted portfolios Q4 over time) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor) and specific subsets of determinants including all the sentiment, macro, credit risk, liquidity and corporate determinants. Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all determinants in the panel regression while other rows results when we include a specific subgroup of determinants. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions Q4 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0120 | 0.0116 | 0.4998** | 0.0651 | 0.1616** | -1.1110 | -0.1666 | -0.0665 | 0.0244 | -0.3691** | 0.4495*** | -0.0097 | -0.3955** | -0.4248** | 0.4754 |
| Sentiment | -0.0150 | 0.1135** | | | | | | | | | | | | | 0.0288 |
| Macro | | | 1.5209** | -0.5072 | 0.1703** | | | | | | | | | | 0.0198 |
| Credit risk | | | | | | -4.8547** | 0.0222 | -0.3376 | | | | | | | 0.0316 |
| Liquidity | | | | | | | | | 0.0899** | -0.8958*** | | | | | 0.0359 |
| Corporate | | | | | | | | | | | 0.4709*** | -0.0128 | -0.4007** | -0.4473*** | 0.4617 |

**Panel B.- Low volatility state regressions Q4 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0164 | -0.0142* | 0.1411 | -0.0957 | -0.1129 | -1.8569** | -0.8229* | -0.2062 | -0.0040 | -0.1494 | 0.6088*** | 0.0086 | -0.2061 | -0.2052 | 0.4098 |
| Sentiment | -0.0390** | 0.0358** | | | | | | | | | | | | | 0.0240 |
| Macro | | | 0.3784** | 0.4501* | 0.2306* | | | | | | | | | | 0.0050 |
| Credit risk | | | | | | -1.6400* | -0.0754 | 1.4100* | | | | | | | 0.0151 |
| Liquidity | | | | | | | | | 0.0585* | -0.2766** | | | | | 0.0147 |
| Corporate | | | | | | | | | | | 0.5866** | 0.0115 | -0.2511** | -0.2204* | 0.3995 |

**Panel C.- High volatility state regressions Q4 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0106 | 0.0223 | 0.6709* | 0.1244 | 0.2090** | -0.9793 | -0.0822 | -0.0121 | 0.0294 | -0.4634* | 0.4166*** | -0.0067 | -0.4124** | -0.4666** | 0.4960 |
| Sentiment | -0.0390** | 0.0358** | | | | | | | | | | | | | 0.0375 |
| Macro | | | 0.3784** | 0.4501* | 0.2306* | | | | | | | | | | 0.0280 |
| Credit risk | | | | | | -1.6400* | -0.0754 | 1.4100* | | | | | | | 0.0385 |
| Liquidity | | | | | | | | | 0.0585* | -0.2766** | | | | | 0.0460 |
| Corporate | | | | | | | | | | | 0.5866** | 0.0115 | -0.2511** | -0.2204* | 0.4790 |

## Table A8. Regression analysis sub-groups of determinants of the risk-return trade-off for Q3 spreads

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of the returns spreads involving the medium risk-sorted portfolios Q3 over time) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor) and specific subsets of determinants including all the sentiment, macro, credit risk, liquidity and corporate determinants. Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all determinants in the panel regression while other rows results when we include a specific subgroup of determinants. In the last column we display the adjusted R-squared of the corresponding regression.

| **Panel A.- Full sample regressions Q3 spreads** | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0075 | 0.0127 | 0.4331*** | 0.1830 | 0.1473* | -0.8779 | -0.1283 | -0.0645 | 0.0240 | -0.3263** | 0.3737** | -0.0057 | -0.3392 | -0.3689** | 0.3919 |
| Sentiment | -0.0103* | 0.0982** | | | | | | | | | | | | | 0.0234 |
| Macro | | | 1.2884** | -0.3477* | 0.1550* | | | | | | | | | | 0.0161 |
| Credit risk | | | | | | -4.0779** | -0.2913 | 0.0057 | | | | | | | 0.0257 |
| Liquidity | | | | | | | | | 0.0792*** | -0.7644** | | | | | 0.0315 |
| Corporate | | | | | | | | | | | 0.3945* | -0.0070 | -0.3419 | -0.3873** | 0.3808 |
| **Panel B.- Low volatility state regressions Q3 spreads** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0114* | -0.0073 | 0.0589 | 0.0374 | -0.0543 | -1.5006** | -0.4841 | -0.0023 | 0.0047 | -0.1173 | 0.4942** | 0.0051 | -0.2064 | -0.1961* | 0.3593 |
| Sentiment | -0.0321** | 0.0338** | | | | | | | | | | | | | 0.0209 |
| Macro | | | 0.2954** | 0.4514** | 0.2291* | | | | | | | | | | 0.0054 |
| Credit risk | | | | | | -1.3495*** | 0.0260 | 1.3473* | | | | | | | 0.0167 |
| Liquidity | | | | | | | | | 0.0546** | -0.2109 | | | | | 0.0147 |
| Corporate | | | | | | | | | | | 0.4866** | 0.0095 | -0.2356* | -0.2073* | 0.3531 |
| **Panel C.- High volatility state regressions Q3 spreads** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0061 | 0.0214 | 0.6000** | 0.2394 | 0.1779 | -0.7496 | -0.0887 | -0.0394 | 0.0269 | -0.4447* | 0.3469* | -0.0019 | -0.3504 | -0.4033** | 0.4033 |
| Sentiment | -0.0063 | 0.1258** | | | | | | | | | | | | | 0.0302 |
| Macro | | | 1.7174** | -0.5975*** | 0.0760 | | | | | | | | | | 0.0228 |
| Credit risk | | | | | | -4.2214** | -0.4065 | -0.1079 | | | | | | | 0.0311 |
| Liquidity | | | | | | | | | 0.0768*** | -1.4967** | | | | | 0.0398 |
| Corporate | | | | | | | | | | | 0.3751* | -0.0094 | -0.3483 | -0.4184** | 0.3894 |

## Table A9. Regression analysis sub-groups of determinants of the risk-return trade-off for Q2 spreads

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of the returns spreads involving the medium-low risk-sorted portfolios Q2 over time) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor) and specific subsets of determinants including all the sentiment, macro, credit risk, liquidity and corporate determinants. Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all determinants in the panel regression while other rows results when we include a specific subgroup of determinants. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions Q2 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0073 | 0.0158** | 0.5571** | 0.2669 | 0.1676 | -0.8327 | -0.1889 | -0.1086 | 0.0341*** | -0.4002* | 0.4153 | 0.0045 | -0.3782 | -0.4172* | 0.3867 |
| Sentiment | -0.0103* | 0.1120* | | | | | | | | | | | | | 0.0234 |
| Macro | | | 1.5105* | -0.3748 | 0.1764 | | | | | | | | | | 0.0174 |
| Credit risk | | | | | | -4.4946* | -0.3975 | -0.0278 | | | | | | | 0.0253 |
| Liquidity | | | | | | | | | 0.0956** | -0.8828* | | | | | 0.0355 |
| Corporate | | | | | | | | | | | 0.4417 | 0.0016 | -0.3791 | -0.4388* | 0.3737 |

**Panel B.- Low volatility state regressions Q2 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0153 | -0.0048 | 0.0356 | 0.1356 | 0.0108 | -1.7129* | -0.2707 | 0.0318 | 0.0135 | -0.1522 | 0.5464* | 0.0258 | -0.2412 | -0.2267** | 0.3683 |
| Sentiment | -0.0389 | 0.0409* | | | | | | | | | | | | | 0.0246 |
| Macro | | | 0.3369* | 0.5953* | 0.3275* | | | | | | | | | | 0.0080 |
| Credit risk | | | | | | -1.7161* | 0.1930 | 1.5510** | | | | | | | 0.0185 |
| Liquidity | | | | | | | | | 0.0675** | -0.2459 | | | | | 0.0177 |
| Corporate | | | | | | | | | | | 0.5475* | 0.0311 | -0.2736 | -0.2397** | 0.3612 |

**Panel C.- High volatility state regressions Q2 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0050 | 0.0270*** | 0.7868* | 0.2693 | 0.1757 | -0.6359 | -0.1951 | -0.0885 | 0.0371*** | -0.5489** | 0.3829 | 0.0080 | -0.3890 | -0.4571* | 0.3960 |
| Sentiment | -0.0053 | 0.1431* | | | | | | | | | | | | | 0.0301 |
| Macro | | | 2.0253* | -0.7185* | 0.0621 | | | | | | | | | | 0.0247 |
| Credit risk | | | | | | -4.6089* | -0.5912 | -0.1626 | | | | | | | 0.0305 |
| Liquidity | | | | | | | | | 0.0930** | -1.7257* | | | | | 0.0441 |
| Corporate | | | | | | | | | | | 0.4191 | -0.0042 | -0.3833 | -0.4730 | 0.3801 |

## Table A10. Regression analysis sub-groups of determinants of the risk-return trade-off for Q1 spreads

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of the estimated risk-return trade-off (computed by using all combinations of the returns spreads involving the low risk-sorted portfolios Q1 over time) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor) and specific subsets of determinants including all the sentiment, macro, credit risk, liquidity and corporate determinants. Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all determinants in the panel regression while other rows results when we include a specific subgroup of determinants. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions Q1 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0125* | 0.0336*** | 0.6071* | 0.5221** | 0.1963 | -2.4312*** | -0.7863** | -0.2207** | 0.0546** | -0.4061* | 0.4943* | 0.0071 | -0.3824 | -0.5988** | 0.4062 |
| Sentiment | -0.0166** | 0.1561** | | | | | | | | | | | | | 0.0317 |
| Macro | | | 1.9556** | -0.4517* | 0.2131 | | | | | | | | | | 0.0194 |
| Credit risk | | | | | | -6.7523** | 0.2176 | -1.1218** | | | | | | | 0.0427 |
| Liquidity | | | | | | | | | 0.1394** | -1.0405** | | | | | 0.0462 |
| Corporate | | | | | | | | | | | 0.5392* | 0.0043 | -0.3891 | -0.6371** | 0.3814 |

**Panel B.- Low volatility state regressions Q1 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0039 | 0.0006 | -0.1645 | 0.1093 | -0.1353 | -2.2885** | -0.0771 | 0.0798 | 0.0296** | -0.0915 | 0.6843* | 0.0415 | -0.3352* | -0.4488*** | 0.4380 |
| Sentiment | -0.0373 | 0.0599** | | | | | | | | | | | | | 0.0195 |
| Macro | | | 0.3831* | 0.7047* | 0.2990* | | | | | | | | | | 0.0054 |
| Credit risk | | | | | | -1.6994* | 2.7156** | 0.2317 | | | | | | | 0.0363 |
| Liquidity | | | | | | | | | 0.0975** | -0.0085 | | | | | 0.0221 |
| Corporate | | | | | | | | | | | 0.6985* | 0.0539 | -0.3540* | -0.4613*** | 0.4295 |

**Panel C.- High volatility state regressions Q1 spreads**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0113* | 0.0478*** | 0.8398* | 0.6387* | 0.2449 | -2.2901*** | -0.9939* | -0.2895* | 0.0585** | -0.8481** | 0.4400 | 0.0177 | -0.3900 | -0.6477 | 0.4118 |
| Sentiment | -0.0122** | 0.1964** | | | | | | | | | | | | | 0.0399 |
| Macro | | | 2.6319** | -0.8483* | 0.1076 | | | | | | | | | | 0.0280 |
| Credit risk | | | | | | -7.0084** | -1.5098** | -0.4906** | | | | | | | 0.0545 |
| Liquidity | | | | | | | | | 0.1360** | -2.4090** | | | | | 0.0610 |
| Corporate | | | | | | | | | | | 0.5018* | -0.0048 | -0.3854 | -0.6785 | 0.3783 |

# Appendix B - Robustness determinants risk-sorted portfolios

## Table B1. Regression analysis determinants of the risk-sorted portfolios

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of all risk-sorted portfolios and simple linear regressions of each risk-sorted portfolio (Q5, Q4, Q3, Q2 and Q1) on a constant and the complete set of determinants (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all risk-sorted portfolios in the panel regression and the other rows represented simple linear regression of each individual risk-sorted portfolio. In the last column we display the adjusted R-squared of the corresponding regression.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A.- Full sample regressions** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0205*** | 0.1050*** | 0.9672*** | -0.4242*** | -0.0451 | -3.9329*** | -2.0344*** | 0.2742** | 0.1778*** | -1.5193*** | 0.3803 | 0.2001*** | -0.3233 | -0.9047*** | 0.3133 |
| Q5 | -0.0276* | 0.1207** | 1.4509* | 0.0256 | 0.2488 | -4.7484* | -1.5238 | 0.3772 | 0.1883*** | -2.0333** | 1.0096*** | 0.1469 | -0.9922*** | -1.4848*** | 0.5920 |
| Q4 | -0.0393** | 0.1099** | 1.3110* | -0.6373 | -0.0255 | -4.8707* | -2.5987** | 0.1168 | 0.2035*** | -1.6688*** | 0.5602*** | 0.2227 | -0.4046*** | -1.0844*** | 0.4178 |
| Q3 | -0.0211 | 0.1143*** | 1.0442 | -0.1660 | -0.0828 | -3.9382* | -2.4453** | 0.1249 | 0.2017*** | -1.4976* | 0.2566*** | 0.2387* | -0.1794 | -0.8608*** | 0.3050 |
| Q2 | -0.0219* | 0.1018*** | 0.5482 | -0.5018 | -0.1639 | -4.1194** | -2.2030** | 0.3013 | 0.1615*** | -1.2023* | 0.0903 | 0.1978* | -0.0229 | -0.6679*** | 0.2328 |
| Q1 | -0.0150 | 0.0781*** | 0.4815 | -0.8419 | -0.2021 | -1.9880 | -1.4064* | 0.4507 | 0.1342*** | -1.1944*** | -0.0151 | 0.1944** | -0.0174 | -0.4258*** | 0.1649 |
| **Panel B.- Low volatility state regressions** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0367*** | 0.0142* | -0.1286 | 0.2149 | -0.5108*** | -3.3604*** | -1.5113*** | -0.1011 | 0.0916*** | -0.1486 | 0.4473 | -0.0536 | -0.2934* | -0.0656 | 0.1973 |
| Q5 | -0.0435 | 0.0017 | 0.0025 | 0.4177 | -0.6455 | -5.2577 | -2.8855** | -0.0701 | 0.0862* | -0.4233 | 1.2093*** | -0.1623 | -0.7128*** | -0.3325 | 0.5376 |
| Q4 | -0.0539** | 0.0037 | -0.0280 | -0.0478 | -0.5715 | -4.5713 | -1.6924 | -0.3968 | 0.0898** | -0.1648 | 0.7511*** | 0.0303 | -0.2885* | -0.1613 | 0.3490 |
| Q3 | -0.0340 | 0.0311 | -0.3568 | 0.4850 | -0.3369 | -3.1463 | -0.3376 | 0.4188 | 0.1247*** | -0.0364 | 0.2926*** | 0.0168 | -0.2898 | -0.1251 | 0.1735 |
| Q2 | -0.0183 | 0.0211 | -0.2640 | 0.0924 | -0.5974* | -2.2970 | -1.1915 | 0.2824 | 0.0893** | 0.1031 | 0.0837 | -0.0658 | -0.1505 | -0.0026 | 0.0881 |
| Q1 | -0.0335* | 0.0137 | 0.0030 | 0.1275 | -0.4025 | -1.5296 | -1.4496 | -0.7401 | 0.0679* | -0.2219 | -0.1001 | -0.0876 | -0.0252 | 0.2934 | 0.1066 |
| **Panel C.- High volatility state regressions** | | | | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0199*** | 0.1398*** | 1.4902*** | -0.3476 | 0.0798 | -3.0254*** | -2.4392*** | 0.4717*** | 0.1933*** | -2.7348*** | 0.3458 | 0.2849*** | -0.3101 | -1.0887*** | 0.3515 |
| Q5 | -0.0216 | 0.1616** | 2.1879** | 0.4434 | 0.4794 | -3.7276 | -1.6002 | 0.6330 | 0.2032*** | -3.3442** | 0.9585*** | 0.2434 | -0.9968*** | -1.7149*** | 0.6171 |
| Q4 | -0.0329* | 0.1551** | 1.9196** | -0.7091 | 0.0921 | -3.3831 | -3.1080** | 0.3479 | 0.2258*** | -2.9464*** | 0.4927*** | 0.3036 | -0.4022*** | -1.2934*** | 0.4554 |
| Q3 | -0.0148 | 0.1517** | 1.6360** | -0.2489 | -0.0323 | -2.9441 | -3.1344*** | 0.2388 | 0.2159*** | -2.8719*** | 0.2139** | 0.3232** | -0.1540 | -1.0400*** | 0.3569 |
| Q2 | -0.0193 | 0.1292*** | 0.8890 | -0.3647 | -0.0238 | -3.3990* | -2.7092** | 0.4354 | 0.1750*** | -2.4552*** | 0.0699 | 0.2837** | 0.0005 | -0.8248*** | 0.2879 |
| Q1 | -0.0109 | 0.1016*** | 0.8183 | -0.8585 | -0.1161 | -1.1933 | -1.6440* | 0.7033* | 0.1465*** | -2.0564*** | -0.0066 | 0.2707 | 0.0019 | -0.5706*** | 0.2281 |

## Table B2. Regression analysis determinants of the risk-sorted portfolios excluding sentiment variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of all risk-sorted portfolios and simple linear regressions of each risk-sorted portfolio (Q5, Q4, Q3, Q2 and Q1) on a constant and the complete set of determinants except the sentiment variables (inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 tco 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all risk-sorted portfolios in the panel regression and the other rows represented simple linear regression of each individual risk-sorted portfolio. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions**

| | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | 1.1329*** | -0.2493 | 0.0348 | -4.3647*** | -1.9829*** | 0.1392 | 0.1772*** | -1.5307*** | 0.4007* | 0.2050*** | -0.3321 | -0.9288*** | 0.3006 |
| Q5 | 1.6370** | 0.2160 | 0.3401 | -5.2494* | -1.4659 | 0.2219 | 0.1877*** | -2.0459** | 1.0336*** | 0.1532 | -1.0020*** | -1.5120*** | 0.5851 |
| Q4 | 1.5381** | -0.3263 | 0.0663 | -5.2707** | -2.5142** | -0.0240 | 0.2012*** | -1.6878** | 0.5763*** | 0.2209 | -0.4181*** | -1.1163*** | 0.4032 |
| Q3 | 1.2000* | -0.0347 | 0.0004 | -4.4328** | -2.4017** | -0.0224 | 0.2019*** | -1.5068* | 0.2813*** | 0.2473* | -0.1869 | -0.8840*** | 0.2920 |
| Q2 | 0.6995 | -0.3545 | 0.0878 | -4.5473** | -2.1572** | 0.1703 | 0.1612*** | -1.2122* | 0.1109 | 0.2038* | -0.0306 | -0.6900*** | 0.2169 |
| Q1 | 0.5899 | -0.7471 | -0.1449 | -2.3238* | -1.3754* | 0.3502 | 0.1342*** | -1.2009** | 0.0015 | 0.2000** | -0.0227 | -0.4418*** | 0.1555 |

**Panel B.- Low volatility state regressions**

| | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.1417* | 0.5378*** | -0.5084*** | -3.4923*** | -1.4708** | -0.0858 | 0.0964*** | -0.1412 | 0.4389 | -0.0643 | -0.0366** | -0.0948 | 0.1886 |
| Q5 | -0.0452 | 0.8065 | -0.6443 | -5.2685 | -2.7692* | -0.0457 | 0.0912* | -0.4312 | 1.1953*** | -0.1749 | -0.8011*** | -0.3690* | 0.5314 |
| Q4 | -0.0836 | 0.4338 | -0.5696 | -4.6003 | -1.5555 | -0.3672 | 0.0961** | -0.1727 | 0.7341*** | 0.0148 | -0.3979** | -0.2064 | 0.3325 |
| Q3 | -0.3311 | 0.7773 | -0.3331 | -3.4398 | -0.3801 | 0.4259 | 0.1299*** | -0.0100 | 0.2895** | 0.0066 | -0.3550* | -0.1500 | 0.1636 |
| Q2 | -0.2410 | 0.2485 | -0.5950* | -2.4961 | -1.2335 | 0.2845 | 0.0924** | 0.1220 | 0.0831 | -0.0714 | -0.1858 | -0.0156 | 0.0837 |
| Q1 | -0.0074 | 0.4226 | -0.4003 | -1.6568 | -1.4156 | -0.7264 | 0.0723* | -0.2141 | -0.1076 | -0.0966 | -0.0921 | 0.2667 | 0.0906 |

**Panel C.- High volatility state regressions**

| | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | 1.5993*** | -0.1793 | 0.2090 | -3.6115*** | -2.2738*** | 0.2843** | 0.1896*** | -2.9676*** | 0.3799* | 0.2969*** | -0.3120 | -1.1155*** | 0.3395 |
| Q5 | 2.3052** | 0.6231 | 0.6275 | -4.4099 | -1.4136 | 0.4161 | 0.1992*** | -3.6119** | 0.9986*** | 0.2581 | -0.9989*** | -1.7451*** | 0.6049 |
| Q4 | 2.1093** | -0.4075 | 0.2443 | -4.4733 | -2.8894** | 0.1421 | 0.2196*** | -3.2145*** | 0.5256*** | 0.3103* | -0.4048*** | -1.3294*** | 0.4397 |
| Q3 | 1.7116** | -0.1380 | 0.1021 | -3.6047 | -2.9768** | 0.0342 | 0.2132*** | -3.1182*** | 0.2540** | 0.3404** | -0.1559 | -1.0651*** | 0.3421 |
| Q2 | 0.9954 | -0.1999 | 0.0963 | -3.9364** | -2.5535** | 0.2624 | 0.1715*** | -2.6711*** | 0.1011 | 0.2942** | -0.0013 | -0.8500*** | 0.2702 |
| Q1 | 0.8749 | -0.7742 | -0.0252 | -1.6325 | -1.5354 | 0.5664 | 0.1445*** | -2.2223*** | 0.0202 | 0.2817** | 0.0007 | -0.5879*** | 0.2126 |

## Table B3. Regression analysis determinants of the risk-sorted portfolios excluding macro variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of all risk-sorted portfolios and simple linear regressions of each risk-sorted portfolio (Q5, Q4, Q3, Q2 and Q1) on a constant and the complete set of determinants except macro variables (investor sentiment, consumer sentiment, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all risk-sorted portfolios in the panel regression and the other rows represented simple linear regression of each individual risk-sorted portfolio. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions**

| | Investor Sentim. | Consumer Sentim. | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0258*** | 0.1073*** | -4.2431*** | -2.1176*** | 0.2608** | 0.1816*** | -1.5417*** | 0.3872 | 0.1927*** | -0.3196 | -0.9020*** | 0.3090 |
| Q5 | -0.0294* | 0.1284*** | -5.2939** | -1.5152 | 0.2939 | 0.1930*** | -2.0467** | 1.0187*** | 0.1395 | -0.9886*** | -1.4812*** | 0.5892 |
| Q4 | -0.0404** | 0.1141** | -5.3236** | -2.6899** | 0.0839 | 0.2089*** | -1.6995*** | 0.5691*** | 0.2137 | -0.4002*** | -1.0816*** | 0.4142 |
| Q3 | -0.0225 | 0.1153*** | -4.2023* | -2.5625** | 0.1373 | 0.2049*** | -1.5168** | 0.2648*** | 0.2285* | -0.1743 | -0.8558*** | 0.3018 |
| Q2 | -0.0223* | 0.1012*** | -4.2553** | -2.3083*** | 0.3229 | 0.1640*** | -1.2233*** | 0.0946 | 0.1919* | -0.0199 | -0.6660*** | 0.2308 |
| Q1 | -0.0148 | 0.0776*** | -2.1405 | -1.5121* | 0.4658 | 0.1373*** | -1.2220*** | -0.0115 | 0.1899** | -0.0151 | -0.4257*** | 0.1656 |

**Panel B.- Low volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0376*** | 0.0138** | -3.1309*** | -1.4636** | -0.1841 | 0.0952*** | -0.1713 | 0.4228 | -0.0636 | -0.3096 | -0.0654 | 0.1892 |
| Q5 | -0.0449* | 0.0026 | -4.9897 | -2.7604* | -0.1669 | 0.0915* | -0.4458 | 1.1793*** | 0.1723 | -0.7306*** | -0.3363* | 0.5307 |
| Q4 | -0.0542** | 0.0043 | -4.3575 | -1.6266 | -0.4660 | 0.0955** | -0.1937 | 0.7218*** | 0.0192 | -0.3095* | -0.1607 | 0.3404 |
| Q3 | -0.0357 | 0.0285 | -2.9177 | -0.3634 | 0.3239 | 0.1242*** | -0.0498 | 0.2787 | 0.0083 | -0.2978 | -0.1230 | 0.1682 |
| Q2 | -0.0192 | 0.0196 | -2.0175 | -1.1851 | 0.1825 | 0.0932** | 0.0712 | 0.0541 | -0.0797 | -0.1719 | 0.0008 | 0.0698 |
| Q1 | -0.0342* | 0.0143 | -1.3721 | -1.3825 | -0.7943 | 0.0716* | -0.2385 | -0.1997 | -0.0936 | -0.0379 | 0.2921*** | 0.0955 |

**Panel C.- High volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Default Spread | Term Spread | TED Spread | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0220*** | 0.1417*** | -3.5179*** | -2.5964*** | 0.4011** | 0.1965*** | -2.8614*** | 0.3575 | 0.2689*** | 0.3048 | -1.0756*** | 0.3473 |
| Q5 | -0.0253 | 0.1706*** | -4.5137 | -1.6812 | 0.4732 | 0.2070*** | -3.5057** | 0.9692*** | 0.2209 | -0.9943*** | -1.6913*** | 0.6115 |
| Q4 | -0.0354* | 0.1583*** | -4.5352 | -3.3033*** | 0.2458 | 0.2305*** | -3.1125** | 0.5079*** | 0.2840 | -0.3951*** | -1.2779*** | 0.4493 |
| Q3 | -0.0175 | 0.1498*** | -3.3876 | -3.3792*** | 0.2087 | 0.2188*** | -3.0144*** | 0.2291** | 0.3031* | -0.1467 | -1.0244*** | 0.3511 |
| Q2 | -0.0204 | 0.1290*** | -3.6752* | -2.8341*** | 0.4081 | 0.1771*** | -2.5353*** | 0.0782 | 0.2737** | 0.0047 | -0.8176*** | 0.2853 |
| Q1 | -0.0115 | 0.1008*** | -1.4777 | -1.7842** | 0.6798* | 0.1491*** | -2.1392*** | 0.0030 | 0.2626** | 0.0073 | -0.5666*** | 0.2235 |

**Table B4. Regression analysis determinants of the risk-sorted portfolios excluding credit risk variables**

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of all risk-sorted portfolios and simple linear regressions of each risk-sorted portfolio (Q5, Q4, Q3, Q2 and Q1) on a constant and the complete set of determinants except credit risk variables (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all risk-sorted portfolios in the panel regression and the other rows represented simple linear regression of each individual risk-sorted portfolio. In the last column we display the adjusted R-squared of the corresponding regression.

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A.- Full sample regressions** | | | | | | | | | | | | |
| All | -0.0227*** | 0.1199*** | 1.2437*** | 0.6664** | -0.0847 | 0.1942*** | -1.6558*** | 0.3896 | 0.2053*** | -0.3476 | -0.9118*** | 0.2995 |
| Q5 | -0.0252 | 0.1369*** | 1.7431** | -0.2332 | 0.2209 | 0.2037*** | -2.1878** | 1.0242*** | 0.1596 | -1.0196*** | -1.4953*** | 0.5856 |
| Q4 | -0.0363** | 0.1307*** | 1.6609** | -0.9696 | -0.0633 | 0.2246*** | -1.8392** | 0.5685*** | 0.2241 | -0.4333*** | -1.0930*** | 0.4025 |
| Q3 | -0.0185 | 0.1313*** | 1.3416** | -0.4406 | -0.1235 | 0.2203*** | -1.6392** | 0.2627*** | 0.2386* | -0.2036* | -0.8671*** | 0.2882 |
| Q2 | -0.0195 | 0.1174*** | 0.8407 | -0.7555 | -0.2080 | 0.1790*** | -1.3461** | 0.0999 | 0.2031* | -0.0486 | -0.6751*** | 0.2101 |
| Q1 | -0.0137 | 0.0833*** | 0.6322 | -0.9329 | -0.2499 | 0.1436*** | -1.2667*** | -0.0075 | 0.2012** | -0.0329 | -0.4285*** | 0.1569 |
| **Panel B.- Low volatility state regressions** | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0362*** | 0.0281*** | -0.2187*** | 0.0897 | -0.5008*** | 0.1047*** | -0.1916 | 0.4244 | -0.0323 | -0.3144* | -0.0798 | 0.1903 |
| Q5 | -0.0427 | 0.0257 | -0.1740 | 0.1826 | -0.6297 | 0.1110** | -0.4929 | 1.1696*** | -0.1249 | -0.7491 | -0.3621* | 0.5269 |
| Q4 | -0.0535** | 0.0212 | -0.1381 | -0.1781 | -0.5611 | 0.1048** | -0.2214 | 0.7188*** | 0.0568 | -0.3152* | -0.1751 | 0.3390 |
| Q3 | -0.0342 | 0.0384 | -0.3237 | 0.4032 | -0.3181 | 0.1278*** | -0.0726 | 0.2927*** | 0.0268 | -0.3004 | -0.1233 | 0.1691 |
| Q2 | -0.0181 | 0.0308 | -0.3159 | -0.0262 | -0.5857* | 0.0995** | 0.0727 | 0.0731 | -0.0507 | -0.1651 | -0.0148 | 0.0814 |
| Q1 | -0.0328* | 0.0246 | -0.1419 | 0.0670 | -0.4096* | 0.0804** | -0.2440 | -0.1322 | 0.0694 | -0.0421 | 0.2766** | 0.0932 |
| **Panel C.- High volatility state regressions** | | | | | | | | | | | | |
| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Pastor | Amihud | SMB | HML | RMW | CMA | $R^2$ |
| All | -0.0174*** | 0.1485*** | 1.9811*** | -0.5591* | -0.0103 | 0.2076*** | -2.9435*** | 0.3575 | 0.2868*** | -0.3324 | -1.0881*** | 0.3405 |
| Q5 | -0.0194 | 0.1707** | 2.5511*** | 0.2363 | 0.4052 | 0.2159*** | -3.5636** | 0.9761*** | 0.2590 | -1.0226*** | -1.7210*** | 0.6120 |
| Q4 | -0.0297* | 0.1694** | 2.4409*** | -1.0139 | -0.0043 | 0.2444*** | -3.2098*** | 0.5049*** | 0.2989 | -0.4274*** | -1.2917*** | 0.4412 |
| Q3 | -0.0119 | 0.1634*** | 2.1045*** | -0.5102 | -0.1262 | 0.2327*** | -3.0933*** | 0.2215** | 0.3125** | -0.1741 | -1.0349*** | 0.3398 |
| Q2 | -0.0164 | 0.1401*** | 1.3404* | -0.6144 | -0.1173 | 0.1911*** | -2.6877*** | 0.0821 | 0.2834** | -0.0232 | -0.8239*** | 0.2651 |
| Q1 | -0.0099 | 0.0991*** | 1.0188* | -0.8938 | -0.2091 | 0.1537*** | -2.1631*** | 0.0028 | 0.2802** | -0.0144 | -0.5692*** | 0.2144 |

## Table B5. Regression analysis determinants of the risk-sorted portfolios excluding liquidity variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of all risk-sorted portfolios and simple linear regressions of each risk-sorted portfolio (Q5, Q4, Q3, Q2 and Q1) on a constant and the complete set of determinants except liquidity variables (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all risk-sorted portfolios in the panel regression and the other rows represented simple linear regression of each individual risk-sorted portfolio. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | Term Spread | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0220*** | 0.1128*** | 1.1932*** | -1.1602*** | -0.0917 | -5.0366*** | -2.7729*** | 0.2192** | 0.4404* | 0.1982*** | -0.2968 | -0.9550*** | 0.2718 |
| Q5 | -0.0245 | 0.1291** | 1.7007** | -0.8042 | 0.1933 | -6.0373** | -2.3198* | 0.3177 | 1.0770*** | 0.1442 | -0.9635*** | -1.5388*** | 0.5668 |
| Q4 | -0.0359** | 0.1189** | 1.5680** | -1.4710 | -0.0779 | -6.1138** | -3.4399*** | 0.0541 | 0.6283*** | 0.2205 | -0.3744*** | -1.1417*** | 0.3756 |
| Q3 | -0.0177 | 0.1232*** | 1.2951* | -0.9738 | -0.1325 | -5.1262** | -3.2729*** | 0.0631 | 0.3227*** | 0.2369* | -0.1496 | -0.9174*** | 0.2470 |
| Q2 | -0.0192 | 0.1089*** | 0.7490 | -1.1489 | -0.2037 | -5.0713*** | -2.8664*** | 0.2519 | 0.1431* | 0.1964* | 0.0009 | -0.7131*** | 0.1808 |
| Q1 | -0.0127 | 0.0840*** | 0.6532 | -1.4029* | -0.2381 | -2.8343** | -1.8645** | 0.4091 | 0.0306 | 0.1929** | 0.0027 | -0.4637*** | 0.1074 |

**Panel B.- Low volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | Term Spread | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0392*** | 0.0169* | -0.0071 | -0.0613 | -0.5591*** | -3.5154*** | -2.2757*** | -0.0575 | 0.4864 | -0.0339 | -0.2770* | -0.0764 | 0.1844 |
| Q5 | -0.0459* | 0.0006 | 0.0996 | 0.0952 | -0.7026* | -5.5807 | -3.6271*** | -0.0269 | 1.2523*** | -0.1491 | -0.6910 | -0.3311 | 0.5303 |
| Q4 | -0.0565** | 0.0061 | 0.0902 | -0.3232 | -0.6197 | -4.7334 | -2.4439** | -0.3539 | 0.7889*** | 0.0493 | -0.2720 | -0.1712 | 0.3381 |
| Q3 | -0.0375 | 0.0369 | -0.1811 | 0.1454 | -0.3961 | -3.2498 | -1.3652 | 0.4769 | 0.3422*** | 0.0466 | -0.2712 | -0.1466 | 0.1459 |
| Q2 | -0.0209 | 0.0269 | -0.1302 | -0.1224 | -0.6346** | -2.2895 | -1.9174* | 0.3230 | 0.1165 | -0.0421 | -0.1401 | -0.0234 | 0.0679 |
| Q1 | -0.0354* | 0.0143 | 0.0863 | -0.1019 | -0.4429* | -1.7136 | -2.0249 | -0.7070 | -0.0686 | -0.0742 | -0.0106 | 0.2899 | 0.0895 |

**Panel C.- High volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | Term Spread | SMB | HML | RMW | CMA | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0143** | 0.1638*** | 1.8986*** | -0.9693** | 0.0287 | -4.4388*** | -3.1034*** | 0.4516*** | 0.4092* | 0.2677*** | -0.2703 | -1.1521*** | 0.3026 |
| Q5 | -0.0156 | 0.1896** | 2.6561** | -0.2355 | 0.4210 | -5.3127* | -2.3212 | 0.6138 | 1.0278*** | 0.2269 | -0.9551*** | -1.7870*** | 0.5872 |
| Q4 | -0.0264 | 0.1817** | 2.3762** | -1.4222 | 0.0349 | -5.4619** | -3.8723*** | 0.3234 | 0.5655*** | 0.2825 | -0.3556** | -1.3646*** | 0.4029 |
| Q3 | -0.0086 | 0.1773*** | 2.0770** | -0.9335 | -0.0876 | -4.4841* | -3.8675*** | 0.2156 | 0.2828*** | 0.3033 | -0.1096 | -1.1087*** | 0.2856 |
| Q2 | -0.0142 | 0.1508*** | 1.2572 | -0.9266 | -0.0698 | -4.6744** | -3.3097*** | 0.4171 | 0.1273 | 0.2680* | 0.0366 | -0.8820*** | 0.2204 |
| Q1 | -0.0066 | 0.1197*** | 1.1265 | -1.3287 | -0.1547 | -2.2609 | -2.1466** | 0.6880 | 0.0417 | 0.2576 | 0.0321 | -0.6184*** | 0.1506 |

## Table B6. Regression analysis determinants of the risk-sorted portfolios excluding corporate variables

This table reports the estimated coefficients (where ***, ** and * represents significance at 1%, 5% and 10%, respectively) from panel regressions of all risk-sorted portfolios and simple linear regressions of each risk-sorted portfolio (Q5, Q4, Q3, Q2 and Q1) on a constant and the complete set of determinants except corporate variables (investor sentiment, consumer sentiment, inflation, unemployment, industrial production growth, default spread, term spread, TED spread, Pastor and Stambaugh (2003) liquidity factor, Amihud (2002) illiquidity factor, size factor, book-to-market factor, investment factor and profitability factor). Definitions of all explanatory variables are summarised in Table 5. Panel A reports results for the full sample period 1963:07 to 2017:09. Panel B and Panel C displays the estimates for periods of low volatility and high volatility according to the inferred probabilities by fitting a Markov-Switching GARCH model to the market portfolio. Within each panel, the first row includes all risk-sorted portfolios in the panel regression and the other rows represented simple linear regression of each individual risk-sorted portfolio. In the last column we display the adjusted R-squared of the corresponding regression.

**Panel A.- Full sample regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | Term Spread | Pastor | Amihud | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0332*** | 0.1692*** | 1.3806** | -0.5909** | -0.1002 | -5.9810** | -1.8390*** | 0.4470** | 0.2343*** | -1.8349*** | 0.1641 |
| Q5 | -0.0445 | 0.2825*** | 2.5700** | -0.1221 | 0.1156 | -10.0582*** | -1.1877 | 0.9656 | 0.3126*** | -2.8527** | 0.1776 |
| Q4 | -0.0487*** | 0.1999*** | 1.9009** | -0.8025 | -0.1011 | -7.6475** | -2.3165* | 0.3896 | 0.2789*** | -2.1085** | 0.2056 |
| Q3 | -0.0280*** | 0.1599*** | 1.3182* | -0.3584 | -0.1239 | -5.3493** | -2.2633** | 0.2038 | 0.2470*** | -1.7157* | 0.1958 |
| Q2 | -0.0274** | 0.1204*** | 0.6659 | -0.6760 | -0.1907 | -4.6648** | -2.1061** | 0.2434 | 0.1893*** | -1.2960* | 0.1694 |
| Q1 | -0.0172* | 0.0833*** | 0.4480 | -0.9959 | -0.2011 | -2.1853 | -1.3214 | 0.4326 | 0.1440*** | -1.2017** | 0.1382 |

**Panel B.- Low volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | Term Spread | Pastor | Amihud | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0579** | 0.0497** | -0.1610* | 0.4076 | -0.2867** | -3.0673*** | -0.5602 | 1.0085 | 0.1338*** | -0.2884 | 0.0775 |
| Q5 | -0.0993** | 0.0951 | -0.0404 | 1.1550 | -0.0336 | -3.6489 | -0.3719 | 2.9538* | 0.1994** | -0.7844 | 0.1092 |
| Q4 | -0.0796*** | 0.0585 | 0.0116 | 0.5002 | -0.1660 | -4.0595 | -0.2500 | 1.3533 | 0.1625*** | -0.3793 | 0.1066 |
| Q3 | -0.0516** | 0.0588 | -0.3665 | 0.5722 | -0.1850 | -3.1779 | 0.2150 | 1.1852 | 0.1554*** | -0.1075 | 0.0964 |
| Q2 | -0.0271 | 0.0298 | -0.3109 | 0.0353 | -0.5686* | -2.2051 | -0.9475 | 0.5472 | 0.0964** | 0.0695 | 0.0709 |
| Q1 | -0.0320* | 0.0092 | -0.0988 | -0.2247 | -0.4803* | 2.2454 | -1.4465 | -0.9969 | 0.0552 | -0.2403 | 0.0763 |

**Panel C.- High volatility state regressions**

| | Investor Sentim. | Consumer Sentim. | Inflat. | Unemp. | IP growth | Default Spread | Term Spread | Term Spread | Pastor | Amihud | $R^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All | -0.0267*** | 0.2190*** | 1.9241** | -0.9803*** | -0.1644*** | -5.0800** | -2.2281*** | 0.5427** | 0.2443*** | -3.5153*** | 0.1981 |
| Q5 | -0.0312 | 0.3653*** | 3.6333** | -0.4874 | -0.0592 | -9.0178** | -1.4397 | 0.9843 | 0.3150*** | -5.0215** | 0.2097 |
| Q4 | -0.0408** | 0.2624*** | 2.5691** | -1.4756 | -0.2319 | -6.5837** | -2.8725* | 0.4539 | 0.2933*** | -3.9426*** | 0.2454 |
| Q3 | -0.0218 | 0.2048*** | 1.8436* | -0.8705 | -0.2241 | -4.3266* | -2.8936** | 0.2319 | 0.2562*** | -3.4929*** | 0.2392 |
| Q2 | -0.0258* | 0.1514*** | 0.8937 | -0.8703 | -0.1442 | -3.9864* | -2.5067** | 0.3465 | 0.2009*** | -2.8440*** | 0.2091 |
| Q1 | -0.0139 | 0.1111*** | 0.6807 | -1.1977 | -0.1631 | -1.4855 | -1.4277 | 0.6969 | 0.1561*** | -2.2753*** | 0.1760 |