Do Liquidity and Idiosyncratic Risk Matter?: Evidence from the European Mutual Fund Market

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July 2013

Abstract

This paper examines the interaction of idiosyncratic risk, liquidity and return across time in determining fund performance, as well as across investment style portfolios of European mutual funds. This study utilizes a unique data set including returns from six European-domiciled equity mutual funds existing each year. Overall, using monthly data, we find that both liquidity and idiosyncratic risk are relevant in determining mutual fund returns. Our results are robust across different model specifications. We show that model specifications up to six factors are useful, these risk factors capture different aspects in the cross-section of mutual funds returns. The evidence regarding mutual funds subgroups is strongly in favor of the significance of liquidity, and idiosyncratic risk to a lesser extent, as risk factors. Even if liquidity and idiosyncratic risk are considered at the same time, one factor is not significantly decreasing the importance of the other factor.

JEL Classification: G12, G15, G23.
Keywords: Mutual Fund Performance; Idiosyncratic Risk; Liquidity; Style Analysis.

[*] We thank Ed Moisson of Lipper for generously providing the main dataset used in this study. We also thank José León from Morningstar for providing statistics about European mutual funds, and Marcel Defize from Thomson Reuters for supplying additional data. We appreciate helpful comments and suggestions from seminar participants at University of Glasgow, University of Barcelona, the 2012 Infiniti Conference, the 2012 FMA Annual Conference, the 2013 MFA Annual Conference, the 2013 SWFA Annual Conference, and the 2013 EFA Annual Meeting.

I. Introduction and Literature Review

Recent academic research has examined the role of idiosyncratic risk and liquidity in expected returns. Most papers show that liquidity is negatively related to expected stock returns. Another stream of research documents a positive relation between idiosyncratic risk and expected returns. In this paper we analyse the roles played by liquidity and idiosyncratic risk in mutual fund returns in Europe. To date, there is no study that relates these lines of research for the most important mutual fund countries in Europe. This paper fills this gap by examining if idiosyncratic risk and liquidity factors influence mutual fund returns in the largest European capital markets. Using Fama-French and Carhart models, we analyse whether liquidity and idiosyncratic risk are systematically priced on fund performance.

Numerous empirical studies show that liquidity is a relevant risk factor in the explanation of the cross section of asset returns. Pastor and Stambaugh (2003) incorporate a liquidity factor into the Fama-French three-factor model, they argue that market-wide liquidity is a state variable important for stock pricing. O´Hara (2003) argues that asset pricing models need to incorporate the transaction cost of liquidity and the risks of price discovery, she develops an asymmetric information asset pricing model that adds these effects. Archarya and Pedersen (2005) find that a liquidity-adjusted CAPM model explains the data better than the standard CAPM. They also find weak evidence that liquidity risk is relevant above the effects of market risk and the level of liquidity. Watanabe and Watanabe (2008) discover that liquidity betas vary significantly over time, and the transition from the low to the high liquidity-beta state is predicted by a rise in trading volume. Lee (2011) tests the liquidity-adjusted capital asset pricing model of Acharya and Pedersen (2005) globally. He finds that liquidity risks are priced independently of market risk in international financial markets. He shows that a security's required rate of return depends on the covariance of its own liquidity with the aggregate local market liquidity, as well as on the covariance of its own liquidity with local and global market returns

These studies have used several liquidity measures: Amihud and Mendelson (1986) use a bid-ask spread measure, Datar et al. (1998) employ a turnover measure, Amihud

(2002) uses the reaction of price fluctuation to trading volume, and Liu (2006) employs an innovative measure capturing the trading speed dimension of liquidity. He argues that current measures are inaccurate and have limitations to capture liquidity risk.

Liu (2006) considers the factors that influence security´s liquidity, assuming that the average investor has solvency constraints. First, liquidity becomes more important when the economy is in a recession, as risk-averse investors prefer to invest in less-risky and more liquid assets. Furthermore, it is difficult for companies to raise funds in the capital markets when the economy is in a recession. Second, asymmetric information can foster illiquidity. Investors will not trade if they become aware that there are insider traders who have private information about the market, this will restrict liquidity. The author mentions that the liquidity premium could be related to the private information premium studied by Easley et al. (2010). Third, investors are not interested in holding the stocks of companies that have a high probability of default, thus these companies are less liquid. He also finds that small and high book-to-market stocks are less liquid, and concludes that it is reasonable to state that a liquidity factor captures distress risk better than the size and book-to-market proxies used in Fama-French model.

Another line of research shows that liquidity is negatively related to expected stock returns. Chordia, Subrahmanyam, and Anshuman (2001) measure liquidity by trading activity such as volume and turnover, and find that stocks with more volatile liquidity have lower expected returns. Amihud (2002) shows that asset expected returns are increasing in illiquidity. He argues that the stock excess return compensates for the lower liquidity of stocks compared to that of Treasury securities, and expected stock excess returns vary over time as a consequence of changes in market illiquidity. He points out that unexpected illiquidity has a significant negative effect on stock return, and that the effects of illiquidity are stronger on the returns of small stock portfolios. Finally, he concludes that the stock excess return is a premium for stock illiquidity. Other authors reporting a negative relation include Archarya and Pedersen (2005), Baker and Stein (2004), and Hasbrouck (2005). The most frequent explanation given for a negative relation between stock liquidity and returns is that illiquid stocks have higher transaction costs or higher sensitivity to a liquidity risk factor (see Acharya and Pedersen (2005)).

In contrast, there is limited research on the joint importance of liquidity and idiosyncratic risk. Some recent papers investigate the relation between idiosyncratic link and liquidity, and address the question whether idiosyncratic risk is a proxy for liquidity risk. Bali et. al. (2005) control for market liquidity in a screening process, they exclude the smallest, least liquid and lowest-priced stocks from their sample. Malkiel and Xu (2006) find that liquidity does not diminish the explanatory power of idiosyncratic risk. Angelidis and Andrikopoulos (2010) study the times series and cross section determinants of the liquidity of stocks traded in the LSE, they explore the interactions between idiosyncratic risk, return and liquidity using 20 years of daily data on trading activity, returns and volatility. Taking into account size-based portfolios, they study liquidity interactions (spillovers) between large cap and small cap stocks. Using a VAR modelling approach, they find significant volatility spillovers from large cap stocks to small cap ones and vice versa, also find that illiquidity shocks are persistent and can predict shocks in volatility. Finally, they show some evidence of asymmetric liquidity spillovers, from large cap stocks to small cap ones.

Ang, Hodrick, Xing, and Zhang (2009) investigate the pricing of idiosyncratic risk in international stock markets. They find that stocks with recent past high idiosyncratic volatility present low future average returns around the world. Across 23 countries, the difference in average returns between the extreme quintile portfolios sorted on past idiosyncratic volatility is -1.31% per month, after adjusting for market, size, and book-to-market factors. They point out that the low returns of stocks with high idiosyncratic volatility around the world co-move significantly with the idiosyncratic volatility effect in the United States. The authors conclude that the puzzle of low returns to high-idiosyncratic-volatility stocks is a global phenomenon.

Spiegel and Wang (2005) document that there exists a theoretical relationship between idiosyncratic risk and liquidity, they show that stocks idiosyncratic risk and liquidity are negatively correlated. They find that idiosyncratic risk is a much stronger predictor of returns than liquidity and often eliminates the power of liquidity to explain returns.

Closest to our ambition is the work of Wagner and Winter (2013), who analyse 529 actively managed mutual funds with European investment focus and are registered in Austria, Germany or Switzerland, using daily observations from October 2002 to

September 2009. They confirm that liquidity and idiosyncratic risk are relevant for mutual fund performance, showing that liquidity and idiosyncratic risk provide important extensions to the well-known Fama-French (1992 and 1993) as well as the Carhart (1997) models. They point that even if liquidity and idiosyncratic risk are considered at the same time, one factor does not diminish the importance of the other factor. The authors conclude that their results confirm the hypotheses that mutual fund managers prefer more liquid stocks as the liquidity risk factor implies a positive return premium.

Dong, Feng, and Sadka (2012) study the role of liquidity risk in the United States' mutual fund markets. They find that the systematic liquidity-risk exposures of mutual funds can predict their performance in the cross-section. They show that funds with a high liquidity-risk exposure earn significantly high future returns during 1984-2009 period. Although, only a small fraction of the outperformance of high-liquidity-beta funds relative to low-liquidity-beta funds can be explained by systematic risk factors. Thus, they suggest that the liquidity-risk exposure of a fund is correlated with its manager´s ability to generate abnormal performance.

Several authors stated theoretical grounds of why idiosyncratic risk should be inversely related to a stock´s overall liquidity. Ho and Stoll (1980) strategic inventory control models or Spiegel and Subrahmanyam (1995) competitive models lead to this relationship. The evidence that liquidity and idiosyncratic risk are important variables for asset pricing motivates us to explore the contribution of both factors to the performance of mutual funds in the main European markets.

In this study we investigate whether idiosyncratic risk and liquidity have a systematic effect on fund performance and are useful risk factors to complement multifactor models typically used in mutual fund performance evaluation. To the best of our knowledge, the combined importance of idiosyncratic risk and liquidity in fund performance has not been investigated in a large capitalization area like Europe. Other studies are limited in terms of their markets and time periods. Wagner and Winter (2013) only consider eight-year time period and cover a small capitalization percentage of equity funds in Europe. Their funds are registered in Austria, Germany or Switzerland, which only account for 15% of total mutual fund assets in Europe, while

UK, France and Germany together accounted for 65% of total mutual fund assets in Europe at the end of 2011 (See EFAMA 2011 annual statistics). Our research is a conclusive study in Europe using the largest available database for fund returns and covering the largest financial markets, which account for 90% of market capitalization in Europe. We find that an important number of style portfolios present significant idiosyncratic risk and liquidity factor loadings.

The remainder of this paper is organized as follows: In Section II we describe our data set and the research design of the paper, we also provide summary statistics. In Section III we present our estimation procedure for liquidity and idiosyncratic risk measures. In Section IV we review the basic models and the methodology, including the details of the econometric model. In Section V we show our empirical results and provide an examination on the importance of idiosyncratic risk and liquidity in fund performance. Section VI concludes, we summarise our main findings and draw our conclusions. Tables and figures are provided in the appendix.

II. Data and Research Design

A. European Mutual Funds

We use data on mutual funds with a European focus. We consider the six most important European mutual fund markets, they account for almost 90% of total mutual fund assets in Europe. The funds are registered in United Kingdom, France, Italy, Spain, Germany and Netherlands.[†] All returns are in local currency.

We construct a database including the six most important mutual fund countries. We restrict our sample to domestic equity funds with at least 24 months of data. We exclude index funds, sector funds (e.g. technology or health care), equity funds that invest internationally, or funds that became one of these types in a subsequent year during the sample period. We do not include index funds as we want to examine the role of liquidity and idiosyncratic risk for actively managed funds. Our sample contains 1,196 equity mutual funds with monthly returns from January 1988 to December 2010. In

[†] See European Fund and Asset Management Association (EFAMA) 2011 annual statistics. We exclude Luxemburg as it is considered an offshore centre, as a result of fiscal advantages.

each country we separate funds by investment styles to test whether this affects performance. We organize our set of mutual funds into different value-weighted mutual fund style portfolios. We use Morningstar Direct to obtain the style classification of mutual funds. Data on returns comes from Lipper[‡], all returns include any dividend paid. Fund returns are net of any management fee and other operating expenses, and only the primary share class is included.

Survivorship bias is a relevant aspect for mutual fund research (see for example Elton et al. (1996)). This issue can influence our results, if dead funds disappear from the sample the average performance will be overestimated. We include dead fund in the sample until they disappear. Afterwards, the portfolios are re-weighted with the surviving funds. Datastream contains data on dead funds for all countries.

Similarly to Otten and Bams (2002), we compare the mean returns of all funds (dead + surviving) with the return on surviving funds. We specify the overestimation by survivorship bias for all our European countries, and find that restricting our sample to surviving funds yields to overestimate average returns by 0.31% (Germany), 0.24% (Spain), 0.40% (United Kingdom), 0.17% (Italy), 0.33% (France) and 0.12% (Netherlands) per year. The percentage of dead funds during the sample period was 24% for (Germany), 29% (Spain), 17% (United Kingdom), 45% (Italy), 22% (France) and 22% (Netherlands).

B. Benchmarks

In each country, we construct a European version of the Carhart 4-factor and Fama-French models, we consider all stocks included in the Worldscope database (Thomson Financial Company) for each country. Worldscope includes over 98% of total market capitalization per country. We restrict our selection to only primary quotes of major securities, the prices are adjusted and we also include dead and suspended stocks. The market excess return is calculated as the difference between the value-weighted average return in local currency of all stocks in each country and the one-month Treasury bill rate. For each country, we estimate the Fama-French factors using 6 value-weight

[‡] Source: Lipper, a Thomson Reuters company.

portfolios formed on size and book-to-market. The SMB (Small Minus Big) factor is the average return on the three small portfolios minus the average return on the three big portfolios. The HML (High Minus Low) factor is the average return on the two value portfolios minus the average return on the two growth portfolios. We calculate the Momentum factor (MOM) using six value-weight portfolios formed on size and prior (2-12) returns. The portfolios, which are formed monthly, are the intersections of 2 portfolios formed on size (market equity, ME) and 3 portfolios formed on prior (2-12) return. The monthly size breakpoint is the median market equity in each country. The monthly prior (2-12) return breakpoints are the 30^{th} and 70^{th} percentiles in each country. The MOM factor is the monthly average return in local currency on the two high-prior return portfolios minus the monthly average return on the two low-prior return portfolios

III. Estimation of Liquidity and Idiosyncratic Risk

A. The Liquidity Measure

Using a panel of liquidity measures, Stoll (2000) arguments that there is no single measure that captures all dimensions of liquidity. Amihud (2002) argues that liquidity has a number of aspects that cannot be captured in a single measure. He states that illiquidity shows the impact of order flow on price as a result from adverse selection costs and inventory costs.

We create a market liquidity factor for the main European capital markets. To our knowledge, there is no paper that studies market liquidity for several European capital markets. Our approach of liquidity is in the spirit of the return-to-volume measure of Amihud (2002), which he proposes to capture the price-impact dimension of liquidity. He measures iliquidity as:

$$I_{i,t} = |r_{i,t}| / Vol_{i,t} \quad (1)$$

where $|r_{i,t}|$ is the absolute return on stock *i* on day *t* and $Vol_{i,t}$ is the reported trading volume. The average is computed over all days in the sample for which the ratio is

defined. *I* captures the absolute return impact of a cumulative unsigned volume. The square root variant is defined as:

$$I^{1/2} = \sqrt{|r_{i,t}|} \,/\, Vol_{i,t} \qquad (2)$$

The Amihud ratio is highly correlated to other liquidity measures which use microstructure data. Although Amihud´s (2002) illiquidity ratio presents two shortcomings. First, the illiquidity ratio increases when a stock price also increases, even when the liquidity is constant. Second, the Amihud illiquidity ratio could be correlated to market capitalization, as trading volume is related to the market capitalization of traded stocks. As the liquidity measure of Amihud (2002) is defined as the ratio of the daily absolute return to daily dollar (euro in this study) trading volume averaged over one year, if a stock´s trading volume is zero in a given trading date, then its return-to-volume ratio cannot be calculated.

For these reasons, we will follow Lo and Wang (2000) using the natural log of the ratio of absolute return to turnover to reduce the effect of outliers that are common during periods of low trading activity, and to minimize the influence of market capitalization on turnover:

$$\Phi_{i,t} = \ln |r_{i,t}| \,/\, Turnover_{i,t} \qquad (3)$$

where $\Phi_{i,t}$ is a measure for the illiquidity of stocks traded, $|r_{i,t}|$ and $Turnover_{i,t}$ are, respectively, the absolute return and turnover on month *t* for stock *i*. We first calculate the monthly liquidity measure for each individual stock and then perform an aggregation. We construct monthly value-weighted and equally-weighted liquidity measures. Lo and Wang (2000) state that the relation between market capitalization and volume comes from Merton´s (1987) model of capital market equilibrium in which investors hold only the stocks they are familiar with. This means that larger-capitalization companies might have more active trading, as they tend to have more diversified ownership. The analysis that follows refer to liquidity as measured by the Lo and Wang (2000) estimator.

We create some filters to help reduce the measurement error in the monthly illiquidity series. Stocks are included in a given month if they have a return for that month and satisfy the following conditions:

(i) A stock´s liquidity is computed only if the stock has return and volume data for at least 24 observations. This makes the calculated parameters more reliable. The monthly observations are not required to be consecutive. The stock must be listed at the end of the previous year.

(ii) The stock price at the beginning of the year is between 5 and 1000 in local currency.[§]

Table 1 presents summary statistics for the liquidity measure for each of the six countries. Looking at the period, series show that the return for Germany has underperformed the others (but not by a huge amount) and the dividend yield has been fairly consistently lower until recent years. As expected, the liquidity measure is highly negatively correlated with the turnover measure, showing that the liquidity measure well captures the trading quantity characteristic of liquidity. The equally weighted liquidity measure is higher, except for Netherlands, than that of the value-weighted since the latter measure resembles that of the largest capitalization stocks. However, the standard deviation of the less liquid markets is lower than that of the more liquid ones. Figure 1 plots the time series for each market.

B. Liquidity Implications of Portfolio Theory

Recent research have addressed the importance of factors such as idiosyncratic risk, asymmetric information, transaction costs and other forms of market imperfections which could be relevant for asset pricing and determining trading activity. To evaluate their relevance in explaining liquidity, a new model is needed that can take into account these factors.

Asset pricing models have been used extensively in empirical investigations in the time-series and cross-sectional characteristics of asset returns. Examining the behavior of

[§] Returns on low-price stocks are influenced by the minimum tick of $1/8 (see Harris 1994), which adds noise to the estimations. Prices are converted to euros before the introduction of the currency.

liquidity, we aim to prove that the liquidity implication of these models is relevant for asset pricing.

Pastor and Stambaugh (2003) argue that liquidity appears to be a good candidate for a priced state variable. They point that it is often viewed as a relevant characteristic of the investment environment and the macroeconomy, and recent research studies show that fluctuations in several measures of liquidity are correlated across assets. Pastor and Stambaugh (2003) investigate whether marketwide liquidity is indeed priced, and find that expected stock returns are related cross-sectionally to the sensitivities of returns to fluctuations in aggregate liquidity. Their research focuses on systematic liquidity risk in returns and show that stocks whose returns are more exposed to marketwide liquidity fluctuations present higher expected returns.

Wagner and Winter (2010) state that mutual fund managers may actively manage their exposure towards a liquidity risk factor. They consider two assumptions. First, mutual fund managers may focus on illiquidity to benefit from positive expected returns. Second, mutual fund managers will focus on the liquidity of their funds´ assets, which affect their average exposure to liquidity risk.

We will examine the implications of liquidity in pricing for mutual funds. The theoretical asset pricing models serve as valuable framework for our empirical analysis. We aim to develop a more complete understanding of trading and pricing in asset markets.

C. The Idiosyncratic Risk Measure

Following the current literature, we will use the three-factor model of Fama and French (1993). We define idiosyncratic risk as the standard deviation of the residual $\varepsilon_{i,t}$ in the regression:

$$R_{i,t} = \alpha_i + \beta_{mkt,i} R_{mkt,t} + \beta_{smb,i} R_{smb,t} + \beta_{hml,i} R_{hml,t} + \varepsilon_{i,t} \quad (4)$$

where $R_{i,t}$ is the time *t* excess return on fund *i* , $R_{mkt,t}$ is the market return at time *t*, with R_{smb} and R_{hml} respectively representing the returns on portfolios formed to capture the

size and the book-to-market equity effect. When we refer to idiosyncratic risk, we mean idiosyncratic risk relative to the Fama-French model. A fund is included in the sample if 24 out of the 120 previous observations are available for estimation.

Volatility is time varying and exhibits an asymmetric effect. Thus, we will use a dynamic model like EGARCH (Exponential Generalized Autoregressive Conditional Heteroskedasticity) in order to capture time variation in a fund´s variance. The EGARCH method is more suitable than both ARCH and GARCH methods, as it allows for and asymmetric response of volatility to stock returns. Furthermore, unlike GARCH, the EGARCH model, specified in logarithms, does not impose the non-negativity constraints on parameters.

Standard GARCH models assume that good and bad news have a symmetrical effect on volatility. The basic advantage of EGARCH models (Nelson (1991)) is that they do not hold the assumption of symmetrical result on volatility, allowing for different effects of good and bad news. The GARCH model considers volatility as an additive function of the lagged error terms, while in the EGARCH it is a multiplicative function of lagged innovations that can respond asymmetrically to good and bad news.

Spiegel and Wang (2005) and Fu (2009) explained that dynamic models like EGARCH better capture the time-varying characteristic of idiosyncratic risk. Spiegel and Wang (2005) compare the accuracy of the OLS and EGARCH idiosyncratic risk estimators, and show that the EGARCH estimates of idiosyncratic risk are superior to the ones generated by the OLS model. Similarly Fu (2009) finds that the EGARCH model´s estimates explain better the cross sectional stock returns than do those from an OLS model. The analysis that follows refers to the EGARCH measure of idiosyncratic risk. The EGARCH model estimates the changes in the conditional variance of the residuals through the following equations:

$$\varepsilon_{i,t} = \sqrt{h_{i,t}} \times \upsilon_t \qquad (5a)$$

$$\ln h_{i,t} = k_i + \sum_{j=1}^{p} \Theta_{i,j} \ln h_{i,t-j} + \sum_{k=1}^{q} d_{i,k} (|\upsilon_{t-k}| - E|\upsilon_{t-k}| + x_i \upsilon_{t-k}) \qquad (5b)$$

where $h_{i,t}$ is the conditional variance of $\varepsilon_{i,t}$, v_t is an i.i.d. error term with zero mean and unit variance. The k_i, $\Theta_{i,j}$, $d_{i,k}$ and x_i terms are estimated parameters. Equation (5b) specifies the conditional variance of the Fama-French residuals at time *t*.

At each month *t*, we estimate the EGARCH model using all observations since January 1988, the beginning of the sample, up to month $t - 1$. Funds with fewer than 60 observations available are excluded in the sample. For equation (5), we allow all permutations of p and q such that $1 \leq p \leq 3$ and $1 \leq q \leq 3$. We choose the estimate generated by the model that gives the lowest Akaike´s Information Criterion (AIC). EGARCH (1,1) is the best-fitting model for the most number of observations:

$$\ln(\sigma_t^2) = w_t + \beta \ln(\sigma_{t-1}^2) + a\left(|\varepsilon_{t-1}|/\sigma_{t-1} - \sqrt{2/\pi}\right) + \gamma\, \varepsilon_{t-1}/\sigma_{t-1} \qquad (6)$$

In order to provide an overview of idiosyncratic risk in each market, we plot the average idiosyncratic risk calculated from the residuals of the three-factor model for the six countries in Figure 2. Clearly there is a positive trend in idiosyncratic risk in each country, except for Germany.

IV. Empirical Evidence

A. Correlations

Inventory control models such as Merton (1987) or Brunnermeier and Pedersen (2009) state that there is a negative correlation between idiosyncratic risk and market liquidity. Brunnermeier and Pedersen (2009) create a model that links an asset´s market liquidity and traders funding liquidity. They prove that, given specific conditions, market liquidity and funding liquidity are mutually reinforcing, leading to liquidity spirals. They explain several empirically documented features, including that market liquidity is related to volatility, as trading more volatile assets requires higher margin payments, and market liquidity co-moves with the market since funding conditions do.

We sort fund styles by liquidity and idiosyncratic risk and examine the sort of the other variables. Panel A of Table 3 sorts fund styles by liquidity, Panel B sorts the data by

idiosyncratic risk. We will examine whether or not there is a rank correlation and its robustness. As shown by previous studies, small companies present more idiosyncratic risk than large companies, and high idiosyncratic risk companies have low levels of liquidity. Which has not been stated in previous research is whether idiosyncratic risk causes lower liquidity or if it is due to idiosyncratic risk´s correlation with size.

B. Multifactor Models

Most research on mutual fund performance evaluation use multifactor models. Grinblatt and Titman (1994) state that tests of performance are sensitive to the risk factors included in the model. As we have a range of investment styles, single-factor models can yield biased estimates of performance. The single-factor model assumes that a single market index is enough to account for the fund's investment strategies. Fama and French's (1993, 1996) research on the cross-sectional variation of stock returns has showed strong evidence of the importance of two risk factors: size and book-to-market. Fama and French (1993) argue that SMB and HML are state variables in an intertemporal asset pricing model. We will focus on liquidity and idiosyncratic risk in the context of the Fama and French three-factor (1992,1993) and Carhart (1997) models.

Previous studies have considered multifactor models including liquidity and idiosyncratic risk. Pastor and Stambaugh (2003) create a liquidity factor that has an important effect on returns. They explain that the return earned by the decile portfolio with the highest sensitivity to liquidity risk exceeds by 7.5% per year the decile portfolio with the lowest sensitivity to their liquidity factor. Avramov and Chordia (2006) point that rational asset pricing theories have been silent about how SMB and HML are related to the underlying undiversifiable macroeconomic risks. They use the Fama-French model augmented with a proxy for the Pastor and Stambaugh (2003) liquidity factor. Their liquidity factor is the difference between value-weighted average return on stocks with high sensitivities to liquidity less the value-weighted average return on stocks with low sensitivities to liquidity. They conclude that the inclusion of the liquidity factor does not improve the model ability to explain the predictive power of equity characteristics, furthermore the liquidity factor does not capture the impact of turnover on the cross-section of individual stock returns.

Research on mutual fund performance has been geographically limited and mainly focused on the US and the UK markets. Developments in fund performance multi-factor models have not yet been explored in many other markets. We contribute to the international mutual fund performance literature by providing a comprehensive analysis of the performance of European-domiciled mutual funds investing in the largely unexplored European market.

The present study is the first one in the literature that attempts to estimate a multifactor model including liquidity and idiosyncratic risk for the main countries within the European mutual fund market. Elton et al. (1995) stated that a country´s mutual fund market shows a high degree of leverage as its net value is similar to the country´s stock market. Mutual funds are normally composed by a wide class of stocks from different industries and therefore embody cross-sector trends and information from the whole economy. Thus, knowing the factors influencing mutual funds would be beneficial for both practitioners and academics.

Our goal is to examine whether liquidity and idiosyncratic risk can explain the performance of mutual funds. Using Fama-French and Carhart factors we consider financial market anomalies like the size effect (See Banz (1981) or Reinganum (1981)) and the explanatory power of growth and value stocks (See Fama and French (1996)). We investigate whether a fund´s expected return is related to the sensitivity of its return to the innovation in liquidity, *Lt*, and idiosyncratic risk, *It.* The sensitivity is denoted for fund *i* by its liquidity and idiosyncratic risk beta $\beta_{L,i,}$ and $\beta_{I,i,}$ respectively, is the slope coefficient on *Lt* and *It* in a multiple regression model with other independent factors which are important for asset pricing. At the end of each year, starting with 1988, we sort funds on the basis of their investment style and form portfolios. The returns on these portfolios during the next 12 months are linked across years to create a single return series for each investment style portfolio. We regress the excess returns of these portfolios on factors that are normally used in empirical asset pricing research. When alphas differ from zero, $\beta_{L,i}$ and $\beta_{I,i}$ explain a component of expected returns not captured by the other factors.

We define $\beta_{L,i}$ and $\beta_{I,i}$ as the coefficients on $R_{L,t}$ and $R_{I,t}$ in a regression that also includes the three and four factors of Fama and French (1993) and Carhart (1997) models:

$$R_{i,t} = \alpha_i + \beta_{L,i}\ R_{L,t} + \beta_{I,i}\ R_{I,t} + \beta_{mkt,i}\ R_{mkt,t} + \beta_{smb,i}\ R_{smb,t} + \beta_{hml,i}\ R_{hml,t} + \varepsilon_{i,t} \quad (7)$$

$$R_{i,t} = \alpha_i + \beta_{L,i,}\ R_{L,t} + \beta_{I,i}\ R_{I,t} + \beta_{mkt,i}\ R_{mkt,t} + \beta_{smb,i}\ R_{smb,t} + \beta_{hml,i}\ R_{hml,t} + \beta_{mom,i}\ R_{mom,t} + \varepsilon_{i,t} \quad (8)$$

where $R_{i,t}$ is the return on fund *i* in excess of the one-month T-bill return; R_{mkt} is the excess return on a value-weighted broad market index; R_{smb}, R_{hml}, and R_{mom} are returns on value-weighted, zero-investment, factor-mimicking portfolios for size, book-to-market equity, and one-year momentum in stock returns; α_i is the average return left unexplained by the benchmark models; and $\varepsilon_{i,t}$ is the regression residual. $R_{L,t}$ and $R_{I,t}$ are returns on liquidity and idiosyncratic risk captured from the fund´s co-movement with aggregate liquidity and idiosyncratic risk that is distinct from its co-movement with the other commonly used factors.

For our study, we consider $R_{smb,t}$, $R_{hml,t}$, $R_{mom,t}$, $R_{L,t}$ and $R_{I,t}$ as diversified passive benchmarks returns that represent patterns in average returns during the sample period of our study. The slopes on the explanatory returns in equations (7) and (8) represent a diversified portfolio of passive benchmarks that replicates the exposures of the fund on the left to common factors in returns. The regression alpha captures the average return provided by a fund in excess of the return on a comparable passive portfolio. Following Dybvig and Ross (1985), we understand a positive expected alpha as good performance, and a negative expected alpha means bad performance.

V. Results

The results of correlations for idiosyncratic risk and liquidity are reported in table 3. Panel A reports funds sorted by liquidity, and panel B funds sorted by idiosyncratic risk. Each panel has several rows representing the number of fund investment styles over which the ranking have been evaluated. The first two columns report the rank and the fund investment style for all the countries under consideration. In both panels, the

measures of liquidity, idiosyncratic risk and size are the value-weighted average of the funds in each investment style.

Panel A´s sort by liquidity does not show any conclusive result on idiosyncratic risk, but instead produces almost perfect sort on size, it seems that the size effect may to a large extent depend on liquidity. Previous studies and theoretical models predict that high idiosyncratic risk companies have low levels of liquidity. In this study, there is mixed evidence, thus such a conclusion cannot be stated. In the same sense, it cannot be stated that small capitalization funds have more idiosyncratic risk than the large capitalization ones, there is also mixed evidence. Panel B sorts the data by idiosyncratic risk, this panel also leads to the same conclusion reached by Panel A: size and liquidity are highly correlated with each other, while idiosyncratic risk and liquidity show no correlation.

The correlation between idiosyncratic risk and liquidity might be an indicator of high redundancy. Furthermore, a correlation might be a sign that both risk factors proxy for the same underlying systematic risk. Multicollinearity could be another problem of using highly correlated factors in multifactor models. The fact that liquidity and idiosyncratic risk present no correlation makes them quite appropriate for the use in multifactor models.

Results of different liquidity and idiosyncratic risk augmented Fama and French and Carhart models are reported in tables 4 to 9. For each country we create value-weighted portfolios containing all funds within a specific investment style. We also form a portfolio consisting of all funds within a particular country. We estimate these different multifactor models via OLS regressions, covering the time period January 1988 to December 2010. We use the covariance matrix of Newey and West (1987) for the estimation of standard errors in order to take into account heteroskedasticity and autocorrelation. The number of statistically significant investment style portfolios is given with respect to the 10%, 5% and 1% levels.

Tables 4, 5 and 6 present idiosyncratic risk and liquidity augmented Fama and French models. On average, the per annum alphas, in the multifactor regressions are quite significantly negative with respect to all models, with the exception of Spain which has

significant positive alphas. Most investment style portfolios for the six countries show a significant positive exposure to the market excess return, most investment style portfolios are also significantly positive for the size factor, except for Italy and Netherlands, where the majority of portfolios are not significant. The results with regard to valuation present mixed evidence, while most portfolios are significantly positive, prefer value over growth, two countries present negative exposure. These results are quite stable in all multifactor models. Furthermore, in Table 4, 22 out of the 45 portfolios significantly load on the idiosyncratic risk factor. More portfolios positively load on idiosyncratic risk, mainly Spain and Netherlands, while in the UK, all portfolios are significantly negative. In Table 5, 36 portfolios significantly load on the liquidity factor. France, Netherlands and UK present a significantly negative liquidity factor, while it is significantly positive for Spain and Germany. Thus, over the whole observation period, there is a larger number of funds significantly loading on liquidity than on idiosyncratic risk. Table 6 includes both idiosyncratic risk and liquidity in a Fama and French model, the amount of significant fund portfolios for the liquidity factor do not change, but the idiosyncratic risk factor shows a significant exposure for 24 funds. Thus, although the results regarding liquidity and idiosyncratic risk are quite stable when considering both factors together, idiosyncratic risk significance slightly changes when liquidity is included. This is consistent with the results of Malkiel and Xu (2006) which document that the explanatory power of idiosyncratic risk is not taken away by controlling for liquidity. It is of interest the evidence regarding liquidity, which is rather recent in performance evaluation, and is not less significant than the valuation or size factors which are part of most standard performance models.

Table 7, 8 and 9 report idiosyncratic risk and liquidity augmented Carhart models. As in the Fama and French model, alphas are significantly negative in all variation of the Carhart model, with the exception of Spain. This means that, on average, the investor loses money when investing in these mutual funds after consideration of risk. The results for the market excess return, valuation and size factor exposures are quite similar to the Fama and French models mentioned above for every augmented Carhart model. A considerably large amount of funds significantly positively loads on momentum, which means that fund managers try to find past winners, 31 out of 45 portfolios show a significant momentum factor when idiosyncratic risk is included in a Carhart model, 36 portfolios significantly load on momentum when liquidity is included, while only 32

portfolios present a significantly positive momentum factor when both idiosyncratic risk and liquidity are included in the Carhart model. Thus, the inclusion of idiosyncratic risk into the Carhart model reduces the number of portfolios loading on momentum. In models with momentum, funds show a positive exposure towards valuation, that is prefer value over growth, in Germany, Spain and the UK, and a negative exposure towards valuation, preferring growth over value, in Italy and France. Table 7 reports that 17 portfolios significantly load on idiosyncratic risk factor, which is a smaller amount than in the previous Fama and French models. While in Table 8 the amount of investment style portfolios which significantly load on liquidity are the same as in the Fama French models. Thus, the inclusion of a momentum factor into a multifactor model reduces the average loading on idiosyncratic risk factor. In Table 9 both idiosyncratic risk and liquidity are included into an augmented Carhart model, as in the Fama and French model, the amount of significant fund portfolios for the liquidity factor do not change, but the idiosyncratic risk factor shows a significant exposure for 14 fund portfolios, a small change in idiosyncratic risk significance compared to Table 7. As in the previous Fama and French models considered, we could also state that the explanatory power of idiosyncratic risk is not taken away by controlling for liquidity, and the liquidity factor is not less significant than the most standard valuation or size factors.

Our results which show that alphas after costs are negative, except for Spain, are similar to the results of other previous U.S. performance studies, like Jensen (1968), Grinblatt and Titman (1989a), or Gruber (1996). It is important to consider that we cover the time period of the burst of the technology bubble and the financial crisis. Our results are consistent with Gruenbichler and Pleschiutschnig (1999) who also report a negative risk-adjusted performance with respect to the Carhart model for specific fund categories. However, our results are in contrast to Otten and Bams (2002), who find that European mutual funds present positive risk-adjusted performance after costs. It is interesting to point the case of Spain, as all the fund portfolios with a significantly positive liquidity exposure present a positive performance, these results indicate that mutual fund managers can take advantage of focusing on liquidity.

The factor loadings for both models, Fama and French and Carhart, show significant positive size factor for most fund portfolios, which means that fund returns are driven

by smaller stocks. The valuation factor is also significantly positive, except for Italy and France, indicating that funds follow a more value oriented style. The momentum factor is significantly positive in most cases, indicating that mutual fund managers focus more on past winners. There is also a small tendency that mutual fund managers focus more on stock with a negative exposure towards market liquidity and a positive one towards idiosyncratic risk. The preferences of mutual fund managers in our study resembles the results of Otten and Bams (2002), their research based on the five most important European countries find that European funds prefer smaller stocks and stocks with high book-to market ratios (value). Mutual fund managers may look for small, eventually undervalued stocks which are overseen by the investors. This is part of the selection component of active investing. The focus on such a strategy is profitable, as it is known that over certain periods of time smaller stocks provide for abnormal returns.

The average adjusted R-squared in all models is around 54%, which implies that a considerable part of the performance of the mutual funds can be explained by the different multifactor models. The adjusted R-squared is slightly increased by including both liquidity and idiosyncratic risk in the multifactor models. Moreover, all F-statistics are in favor of the joint significance of the multiple risk factors for each fund portfolio. It is interesting to point that when investing in a large number of assets, which are linked to the market, the market excess return can normally not be actively managed. Thus mutual funds cannot hedge market risk, as it is difficult for mutual fund managers to avoid exposure to the market excess return.

A. Robustness Analysis

Our results mentioned above could be affected by a missing factor. Elton, Gruber, Das, and Hlavka (1993) include a bond index in mutual fund performance evaluation. They considered bonds to examine the effect of non-S&P assets on fund performance as asset category commonly held by mutual funds, and they find that returns on bonds are significant factors in performance assessment. They examined the influence on measured alphas when mutual funds hold non-S&P assets and there is no selection ability. They used as proxy the performance of bonds by the return on several alternative passively managed fund indexes. They argued that one way to view a mutual fund is as a combination of three portfolios: one containing S&P stocks, one containing

non-S&P stocks, and one containing bonds. The authors state that the return on the fund is a weighted average of the return on the three portfolios, and the management performance is the extra return earned on the fund in comparison to holding a combination of three passive portfolios with the same characteristics as the overall fund. They showed that the correction of the bonds impact on mutual fund returns lowers risk-adjusted performance (alpha) for all mutual funds.

We take into account this potential bias in our study by adding an additional factor in the Fama and French and Carhart models, equations 7 and 8. We introduce the excess return on a national Government bond index. Other authors using bond factors in multifactor models include Grinblatt and Titman (1989b), Conner and Korajczyk (1991), and Ludvigson and Ng (2009).

Table 10 presents results for the augmented Carhart model. We find that European mutual funds are to a large extend exposed to bond returns, as all countries, except Italy, present statistically significant exposure. The Fama and French model presents similar findings.[**] 36 fund categories produce significant loadings on the bond index, while idiosyncratic risk and liquidity factors do not show significant changes. Spain, Germany and UK present significantly more negative alphas if we include a bond index, thus the average alpha on funds is influenced by the bond alpha in these countries. The R-square shows that the addition of the index for bonds improves the explanatory power of the equation. Therefore, we consider that the inclusion of a bond index influence the conclusions to be drawn from multifactor models, as we find that returns on bonds are significant factors in performance assessment.

We also examine different subperiods. We divide the period of our study in two halves, one from 1988 to December 1999, and the other one from January 2000 to December 2010. The first half includes the spike of the stock market in the late 90s, while the second half covers the burst of the technology bubble, a short upturn and the crash of the financial crisis. Tables 11 and 12 show the results for each subperiod. The results of the Carhart factors are similar regarding both subperiods. However, in the first subperiod idiosyncratic risk is more significant than in the second one or compared to

[**] Results are available upon request with the authors.

the whole observation period. Furthermore, the size factor is more important during the second than during the first subperiod, which indicates that fund returns are more driven by smaller stocks. Thus, we can conclude that mutual fund managers change their preferences towards different risk factors over time.

A.1 Management Fees

So far we have only considered mutual fund returns net of costs, management fees were already deducted from the fund´s return. Some mutual funds might present a positive performance before fees. Although, if they charge high fees compared to other funds, this reduces the risk-adjusted performance after fees. Sharpe (1966) was the first to analyze the impact of mutual fund fees on the performance results.

US evidence finds that fund under-perform the market by the amount of fees they charge the investor when management fees are deducted. To analyze the influence of fees on European mutual fund performance we obtain current monthly percentage charges for each mutual fund in our data set, for some of our mutual funds there are no monthly percentage charges available, in this case we use information on maximum monthly percentage charges. We present average alphas after costs for every investment style portfolio in all countries, and then we add back management fees to fund returns in order to test their performance.

The average monthly fees of the investigated mutual funds are 1.6% with a minimum of zero monthly fees and a maximum of 4.66%. We examine risk-adjusted performance with respect to the liquidity and idiosyncratic risk augmented Carhart model. We find that, before fees, the average risk-adjusted performance is still negative, although in all portfolios is better than the monthly performance after fees (see Table 13). Overall, the results show that even before costs most mutual funds do not provide for a positive risk-adjusted performance. Five out of six countries under-perform at the 5% level. This means that European funds, similar to US funds, are not successful in finding and implementing new information to offset their fees, and therefore add value for the investor. The only exception is Spanish funds, which out-perform significantly after and before fees. We also analyze the relationship between alphas and the monthly

percentage charges. We find mixed evidence, thus we cannot establish that mutual fund managers that charge higher fees provide better performance.

VI. Conclusions

Studies on the performance of European mutual funds are relatively scarce, compared to the vast literature on U.S. mutual fund performance. Examples of U.S. performance studies include Grinblatt and Titman (1989), Malkiel (1995), Gruber (1996), Carhart (1997). There is an increasing flow of funds received by the mutual fund industry in Europe, as the growing private retirement provisions acts as substitute for the decreasing ability of the government retirement systems, which are negatively influenced by the demographic change. Moreover, regulatory differences in the European financial services industry have decreased in the recent years. This fosters the study of cross-country performance of European mutual funds.

Our study contributes to the mutual fund literature by providing new models and empirical findings on long-term risk-adjusted fund performance using a wide European data set. Our findings do not support the idea that liquidity and idiosyncratic risk are closely intertwined variables. However, our analysis confirms that liquidity as well as idiosyncratic risk are relevant for mutual fund performance. Liquidity and idiosyncratic risk are useful and important risk factors for quite large fund style subgroups of mutual funds. We show that model specifications up to six factors are useful and that the liquidity and idiosyncratic risk effects found are even robust to such stricter models with many factors. The importance of these two risk factors is not significantly diminished by considering them at the same time in addition to valuation, market, size and momentum risk factors. Hence, these risk factors capture different aspects in the cross-section of mutual funds returns, even if they may be theoretically and empirically linked to some extent.

Our model comparisons indicate that the Carhart (1997) is slightly superior compared to the liquidity and idiosyncratic risk augmented Fama and French (1992, 1993) models. Our results have been backtested with respect to several subperiods and taking into account different model specifications. In different countries, the evidence regarding

mutual funds subgroups is strongly in favor of the significance of liquidity, and idiosyncratic risk to a lesser extent, as risk factors. The liquidity factor is as relevant as size, valuation and momentum, but still market excess return is the most important factor in mutual fund performance. Even if liquidity and idiosyncratic risk are considered at the same time, one factor is not significantly decreasing the importance of the other factor. Thus, these factors capture different characteristics.

Contributing to the evidence of anomalies in asset pricing, we can conclude that liquidity as well as idiosyncratic risk factors are important for mutual fund performance. Analyzing fund style subgroups, both the well-known Fama and French and Carhart models are significantly complemented by liquidity and idiosyncratic risk.

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Appendix: Tables and Figures

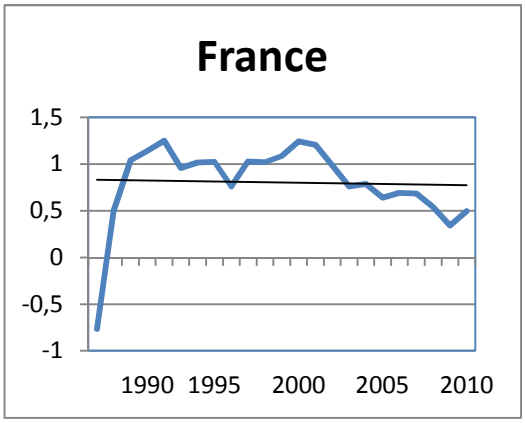
Table 1: Descriptive statistics for equally-weighted and value-weighted liquidity measure

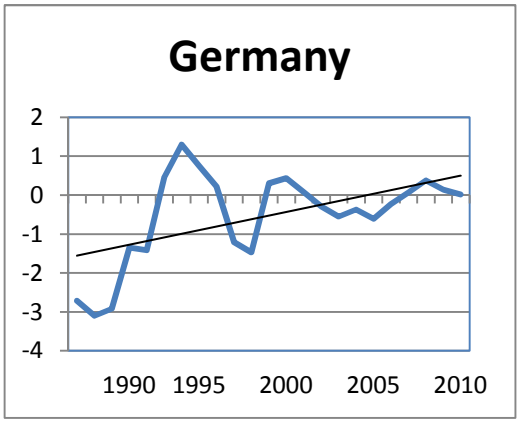
Summary statistics for monthly value-weighted and equal-weighted turnover and return indexes for January 1988 to December 2010. Turnover shows the aggregation of number of shares traded multiplied by the closing price for each stock. The figure is always expressed in thousands. Return presents the theoretical growth in value of a notional stock holding. Liquidity is the result of Equation (3). Stocks included for each country are the following: Germany (661), Italy (267), Spain (123), Netherlands (113), France (669), and UK (1200).

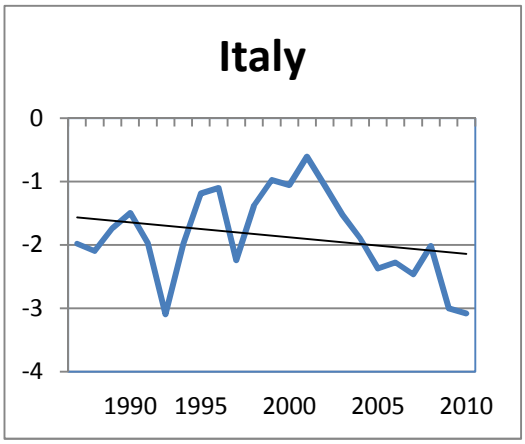
Countries	Statistic	Turnover VW	Turnover EW	Return VW	Return EW	Liquidity VW	Liquidity EW
Germany	Mean	8,165.456	7,368.703	383.339	354.759	-0.372	-0.482
	Median	487.163	469.197	139.336	125.502	-0.320	-0.436
	Std. Dev.	10,893.149	9,588.273	793.206	746.093	2.592	2.646
	Skewness	6.036	6.801	4.967	4.988	0.083	0.055
	Kurtosis	66.277	89.837	36.931	37.175	0.074	0.220
Italy	Mean	44,511.372	34,826.367	734.889	656.942	-1.834	-1.847
	Median	2,949.701	2,734.198	152.413	150.852	-2.668	-2.529
	Std. Dev.	200,058.471	150,118.361	2,026.397	1,620.686	2.416	2.264
	Skewness	6.488	5.554	5.275	4.576	0.064	0.105
	Kurtosis	55.309	44.004	34.061	26.677	0.759	0.633
Spain	Mean	37,929.015	31,154.457	475.588	487.757	-2.645	-2.928
	Median	4,065.644	3,529.419	237.028	238.081	-2.573	-2.901
	Std. Dev.	123,277.329	97,594.797	598.441	625.632	2.519	2.424
	Skewness	4.761	4.525	2.510	2.536	0.211	0.329
	Kurtosis	26.379	23.361	8.171	8.227	-0.343	-0.094
Netherlands	Mean	22,901.520	19,944.451	1,948.017	1,533.862	-1.146	-1.085
	Median	1,115.242	1,069.927	354.780	323.393	-1.314	-1.315
	Std. Dev.	62,896.058	53,615.512	7,288.761	5,661.914	3.993	3.886
	Skewness	3.673	3.575	5.533	4.698	-0.027	-0.041
	Kurtosis	15.051	14.363	42.203	33.227	-0.160	-0.194
France	Mean	5,373.980	5,057.566	1,863.508	1,308.510	0.817	0.823
	Median	219.873	359.120	187.441	179.748	0.797	0.778
	Std. Dev.	25,365.027	22,553.579	34,477.211	25,652.902	3.077	3.050
	Skewness	9.447	8.944	18.188	15.049	0.180	0.172
	Kurtosis	118.824	109.197	382.017	298.195	0.462	0.265
UK	Mean	47,397.233	48,627.056	3,527.910	3,062.920	-1.977	-2.021
	Median	6,522.645	8,990.790	571.815	734.508	-2.042	-2.057
	Std. Dev.	200,284.129	181,483.851	22,203.425	20,390.645	2.805	2.746
	Skewness	11.803	10.501	5.993	5.806	0.179	0.131
	Kurtosis	218.001	187.221	53.092	51.715	0.123	0.223

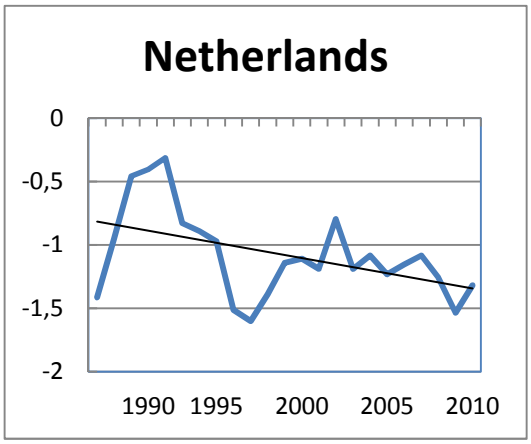
Figure 1: Liquidity measure performance

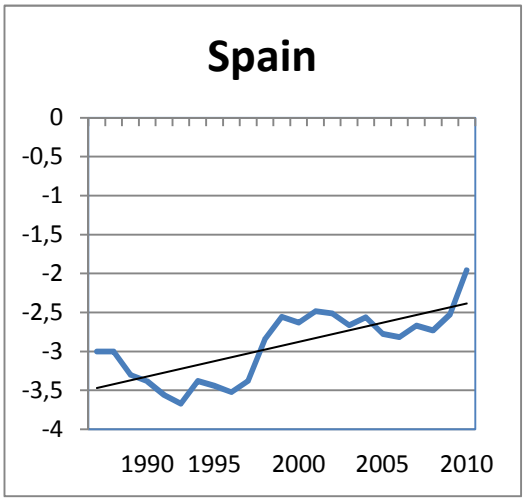
The annual performance of the value-weighted liquidity measure for each country is plot in a different graph. The sample period is from January 1988 to December 2010.











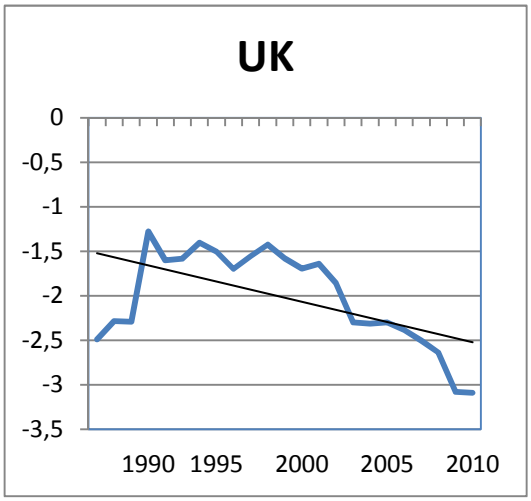


Table 2: Summary statistics for European mutual funds

The table reports summary statistics of the funds in the sample from from January 1988 to December 2010. The return data includes reinvestment of all dividends, based on local currencies.

		By current status					
	Total Number	Live funds	Dead funds	Mean Return	Stdev	Skewness	Kurtosis
Germany	**98**	**74**	**24**	**0.869**	**1.556**	**0.117**	**3.292**
Large Blend	38	35	3	0.849	1.123	0.071	2.280
Large Value	15	4	11	0.808	1.363	-0.025	0.781
Mid Blend	12	9	3	1.024	1.792	0.005	-0.095
Mid Growth	10	7	3	0.963	1.634	0.136	0.094
Small Blend	12	11	1	1.033	1.701	0.206	0.104
Small Growth	11	8	3	1.102	1.458	0.056	0.563
Italy	**93**	**53**	**40**	**0.722**	**1.088**	**0.188**	**2.342**
Large Blend	12	6	6	1.117	0.669	-0.022	1.475
Large Value	37	20	17	0.715	0.838	0.168	1.529
Mid Blend	11	3	8	0.639	0.793	0.127	0.666
Mid Value	10	6	4	0.800	1.107	0.011	0.456
Small Blend	13	10	3	0.525	1.381	0.038	0.346
Small Value	10	8	2	0.310	0.985	0.112	0.542
Spain	**139**	**95**	**44**	**0.689**	**1.441**	**-0.131**	**4.463**
Large Blend	17	6	11	0.634	1.592	-0.145	2.374
Large Growth	11	6	5	0.636	1.691	0.273	1.145
Large Value	71	54	17	0.722	1.235	-0.095	2.953
Mid Blend	10	6	4	0.721	0.635	-0.366	2.478
Mid Value	17	15	2	0.704	1.477	0.098	0.936
Small Value	13	8	5	0.781	1.056	-0.296	2.012
Netherlands	**62**	**46**	**16**	**0.848**	**2.830**	**0.262**	**1.359**
Large Blend	10	8	2	0.021	1.896	0.245	1.586
Large Value	18	13	5	0.842	1.942	0.011	1.072
Mid Value	11	8	3	0.536	2.885	0.552	-0.096
Small Blend	11	7	4	0.841	2.435	0.487	1.234
Small Value	12	10	2	0.968	2.435	0.155	0.432
France	**222**	**169**	**53**	**0.650**	**1.938**	**-0.040**	**2.583**
Large Blend	24	9	15	0.463	1.939	-0.185	1.792
Large Growth	10	7	3	0.417	1.155	0.458	1.658
Large Value	135	111	24	0.661	1.692	-0.035	2.024
Mid Blend	9	6	3	0.515	1.923	0.093	-0.361
Mild Value	21	20	1	0.561	2.134	-0.026	-0.044
Small Blend	12	8	4	0.530	1.597	0.425	1.002
Small Value	11	8	3	0.565	1.165	0.045	2.142
UK	**582**	**485**	**97**	**1.043**	**2.084**	**0.206**	**2.997**
Large Blend	286	245	41	1.014	1.599	0.138	2.636
Large Growth	44	39	5	0.988	1.922	0.105	1.670
Large Value	77	50	27	1.053	1.818	0.094	1.999
Mid Blend	53	45	8	0.981	2.124	0.155	1.009
Mid Growth	20	18	2	1.170	1.617	-0.025	0.338
Mid Value	20	18	2	1.013	2.076	0.027	0.907
Small Blend	43	37	6	1.143	2.195	0.062	0.792
Small Growth	28	24	4	1.175	1.975	0.110	0.898
Small Value	11	9	2	0.919	2.081	0.109	0.357

Figure 2: Annual performance of idiosyncratic risk

The annual performance of the idiosyncratic risk measure for each country, from January 1988 to December 2010.

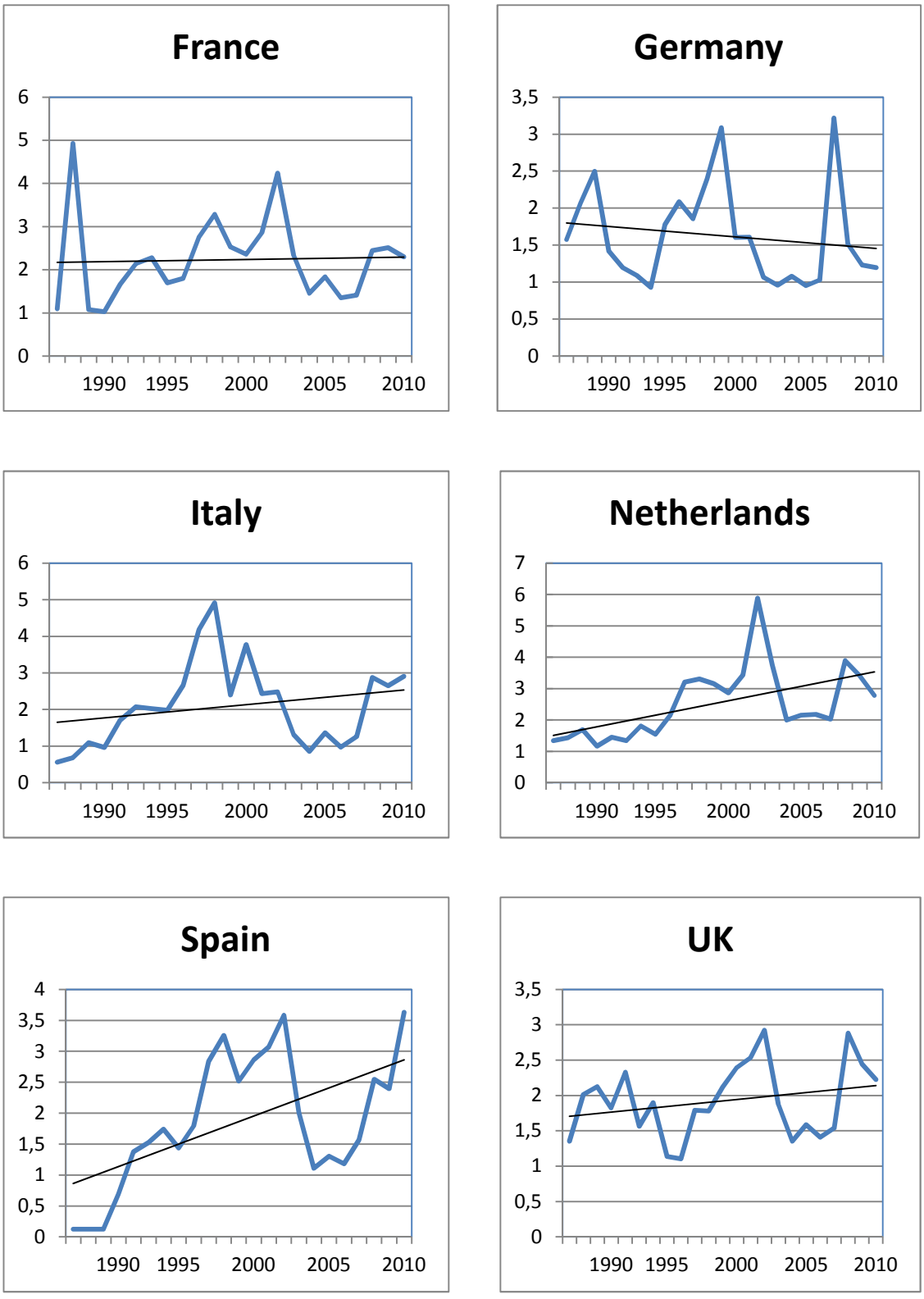


Table 3: The relationship between idiosyncratic risk, liquidity and size

The statistics are calculated using monthly logarithmic data. In each month value-weighted measures are created. The time series cross sectional average and standard deviation of the other two measures for each investment style are reported in the columns named Mean and Std. Dev. Sample period: January 1988 to December 2010.

Panel A: Funds sorted by liquidity					
Rank		Idiosyncratic risk		Size	
	Germany	Mean	Std. Dev.	Mean	Std. Dev.
1 (Low)	Small Growth	1.401	1.542	18.051	19.552
2	Large Value	1.469	1.469	20.309	19.897
3	Large Blend	1.237	1.237	19.989	20.332
4	Mid Blend	1.898	1.898	19.273	19.395
5	Mid Growth	1.618	1.618	18.781	18.273
6 (High)	Small Blend	1.950	1.950	16.663	16.700
	Italy				
1 (Low)	small Value	1.292	2.014	18.601	18.552
2	Large Value	2.114	1.853	18.713	19.937
3	Mid Blend	1.567	1.856	18.713	17.272
4	Small Blend	1.793	1.954	17.793	17.313
5	Large Blend	0.857	1.311	17.837	17.639
6 (High)	Mid Value	1.563	2.139	17.228	16.687
	Spain				
1 (Low)	Large Growth	0.940	1.045	19.177	18.001
2	Mid Blend	0.479	0.827	17.026	17.876
3	Large Blend	1.792	1.518	17.953	17.435
4	Large Value	1.637	1.708	17.921	18.115
5	Mid Value	2.022	1.790	17.121	17.496
6 (High)	Small Value	1.034	1.151	16.978	16.689
	Netherlands				
1 (Low)	Large Blend	1.789	1.985	20.034	19.124
2	Small Blend	0.468	1.652	16.234	16.770
3	Large Value	2.580	1.362	19.922	20.349
4	Mid Value	2.345	1.855	16.915	18.552
5 (High)	Small Value	1.668	2.096	19.646	19.728
	France				
1 (Low)	Large Value	2.033	1.098	21.085	21.644
2	Large Growth	0.970	1.307	19.923	16.780
3	Large Blend	1.926	1.198	18.079	18.160
4	Mid Value	1.896	1.103	17.529	18.094
5	Mid Blend	1.917	1.186	16.901	16.582
6	Small Value	1.637	1.742	16.479	15.677
7 (High)	Small Blend	1.319	1.307	15.557	15.119
	UK				
1 (Low)	Large Blend	1.909	0.959	19.183	20.004
2	Large Growth	0.924	0.717	19.059	19.183
3	Large Value	1.827	1.113	19.337	19.996
4	Mid Blend	1.812	1.103	18.341	18.816
5	Mid Growth	2.026	1.053	19.082	19.975
6	Mid Value	1.458	1.006	18.884	19.369
7	Small Blend	1.816	0.996	18.643	19.114
8	Small Growth	2.120	0.985	18.357	18.708
9 (High)	Small Value	1.004	1.050	18.543	19.124

Panel B: Funds sorted by idiosyncratic risk					
Rank		liquidity		Size	
	Germany	Mean	Std. Dev.	Mean	Std. Dev.
1 (Low)	Small Growth	0.088	0.067	18.051	18.986
2	Large Blend	0.017	0.016	19.989	20.333
3	Large Value	0.012	0.031	20.309	19.897
4	Mid Growth	0.067	0.189	18.781	18.273
5	Mid Blend	0.044	0.067	19.273	19.396
6 (High)	Small Blend	0.599	0.950	16.663	16.700
	Italy				
1 (Low)	Large Blend	0.200	0.014	17.837	17.639
2	Small Value	0.233	0.034	16.221	17.042
3	Mid Value	0.264	0.063	17.228	16.687
4	Mid Blend	0.047	0.025	18.712	17.272
5	Small Blend	0.098	0.042	17.793	17.312
6 (High)	Large Value	0.016	0.018	18.712	19.936
	Spain				
1 (Low)	Mid Blend	0.023	0.015	17.002	16.987
2	Large Growth	0.112	0.067	18.678	17.998
3	Small Value	0.331	0.059	16.978	16.689
4	Large Value	0.119	0.016	17.922	18.115
5	Large Blend	0.101	0.023	17.953	17.667
6 (High)	Mid Value	0.258	0.037	17.122	17.496
	Netherlands				
1 (Low)	Large Blend	0.025	0.052	20.345	18.552
2	Mid Value	0.024	0.034	18.345	17.431
3	Small Blend	0.030	0.012	16.915	16.234
4	Small Value	0.028	0.065	19.647	19.728
5 (High)	Large Value	0.018	0.028	19.922	20.349
	France				
1 (Low)	Large Growth	0.009	0.014	19.923	13.123
2	Small Blend	0.929	0.434	15.557	15.119
3	Small Value	0.394	0.234	16.479	14.234
4	Mid Value	0.136	0.029	17.529	18.094
5	Mid Blend	0.235	0.121	16.901	16.581
6	Large Blend	0.065	0.025	18.079	18.160
7 (High)	Large Value	0.005	0.011	21.085	21.644
	UK				
1 (Low)	Large Growth	0.052	0.089	19.059	19.182
2	Small Value	0.081	0.103	18.542	19.124
3	Mid Value	0.063	0.080	18.884	19.369
4	Mid Blend	0.106	0.143	18.341	18.816
5	Small Blend	0.091	0.109	18.643	19.114
6	Large Value	0.042	0.037	19.337	19.996
7	Large Blend	0.047	0.033	19.183	20.004
8	Mid Growth	0.060	0.034	19.082	19.975
9 (High)	Small Growth	0.125	0.148	18.357	18.707

Table 4: Fama-French regression augmented by idiosyncratic risk

This table reports regression coefficients on value-weighted portfolios grouped by investment style for the idiosyncratic risk augmented Fama-French model. Significance at the 1%, 5%, 10% level is denoted by ***, **. And *, respectively. Regressions are performed considering the covariance matrix of Newey and West (1987). Sample period: January 1988 to December 2010. All alphas in the Table are annualised. Fund highlighted indicate significant idiosyncratic risk factor at the 10% level.

	αi	Id. Risk	Mk. Ex. Re.	Size	Value	Adj. R-squr.	F-stat.
Germany	-0.351***	-0.041	0.543***	0.204***	0.011	0.851	132.960
Large Blend	-0.323***	-0.071	0.747***	-0.016*	0.120***	0.798	498.535
Large Value	-0.522***	0.281	0.708***	-0.033**	0.071***	0.808	345.859
Mid Blend	-0.720***	-0.041	0.647***	0.217***	0.091***	0.810	207.468
Mid Growth	-0.803***	0.075	0.406***	0.089***	0.072*	0.861	69.524
Small Blend	-1.027***	-0.021	0.242***	0.130***	0.077***	0.885	124.996
Small Growth	-0.459***	-0.275	0.591***	0.322***	0.110**	0.786	104.293
Italy	-0.056***	0.051**	0.301***	0.016**	-0.127***	0.819	121.520
Large Blend	-0.022***	0.203*	0.306**	-0.007	-0.149***	0.877	45.971
Large Value	-0.110***	0.097***	0.417***	0.023**	-0.132***	0.794	104.237
Mid Blend	-1.227***	-0.030	0.215***	0.055**	-0.164***	0.841	72.128
Mid Value	-0.264***	-0.020	0.455***	-0.005	-0.137***	0.934	88.510
Small Blend	-1.172***	-0.058	0.403***	0.014	-0.029	0.902	157.965
Small Value	-1.093***	-0.244	0.233**	-0.012	-0.390***	0.803	36.389
Spain	-0.730***	0.258***	0.516***	0.010***	0.041***	0.915	527.017
Large Blend	-0.431***	0.284***	0.499***	0.011***	-0.003	0.851	414.846
Large Growth	-0.933***	0.286***	0.465***	0.010	-0.089***	0.848	217.704
Large Value	-1.059***	0.271***	0.570***	0.010***	0.037***	0.782	559.266
Mid Blend	-0.768***	-0.008	0.230***	0.004	0.146***	0.892	265.089
Mid Value	-1.221***	0.163***	0.400***	0.009***	0.099***	0.863	438.960
Small Value	-0.178***	0.037	0.155***	0.022	0.104***	0.823	307.768
Netherlands	-0.225***	0.201***	0.447***	0.012***	0.088***	0.812	245.514
Large Blend	-1.079	0.128	0.079**	-0.010	0.021	0.916	21.552
Large Value	-1.086***	0.141***	0.480***	0.011***	0.089***	0.856	276.605
Mid Value	-0.962***	0.274	0.611***	0.015	0.226***	0.840	96.069
Small Blend	-1.138***	0.271***	0.395***	0.015	0.081	0.905	135.807
Small Value	-0.348***	0.360***	0.253***	0.015	0.041***	0.802	61.188
France	-0.695***	-0.001	0.485***	0.018***	-0.045***	0.865	295.938
Large Blend	-0.629***	-0.032	0.486***	0.018***	-0.005***	0.904	228.929
Large Growth	-1.848***	0.024	0.495***	0.026**	-0.015*	0.803	116.184
Large Value	-0.544***	0.003	0.523***	0.017***	-0.025***	0.801	315.911
Mid Blend	-1.128***	-0.022	0.375***	0.021***	-0.001**	0.844	174.441
Mid Value	-1.204***	0.009	0.365***	0.023***	-0.006***	0.834	234.471
Small Blend	-0.359***	0.013	0.132***	0.050**	-0.000	0.855	212.563
Small Value	-0.331***	0.069*	0.163***	0.065**	-0.004	0.867	185.220
UK	-0.175***	-0.034***	0.529***	0.016***	0.047***	0.856	378.517
Large Blend	-0.307***	-0.029***	0.551***	0.066***	0.049***	0.902	420.726
Large Growth	-0.959***	-0.023*	0.577***	0.006***	0.027***	0.877	392.061
Large Value	-0.303***	-0.029***	0.509***	0.016***	0.059***	0.820	359.398
Mid Blend	-0.410***	-0.038***	0.479***	0.003***	0.043***	0.923	328.051
Mid Growth	-0.736***	-0.033*	0.433***	0.004***	0.038***	0.834	314.738
Mid Value	-0.177***	-0.006	0.541***	0.000***	0.072***	0.704	318.595
Small Blend	-1.328***	-0.053***	0.475***	0.085***	0.044***	0.733	284.010
Small Growth	-1.688***	-0.089***	0.556***	0.077**	0.028*	0.834	261.077
Small Value	-0.411***	-0.064*	0.443***	0.043	0.059**	0.844	186.574

Table 5: Fama-French regression augmented by liquidity

This table reports regression coefficients on value-weighted portfolios grouped by investment style for the liquidity augmented Fama-French model. Significance at the 1%, 5%, 10% level is denoted by ***, **. And *, respectively. Regressions are performed considering the covariance matrix of Newey and West (1987). Sample period: January 1988 to December 2010. All alphas are annualised. Fund highlighted indicate significant liquidity factor at the 10% level.

	αi	Liquidity	Mk. Ex. Re.	Size	Value	Adj. R-squr.	F-stat.
Germany	-0.521***	0.887***	0.410***	0.140***	-0.004	0.803	213.838
Large Blend	-0.312***	0.222***	0.749***	-0.014	0.118***	0.838	527.299
Large Value	-0.301***	0.181***	0.713***	-0.024	0.067***	0.848	365.161
Mid Blend	-0.131***	0.369***	0.651***	0.170***	0.088***	0.930	211.668
Mid Growth	-0.314***	0.463**	0.408***	0.103***	0.065	0.851	71.629
Small Blend	-1.012***	0.483***	0.228***	0.033***	0.077***	0.775	123.618
Small Growth	-0.321***	0.403	0.557***	0.093***	0.108**	0.886	91.109
Italy	-0.073***	0.244***	0.328***	0.038***	-0.129***	0.904	122.841
Large Blend	-0.326***	0.007	0.423**	-0.009	-0.158***	0.855	95.933
Large Value	-0.213***	0.288***	0.412***	0.031***	-0.138***	0.845	105.271
Mid Blend	-0.767***	0.278	0.332***	0.026	-0.164***	0.845	73.019
Mid Value	-0.312***	0.183	0.289***	-0.006	-0.138***	0.839	89.462
Small Blend	-0.622***	0.171	0.245***	0.058*	-0.029	0.844	159.293
Small Value	-0.613***	-0.441	-0.014**	0.044**	-0.383***	0.806	36.409
Spain	-0.523***	2.919***	0.552***	0.113***	0.066***	0.944	530.322
Large Blend	-0.522***	2.728***	0.529***	0.104***	0.013	0.867	397.380
Large Growth	-0.722***	2.822***	0.500***	0.108***	-0.079***	0.895	200.200
Large Value	-0.642***	2.804***	0.591***	0.089***	0.061***	0.855	565.683
Mid Blend	-0.432***	3.720***	0.350***	0.177***	0.180***	0.933	250.950
Mid Value	-1.053***	3.244***	0.489***	0.195***	0.134***	0.945	460.049
Small Value	-0.321***	2.509***	0.200***	0.190***	0.112***	0.899	249.111
Netherlands	-0.321***	-2.176***	0.434***	0.013***	0.091***	0.875	260.937
Large Blend	-1.222	0.396	0.086**	-0.008	0.015	0.888	22.443
Large Value	-0.821***	-1.823***	0.467***	0.012***	0.091***	0.866	291.211
Mid Value	-0.200***	-2.267***	0.588***	0.016	0.234***	0.904	101.521
Small Blend	-0.426***	-2.552***	0.246***	0.017	0.038	0.903	64.242
Small Value	-0.899***	-2.886***	0.389***	0.026**	0.085***	0.789	146.245
France	-0.533***	-0.778***	0.512***	0.019***	-0.001***	0.923	315.913
Large Blend	-0.149***	-0.769***	0.514***	0.021***	-0.005***	0.845	244.641
Large Growth	-1.511***	-0.765*	0.525***	0.028**	-0.045**	0.902	125.749
Large Value	-0.311***	-0.727***	0.550***	0.018***	-0.013***	0.883	339.359
Mid Blend	-1.338***	-0.926***	0.401***	0.024***	-0.007**	0.834	182.137
Mid Value	-1.104***	-0.809***	0.393***	0.026***	-0.011***	0.888	245.061
Small Blend	-0.255***	-0.029	0.143***	0.060**	-0.000	0.802	210.931
Small Value	-0.612***	-0.369	0.177***	0.066***	-0.006	0.788	184.999
UK	-0.234***	-1.013***	0.539***	0.006***	0.040***	0.933	396.474
Large Blend	-0.234***	-0.992***	0.560***	0.002***	0.042***	0.877	442.537
Large Growth	-0.612***	-1.035***	0.585***	0.016***	0.019**	0.803	413.164
Large Value	-0.610***	-0.979***	0.518***	0.033***	0.051***	0.773	376.449
Mid Blend	-0.345***	-1.066***	0.493***	0.005***	0.036***	0.789	342.041
Mid Growth	-0.566***	-0.899***	0.444***	0.008***	0.030**	0.844	326.879
Mid Value	-0.323***	-1.003***	0.545***	0.007***	0.066***	0.893	332.872
Small Blend	-1.052***	-1.045***	0.483***	0.073***	0.038***	0.802	293.838
Small Growth	-0.845***	-1.163***	0.566***	0.076***	0.025	0.823	271.977
Small Value	-0.843***	-1.115***	0.449***	0.086**	0.055**	0.964	194.288

Table 6: Fama-French regression augmented by liquidity and idiosyncratic risk

This table reports regression coefficients on value-weighted portfolios grouped by investment style for the liquidity and idiosyncratic risk augmented Fama-French model. Significance at the 1%, 5%, 10% level is denoted by ***, **. And *, respectively. Regressions are performed considering the covariance matrix of Newey and West (1987). Sample period: January 1988 to December 2010. All alphas are annualised. Fund highlighted indicate significant liquidity and idiosyncratic risk factor at the 10% level.

	αi	Liquidity	Id. Risk	Mk. Ex. Re.	Size	Value	Adj. R-squr.	F-stat.
Germany	-0.599***	0.898***	-0.007	0.411***	0.171***	0.004	0.833	313.078
Large Blend	-0.003***	0.226***	-0.006	0.748***	-0.010	0.119***	0.847	486.506
Large Value	-0.113***	0.179***	0.000	0.708***	-0.027	0.071***	0.866	326.989
Mid Blend	-0.034***	0.334***	-0.005	0.649***	0.228***	0.088***	0.900	188.418
Mid Growth	-0.123***	0.553**	0.134	0.413***	0.108***	0.066	0.844	80.703
Small Blend	-0.426***	0.470***	-0.015	0.245***	0.138***	0.073***	0.755	113.871
Small Growth	-0.322***	0.351	-0.009	0.597***	0.332***	0.106**	0.816	87.651
Italy	-0.033**	0.238***	0.051**	0.438***	0.018**	-0.128***	0.913	119.856
Large Blend	-0.032**	-0.012	0.204*	0.423***	-0.007	-0.149***	0.823	40.176
Large Value	-0.210***	0.279***	0.097***	0.328***	0.010***	-0.134***	0.873	102.001
Mid Blend	-0.233***	0.274	-0.029	0.476***	0.017**	-0.165***	0.912	64.203
Mid Value	-0.033***	0.176	-0.020	0.527***	-0.006	-0.138***	0.844	81.170
Small Blend	-0.443***	0.159	-0.056	0.212***	0.018*	-0.030	0.822	145.854
Small Value	-0.332***	-0.462	-0.249	-0.114**	0.022**	-0.389***	0.811	30.353
Spain	-0.837***	2.855***	0.164***	0.549***	0.113***	0.062***	0.955	530.852
Large Blend	-0.213***	2.654***	0.206***	0.528***	0.104***	0.007	0.915	384.773
Large Growth	-0.453***	2.771***	0.245***	0.498***	0.105***	-0.086***	0.910	178.281
Large Value	-0.359***	2.741***	0.151***	0.588***	0.088***	0.057***	0.920	562.688
Mid Blend	-0.386***	3.706***	0.119*	0.352***	0.178***	0.178***	0.948	220.693
Mid Value	-0.031***	3.191***	0.147***	0.488***	0.194***	0.129***	0.960	442.801
Small Value	-0.233***	2.765***	0.144**	0.205***	0.151***	0.108***	0.910	219.981
Netherlands	-0.342***	-2.205***	0.043	0.439***	0.013***	0.087***	0.833	252.148
Large Blend	-0.213	0.766	0.228	0.101**	-0.010	0.015	0.740	18.321
Large Value	-0.545***	-1.894***	0.007	0.471***	0.012***	0.087***	0.855	277.313
Mid Value	-0.126***	-2.237***	0.096	0.596***	0.016	0.229***	0.877	83.792
Small Blend	-0.345***	-2.356***	0.245*	0.260***	0.047*	0.035	0.912	55.700
Small Value	-0.677***	-2.909***	0.077	0.398***	0.036**	0.081***	0.810	131.659
France	-0.034***	-1.109***	0.032***	0.522***	0.022***	-0.005***	0.933	311.690
Large Blend	-0.234***	-1.123***	-0.005	0.521***	0.023***	-0.004***	0.811	233.101
Large Growth	-0.765***	-1.117**	0.055	0.538***	0.031***	-0.002**	0.915	106.885
Large Value	-0.067***	-1.065***	0.038***	0.559***	0.021***	-0.003***	0.920	334.874
Mid Blend	-0.633***	-1.242***	0.006	0.412***	0.026***	-0.061**	0.811	167.025
Mid Value	-0.867***	-1.094***	0.041*	0.402***	0.028***	-0.012***	0.897	231.748
Small Blend	-0.633***	-0.050	0.028	0.145***	0.071**	-0.000	0.786	178.785
Small Value	-0.213***	-0.488	0.092**	0.183***	0.067***	-0.000	0.813	157.849
UK	-0.023***	-1.024***	-0.035***	0.537***	0.000***	0.043***	0.965	386.797
Large Blend	-0.003***	-1.001***	-0.030***	0.559***	0.011***	0.045***	0.897	430.234
Large Growth	-0.125***	-1.043***	-0.023*	0.584***	0.014***	0.022**	0.945	394.829
Large Value	-0.122***	-0.987***	-0.029***	0.516***	0.071***	0.055***	0.845	363.861
Mid Blend	-0.245***	-1.074***	-0.041***	0.489***	0.009***	0.037***	0.978	329.674
Mid Growth	-0.277***	-0.928***	-0.038**	0.443***	0.003***	0.032**	0.940	306.868
Mid Value	-0.344***	-1.033***	-0.007	0.546***	0.007***	0.069***	0.910	313.092
Small Blend	-0.889***	-1.079***	-0.055***	0.483***	0.046***	0.039***	0.899	283.029
Small Growth	-0.773***	-1.162***	-0.089***	0.562***	0.082***	0.022	0.867	258.369
Small Value	-0.745***	-1.114***	-0.065**	0.448***	0.093*	0.054**	0.953	177.713

Table 7: Carhart regression augmented by idiosyncratic risk

This table presents regression coefficients on value-weighted portfolios grouped by investment style for the idiosyncratic risk augmented Carhart model. Idiosyncratic risk is estimated from an EGARCH model on Fama-French 3-factor model. Significance at the 1%, 5%, 10% level is denoted by ***, **. And *, respectively. Regressions are performed considering the covariance matrix of Newey and West (1987). The sample period is January 1988 to December 2010. All alphas are annualised. Fund highlighted indicate significant idiosyncratic risk factor at the 10% level.

	αi	Id. Risk	Mk. Ex. Re.	Size	Value	Momentum	Adj. R-squr.	F-stat.
Germany	-1.004***	-0.000	0.456***	0.202***	0.023	0.051***	0.934	310.670
Large Blend	-0.553**	-0.000	0.748***	-0.016	0.122***	0.021***	0.922	489.048
Large Value	-0.054***	0.003	0.708***	-0.032	0.073***	0.019***	0.821	329.810
Mid Blend	-0.069***	-0.005	0.647***	0.218***	0.096***	0.035***	0.845	188.806
Mid Growth	-0.817***	0.080	0.408***	0.093***	0.083**	0.054***	0.873	61.361
Small Blend	-0.319***	-0.004	0.242***	0.129***	0.081***	0.012	0.890	112.697
Small Growth	-0.608***	-0.015	0.591***	0.319***	0.116**	0.025	0.814	87.083
Italy	-0.663***	-0.019	0.345***	0.017**	-0.124***	0.145***	0.910	122.658
Large Blend	-1.021***	0.109	0.337***	-0.008	-0.143***	0.198***	0.856	142.162
Large Value	-0.676***	0.021	0.328***	0.009**	-0.129***	0.160***	0.740	104.868
Mid Blend	-1.383***	-0.106	0.434***	0.016**	-0.161***	0.158***	0.745	65.992
Mid Value	-1.516***	-0.098	0.222***	-0.006	-0.134***	0.157***	0.903	83.503
Small Blend	-0.220***	-0.076	0.329***	0.022**	-0.029	0.036	0.924	146.007
Small Value	-0.528***	-0.351	0.114**	-0.037	-0.389***	0.236**	0.803	31.598
Spain	-1.024***	0.257***	0.516***	0.011***	0.042***	0.001	0.945	522.573
Large Blend	-1.008***	0.285***	0.499***	0.011***	-0.004	-0.001	0.899	395.905
Large Growth	-0.923***	0.317***	0.464***	0.014	-0.082***	-0.051	0.856	191.088
Large Value	-1.328***	0.279***	0.569***	0.017***	0.039***	-0.009	0.790	551.957
Mid Blend	-0.264***	-0.047	0.230***	0.013	0.139***	0.056**	0.923	233.799
Mid Value	-0.322***	0.140***	0.401***	0.009***	0.094***	0.033***	0.867	419.870
Small Value	-0.322***	0.012	0.155***	0.043**	0.098***	0.038*	0.788	270.397
Netherlands	-0.786***	0.198***	0.448***	0.013***	0.088***	0.002	0.910	237.811
Large Blend	-1.744	-0.002	0.075*	-0.010	0.010	0.080	0.736	18.312
Large Value	-0.721***	0.121***	0.479***	0.012***	0.088***	0.017	0.884	264.717
Mid Value	-0.659***	0.303	0.614***	0.015	0.229***	-0.023	0.840	79.824
Small Blend	-0.630***	0.408***	0.256***	0.025***	0.046	-0.049	0.933	52.710
Small Value	-0.653***	0.309***	0.398***	0.019**	0.085***	-0.036	0.866	122.464
France	-0.633***	-0.017**	0.495***	0.017***	-0.008***	0.114***	0.888	298.968
Large Blend	-0.631***	-0.047**	0.495***	0.018***	-0.003***	0.118***	0.913	224.503
Large Growth	-1.343***	0.012	0.502***	0.026**	-0.019*	0.087*	0.845	100.359
Large Value	-1.234***	-0.012	0.532***	0.016***	-0.005***	0.116***	0.878	318.562
Mid Blend	-0.343***	-0.037	0.384***	0.021***	-0.000*	0.102***	0.888	164.011
Mid Value	-0.416***	-0.007	0.373***	0.023***	-0.001***	0.100***	0.887	228.353
Small Blend	-0.678***	0.011	0.133***	0.040*	-0.047	0.020	0.866	185.971
Small Value	-0.002***	0.012	0.155***	0.063**	0.098	0.038***	0.855	270.397
UK	-0.567***	-0.022***	0.532***	0.006***	0.046***	0.042***	0.889	379.963
Large Blend	-1.007***	-0.019***	0.553***	0.016***	0.048***	0.038***	0.945	421.188
Large Growth	-0.456***	-0.013	0.579***	0.006***	0.026***	0.039***	0.898	385.774
Large Value	-0.456***	-0.016*	0.513***	0.076***	0.057***	0.049***	0.834	357.678
Mid Blend	-0.678***	-0.026***	0.483***	0.003***	0.042***	0.040***	0.966	324.118
Mid Growth	-0.678***	-0.023	0.435***	0.007***	0.037***	0.030***	0.822	303.272
Mid Value	-0.678***	0.010	0.544***	0.036***	0.071***	0.058***	0.756	308.814
Small Blend	-1.003***	-0.035**	0.478***	0.086***	0.042***	0.054***	0.798	280.398
Small Growth	-0.345***	-0.075***	0.559***	0.081**	0.026	0.050***	0.911	254.534
Small Value	-0.234***	-0.040	0.448***	0.074	0.056***	0.071***	0.876	177.120

Table 8: Carhart regression augmented by liquidity

This table presents regression coefficients on value-weighted portfolios grouped by investment style for the idiosyncratic risk augmented Carhart model. Idiosyncratic risk is estimated from an EGARCH model on Fama-French 3-factor model. Significance at the 1%, 5%, 10% level is denoted by ***, **. And *, respectively. Regressions are performed considering the covariance matrix of Newey and West (1987). The sample period is January 1988 to December 2010. All alphas are annualised. Fund highlighted indicate significant liquidity factor at the 10% level.

	αi	Liquidity	Mk. Ex. Re.	Size	Value	Momentum	Adj. R-squr.	F-stat.
Germany	-0.733***	0.855***	0.416***	0.143***	0.006	0.046***	0.848	314.389
Large Blend	-0.783***	0.207***	0.749***	-0.014	0.120***	0.018***	0.902	516.725
Large Value	-0.533***	0.167***	0.712***	-0.024	0.069***	0.018***	0.855	347.950
Mid Blend	-0.234***	0.342***	0.652***	0.177***	0.091***	0.034***	0.956	192.548
Mid Growth	-1.004*	0.425**	0.409***	0.106***	0.076*	0.051**	0.876	62.969
Small Blend	-0.045***	0.475***	0.228***	0.033***	0.081***	0.014***	0.854	111.543
Small Growth	-0.543***	0.381	0.556***	0.091***	0.116**	0.030	0.803	76.227
Italy	-1.056***	0.251***	0.375***	0.008***	-0.125***	0.141***	0.912	124.012
Large Blend	-1.768**	-0.028	0.434***	-0.038	-0.148***	0.207***	0.799	42.448
Large Value	-0.101***	0.276***	0.356***	0.010***	-0.131***	0.159***	0.878	106.075
Mid Blend	-1.045***	0.299	0.449***	0.056**	-0.159***	0.146***	0.912	66.623
Mid Value	-0.045***	0.205	0.334***	-0.006	-0.132***	0.146***	0.922	84.183
Small Blend	-0.567***	0.188	0.429***	0.051**	-0.028	0.029	0.912	147.159
Small Value	-0.895***	-0.409	-0.008**	0.072*	-0.379***	0.201**	0.934	31.267
Spain	-0.345***	2.904***	0.552***	0.114***	0.061***	0.027***	0.933	526.691
Large Blend	-0.123***	2.711***	0.530***	0.105***	0.007	0.033**	0.823	380.107
Large Growth	-0.045***	2.821***	0.500***	0.108***	-0.079***	0.003	0.910	174.942
Large Value	-0.022***	2.796***	0.591***	0.089***	0.058***	0.013**	0.930	558.416
Mid Blend	-0.039***	3.691***	0.348***	0.176***	0.164***	0.086***	0.845	224.056
Mid Value	-0.343***	3.212***	0.488***	0.195***	0.123***	0.059***	0.932	442.715
Small Value	0.003*	2.736***	0.204***	0.174***	0.099***	0.073***	0.910	221.957
Netherlands	-0.374***	-2.174***	0.434***	0.013***	0.091***	0.001	0.920	252.749
Large Blend	0.056	0.671	0.090**	-0.009	0.000	0.099*	0.847	19.532
Large Value	-0.217***	-1.798***	0.467***	0.012***	0.090***	0.011	0.923	278.595
Mid Value	-0.423***	-2.309***	0.588***	0.016*	0.236***	-0.018	0.912	84.332
Small Blend	-0.567***	-2.597***	0.246***	0.027**	0.041	-0.028	0.913	55.095
Small Value	-0.232***	-2.957***	0.390***	0.036**	0.089***	-0.032	0.809	131.824
France	-0.441***	-0.794***	0.521***	0.019***	-0.005***	0.110***	0.903	318.951
Large Blend	-1.203***	-0.798***	0.523***	0.021***	-0.006***	0.108***	0.876	239.309
Large Growth	-1.030***	-0.799*	0.532***	0.028**	-0.001**	0.088*	0.911	108.682
Large Value	-0.678***	-0.738***	0.559***	0.018***	-0.002***	0.111***	0.914	341.927
Mid Blend	-0.733***	-0.953***	0.411***	0.024***	-0.013**	0.102***	0.884	171.275
Mid Value	-0.033***	-0.834***	0.402***	0.025***	-0.000***	0.102***	0.911	238.871
Small Blend	-0.143***	-0.017	0.144***	0.050*	-0.003	0.022	0.842	184.586
Small Value	-0.088***	-0.317	0.182***	0.065**	-0.015	0.097***	0.828	165.2492
UK	-1.265***	-1.004***	0.539***	0.006***	0.039***	0.011***	0.945	396.471
Large Blend	-1.033***	-0.984***	0.561***	0.016***	0.041***	0.009***	0.899	441.613
Large Growth	-1.025***	-1.026***	0.586***	0.005***	0.018*	0.011***	0.814	405.339
Large Value	-0.266***	-0.971***	0.519***	0.017***	0.050***	0.010***	0.810	372.497
Mid Blend	-1.023***	-1.058***	0.495***	0.033***	0.035***	0.013***	0.834	336.852
Mid Growth	-1.342***	-0.895***	0.446***	0.027***	0.029**	0.012**	0.910	314.408
Mid Value	-0.563***	-0.991***	0.546***	0.007***	0.065***	0.014***	0.870	320.364
Small Blend	-0.545***	-1.037***	0.484***	0.034***	0.037***	0.014***	0.826	288.317
Small Growth	-0.567***	-1.153***	0.567***	0.066***	0.024	0.013***	0.841	264.149
Small Value	-0.044***	-1.103***	0.451***	0.053**	0.052**	0.021***	0.960	182.936

Table 9: Carhart regression augmented by liquidity and idiosyncratic risk

This table presents regression coefficients on value-weighted portfolios grouped by investment style for the idiosyncratic risk and liquidity augmented Carhart model. Idiosyncratic risk is estimated from an EGARCH model on Fama-French 3-factor model. Significance at the 1%, 5%, 10% level is denoted by ***, **. And *, respectively. Regressions are performed considering the covariance matrix of Newey and West (1987). The sample period is January 1988 to December 2010. All alphas are annualised. Fund highlighted indicate significant idiosyncratic risk and liquidity factor at the 10% level.

	αi	Liquidity	Id. Risk	Mk. Ex. Re.	Size	Value	Momentum	Adj. R-squr.	F-stat.
Germany	-0.234***	0.862***	-0.015	0.502***	0.168***	0.015	0.049***	0.843	413.719
Large Blend	-0.678***	0.210***	-0.004	0.747***	-0.009	0.121***	0.018***	0.866	477.079
Large Value	-0.678***	0.164***	0.000	0.708***	-0.026	0.072***	0.018***	0.890	312.388
Mid Blend	-0.833***	0.308***	-0.001	0.648***	0.228***	0.092***	0.032***	0.912	172.904
Mid Growth	-1.238***	0.516**	0.139	0.414***	0.111***	0.077*	0.052**	0.867	54.578
Small Blend	-1.077***	0.464***	-0.005	0.245***	0.137***	0.076***	0.011	0.810	103.676
Small Growth	-0.443***	0.336	-0.014	0.596***	0.329***	0.112**	0.025	0.800	75.251
Italy	-1.225***	0.237***	-0.019	0.434***	0.058***	-0.124***	0.145***	0.920	121.002
Large Blend	-1.027***	-0.055	0.109	0.256***	-0.067	-0.143***	0.198***	0.811	37.435
Large Value	-0.686***	0.259***	0.019	0.367***	0.090***	-0.129***	0.159***	0.910	102.639
Mid Blend	-0.678***	0.289	-0.106	0.422***	0.057***	-0.162***	0.158***	0.850	59.488
Mid Value	-1.106***	0.189	-0.097	0.351***	-0.006	-0.135***	0.157***	0.864	77.124
Small Blend	-0.733***	0.176	-0.075	0.223***	0.112***	-0.029	0.038	0.834	135.637
Small Value	-0.222***	-0.435	-0.354	0.156**	0.133***	-0.388***	0.236**	0.855	27.095
Spain	-0.834***	2.854***	0.159***	0.549***	0.113***	0.061***	0.006	0.958	526.443
Large Blend	-1.009***	2.652***	0.200***	0.528***	0.104***	0.006	0.007	0.936	367.988
Large Growth	-1.753***	2.772***	0.268***	0.497***	0.103***	-0.081***	-0.030	0.935	158.519
Large Value	-1.559***	2.743***	0.159***	0.589***	0.088***	0.058***	-0.009	0.934	555.426
Mid Blend	-0.221***	3.685***	0.055	0.348***	0.177***	0.164***	0.079***	0.930	199.138
Mid Value	-0.567***	3.180***	0.111***	0.487***	0.194***	0.122***	0.044***	0.954	425.211
Small Value	-0.124***	2.859***	0.102*	0.206***	0.191***	0.099***	0.064***	0.946	198.031
Netherlands	-0.003***	-2.208***	0.049	0.439***	0.013***	0.087***	-0.005	0.879	244.489
Large Blend	0.117	0.772	0.098	0.097**	-0.009	0.004	0.081	0.790	16.016
Large Value	-0.356***	-1.888***	-0.006	0.469***	0.013***	0.086***	0.011	0.894	265.784
Mid Value	-0.779***	-2.261***	0.137	0.599***	0.015	0.233***	-0.034	0.870	71.688
Small Blend	-0.688***	-2.388***	0.301**	0.263***	0.046**	0.041	-0.055	0.956	49.046
Small Value	-0.889***	-2.941***	0.128	0.401***	0.053***	0.086***	-0.046*	0.802	120.105
France	-1.067***	-1.137***	0.010	0.530***	0.022***	-0.005***	0.122***	0.948	315.681
Large Blend	-1.022***	-1.172***	-0.026	0.530***	0.022***	-0.003***	0.129***	0.856	229.638
Large Growth	-0.876***	-1.165***	0.038	0.545***	0.031***	-0.004**	0.098**	0.920	94.541
Large Value	-0.606***	-1.087***	0.017*	0.567***	0.020***	-0.006***	0.121***	0.956	338.334
Mid Blend	-0.499***	-1.287***	-0.015	0.422***	0.026***	-0.004**	0.117***	0.833	158.498
Mid Value	-0.688***	-1.135***	0.021	0.412***	0.027***	-0.001***	0.113***	0.910	226.802
Small Blend	-0.998***	-0.035	0.024	0.146***	0.091**	-0.009	0.024	0.810	158.979
Small Value	-0.188***	-0.436	0.078*	0.186***	0.116***	-0.006	0.089***	0.910	142.689
UK	-1.056***	-1.092***	-0.019***	0.540***	0.006***	0.040***	0.059***	0.955	389.836
Large Blend	-1.440***	-1.061***	-0.016***	0.561***	0.012***	0.043***	0.055***	0.910	432.429
Large Growth	-1.233***	-1.099***	-0.008	0.585***	0.006***	0.020**	0.056***	0.966	390.166
Large Value	-0.586***	-1.058***	-0.012	0.520***	0.007***	0.053***	0.066***	0.910	363.941
Mid Blend	-0.844***	-1.156***	-0.025**	0.494***	0.015***	0.035***	0.058***	0.980	327.211
Mid Growth	-0.644***	-1.011***	-0.024	0.447***	0.025***	0.030**	0.044***	0.966	297.101
Mid Value	-0.598***	-1.105***	0.014	0.549***	0.008***	0.067***	0.073***	0.955	305.356
Small Blend	-0.665***	-1.177***	-0.033**	0.488***	0.033***	0.036***	0.069***	0.910	280.655
Small Growth	-0.468***	-1.235***	-0.070***	0.566***	0.036***	0.019	0.066***	0.890	252.943
Small Value	-0.687**	-1.233***	-0.037	0.455***	0.041*	0.049*	0.086***	0.967	170.111

Table 10: Carhart regression augmented by liquidity, idiosyncratic risk and a government bond index

This table presents regression coefficients on value-weighted portfolios for an augmented Carhart model. Bond excess return is defined as the actual annual return minus the annual return from holding 30-day Treasury bills. All other factors are defined as in Equation (8). Significance at the 1%, 5%, 10% level is denoted by ***, ** and *, respectively. Regressions are performed considering the covariance matrix of Newey and West (1987). The sample period is January 1988 to December 2010. All alphas are annualised. Fund highlighted indicate significant idiosyncratic risk, liquidity, bond excess return factor at the 10% level.

	αi	Liquidity	Id. Risk	Mk. Ex. Re.	Bo. Ex. Re.	Size	Value	Momentum	Adj. R-squr.	F-stat.
Germany	-0.068***	0.739***	-0.003	0.469***	0.740***	0.174***	0.018	0.048***	0.910	415.007
Large Blend	-0.480***	0.107***	0.000	0.724***	0.749***	-0.019**	0.114***	0.019***	0.913	491.095
Large Value	-0.838***	0.065	0.006	0.683***	0.734***	-0.037**	0.066***	0.018***	0.895	313.753
Mid Blend	-0.345***	0.194*	-0.001	0.627***	0.868***	0.218***	0.085***	0.033***	0.934	167.687
Mid Growth	-0.768***	0.330*	0.132	0.399***	1.352***	0.143***	0.070*	0.054***	0.910	54.863
Small Blend	-0.799***	0.325***	-0.005	0.237***	1.279***	0.129***	0.074***	0.014	0.824	106.536
Small Growth	-0.054***	0.208	-0.002	0.589***	1.234***	0.328***	0.102**	0.026	0.803	69.722
Italy	-1.013	0.182	-0.029	0.471***	0.000	0.053**	-0.126	0.142	0.844	119.694
Large Blend	-0.204***	-0.104	0.099	0.361***	0.003	0.004	-0.144***	0.196***	0.910	63.808
Large Value	-1.279***	0.202**	0.008	0.384***	0.007***	0.062***	-0.131***	0.157***	0.913	100.830
Mid Blend	-0.973***	0.209	-0.120	0.271***	0.003*	0.009	-0.164***	0.154***	0.887	54.496
Mid Value	-0.565***	0.147	-0.104	0.469***	0.005	0.082***	-0.136***	0.156***	0.870	71.744
Small Blend	-0.841***	0.139	-0.080	0.358***	0.006	0.076**	-0.030	0.037	0.866	126.708
Small Value	-0.559***	-0.447	-0.356	0.126**	0.009	0.074***	-0.389***	0.235**	0.833	23.622
Spain	-0.663***	2.327***	0.091***	0.529***	0.889***	0.097***	0.064***	-0.006	0.970	554.636
Large Blend	-1.341***	2.065***	0.127***	0.508***	0.992***	0.087***	0.009	-0.005	0.944	378.695
Large Growth	-0.818*	2.143***	0.195**	0.482***	1.099***	0.089**	-0.077***	-0.041	0.956	151.817
Large Value	-0.682***	2.248***	0.093***	0.569***	0.835***	0.072***	0.060***	-0.019***	0.978	579.083
Mid Blend	-0.623***	3.085***	-0.019	0.339***	1.124***	0.171***	0.174***	0.064**	0.945	199.044
Mid Value	-0.926***	2.641***	0.043	0.469***	0.919***	0.180***	0.127***	0.032***	0.977	436.566
Small Value	-0.347	2.585***	0.056	0.215***	1.359***	0.101***	0.107***	0.056**	0.976	195.055
Netherlands	-0.012***	-0.844***	0.042	0.409***	0.997***	0.011***	0.092***	0.001	0.845	260.889
Large Blend	0.469*	0.567	0.097	0.104**	-0.122	-0.009	0.003	0.080	0.823	14.033
Large Value	-0.032***	-0.655***	-0.011	0.441***	0.897***	0.011***	0.090***	0.017	0.930	277.928
Mid Value	0.126***	-0.879	0.140	0.569***	0.960***	0.014	0.241***	-0.031	0.944	66.853
Small Blend	-0.322***	-0.645	0.297**	0.234***	1.477***	0.025**	0.044	-0.045	0.967	52.258
Small Value	-0.207***	-1.267***	0.108	0.367***	1.294***	0.024**	0.093***	-0.039	0.910	123.924
France	-0.644***	-1.156***	0.001	0.530***	0.001***	0.021***	-0.003***	0.124***	0.955	315.287
Large Blend	-0.060***	-1.197***	-0.037	0.529***	0.000***	0.023***	-0.009***	0.131***	0.940	223.372
Large Growth	-1.031**	-1.188***	0.028	0.546***	0.007	0.031***	-0.000**	0.099**	0.944	84.114
Large Value	-1.025***	-1.104***	0.007	0.567***	0.000***	0.020***	-0.003***	0.123***	0.989	337.045
Mid Blend	-1.027***	-1.319***	-0.028	0.423***	0.000**	0.026***	-0.002**	0.122***	0.844	149.319
Mid Value	-0.631***	-1.161***	0.011	0.413***	0.005***	0.027***	-0.005***	0.116***	0.967	219.308
Small Blend	-0.233***	-0.043	0.021	0.145***	0.002	0.051**	-0.004	0.025	0.930	142.968
Small Value	-0.124***	-0.444	0.075*	0.186***	0.003	0.066***	-0.008	0.090***	0.916	128.303
UK	-1.015***	-1.225***	-0.069***	0.490***	0.875***	0.005***	0.035***	0.088***	0.978	465.778
Large Blend	-1.246***	-1.192***	-0.071***	0.508***	0.826***	0.006***	0.038***	0.083***	0.955	520.716
Large Growth	-1.064***	-1.214***	-0.059***	0.529***	0.818***	0.057***	0.015	0.082***	0.980	457.276
Large Value	-0.004***	-1.177***	-0.066***	0.468***	0.862***	0.008	0.049***	0.101***	0.934	440.841
Mid Blend	-1.042***	-1.326***	-0.076***	0.452***	0.945***	0.008**	0.027***	0.094***	0.976	388.888
Mid Growth	-0.299***	-1.288***	-0.074***	0.416***	0.998***	0.048*	0.019	0.082***	0.977	353.939
Mid Value	-0.408***	-1.189***	-0.034*	0.498***	0.876***	0.000**	0.067***	0.102***	0.987	349.620
Small Blend	-0.814***	-1.333***	-0.076***	0.446***	1.043***	0.089***	0.029**	0.097***	0.934	324.888
Small Growth	-0.447***	-1.337***	-0.110***	0.514***	0.964***	0.077*	0.012	0.086***	0.930	280.627
Small Value	-0.772***	-1.371***	-0.073**	0.411***	1.093***	0.096**	0.043*	0.115***	0.978	186.303

Table 11: Carhart regression augmented by liquidity and idiosyncratic risk. (Subperiod 1988-2000)

This table presents regression coefficients on value-weighted portfolios grouped by investment style for the idiosyncratic risk and liquidity augmented Carhart model. The sample period is January 1988 to December 2000. Regressions are performed considering the covariance matrix of Newey and West (1987). All alphas are annualised. Fund highlighted indicate significant idiosyncratic risk and liquidity factor at the 10% level. Significance at the 1%, 5%, 10% level is denoted by ***, ** and *, respectively.

	αi	Liquidity	Id. Risk	Mk. Ex. Re.	Size	Value	Momentum	Adj. R-squr.	F-stat.
Germany	-0.639***	0.549***	-1.167***	0.394***	-0.294***	0.101***	0.082***	0.923	312.107
Large Blend	-0.875***	0.127***	-0.033	0.534***	-0.338***	0.137***	0.034***	0.910	173.443
Large Value	-0.139***	0.114*	0.041	0.534***	-0.269***	0.076***	0.035***	0.844	111.152
Mid Blend	-0.503***	0.182	-0.088	0.361***	-0.139***	0.114***	0.052***	0.956	91.379
Mid Growth	-1.429***	0.377*	0.105	0.198***	-0.013	0.137***	0.051***	0.930	134.100
Small Blend	-2.016***	0.315***	0.017	0.072***	-0.386***	0.056**	0.018***	0.867	363.679
Small Growth	-0.128***	0.237	-0.208	0.333***	-0.361	0.083	0.047**	0.855	126.023
Italy	-1.208***	1.296***	0.704***	0.323***	-0.007***	0.158***	0.409***	0.967	285.999
Large Blend	-2.022***	1.029***	0.875***	0.398***	-0.004	0.209***	0.561***	0.877	228.292
Large Value	-1.286***	1.329***	0.803***	0.209***	-0.007**	0.192***	0.481***	0.956	285.658
Mid Blend	-1.064***	1.278***	0.695***	0.466***	-0.005	0.156***	0.433***	0.910	174.240
Mid Value	-0.232***	1.208***	0.506***	0.389***	-0.007	0.080***	0.310***	0.967	72.577
Small Blend	-0.252***	0.664***	0.305***	0.476**	-0.045**	0.094***	0.115***	0.888	101.046
Small Value	-1.045	0.075	0.130	0.034***	-0.057**	-0.051	0.115	0.805	169.204
Spain	-0.016***	3.107***	0.441***	0.292***	-0.027**	-0.009	-0.056***	0.967	197.449
Large Blend	-0.056***	3.115***	0.482***	0.372***	0.009	0.013	-0.025	0.967	154.632
Large Growth	-1.335**	3.188***	0.518***	0.373***	-0.061	-0.028	-0.069	0.940	61.657
Large Value	-0.082***	3.252***	0.485***	0.328***	-0.036***	-0.018**	-0.077***	0.954	194.805
Mid Blend	0.005*	3.821***	0.631***	0.231***	0.153***	0.049	0.089*	0.956	78.677
Mid Value	-0.783***	1.439***	0.212***	0.137***	-0.005	-0.008	-0.026	0.965	190.668
Small Value	-0.150***	3.821***	0.631***	0.231***	0.153***	0.049	0.089*	0.957	78.677
Netherlands	-1.042***	-3.147***	0.273***	0.176***	0.004**	0.047***	0.018	0.940	122.406
Large Blend	0.095	0.032	-0.029	0.010**	-0.004	0.002	0.007	0.830	22.085
Large Value	-1.242***	-3.138***	0.230***	0.175***	0.022**	0.052***	0.016	0.920	121.375
Mid Value	-0.654***	-2.897***	0.275	0.279***	0.033	0.163***	0.034	0.844	30.622
Small Blend	-0.250***	-2.890***	0.497***	0.053**	0.045**	-0.046	0.003	0.940	46.078
Small Value	-1.366***	-3.305***	0.316***	0.238***	-0.077	0.057*	0.029	0.844	53.637
France	-1.113***	-0.621***	0.097***	0.227***	0.003**	-0.005***	0.143***	0.956	125.893
Large Blend	-0.416***	-0.609***	0.135***	0.254***	0.004	-0.095***	0.148***	0.930	110.069
Large Growth	-0.227***	-0.278	0.071	0.121***	0.009	-0.085	0.072	0.769	39.814
Large Value	-1.022***	-0.641***	0.092***	0.263***	0.003**	-0.006***	0.193***	0.966	115.908
Mid Blend	-1.043***	-0.486*	0.066**	0.124***	0.011	-0.006*	-0.013	0.954	124.728
Mid Value	-1.012***	-0.399**	0.089***	0.113***	0.014	-0.007	0.019	0.967	179.173
Small Blend	-0.111***	-0.319	-0.075	0.186***	0.024**	-0.006	0.451	0.887	234.532
Small Value	-2.010***	-0.298	-0.087	0.178***	0.035*	-0.006	0.405***	0.934	232.796
UK	-0.202***	1.326***	0.029***	0.301***	0.006***	0.119***	0.010***	0.945	209.017
Large Blend	-1.169***	1.583***	0.038***	0.327***	0.016***	0.115***	0.009***	0.944	208.678
Large Growth	-1.044***	1.495***	0.051***	0.386***	0.009***	0.124***	0.018**	0.923	190.353
Large Value	-0.032***	1.635***	0.043***	0.349***	0.007***	0.138***	0.015***	0.978	194.322
Mid Blend	-0.611***	0.609***	0.008	0.193***	0.004***	0.094***	0.004	0.922	213.672
Mid Growth	-2.163**	0.319*	-0.004	0.136***	0.016	0.083***	0.003	0.934	237.209
Mid Value	-0.015***	1.349***	0.053***	0.385***	0.056***	0.165***	0.017***	0.987	164.061
Small Blend	-0.015***	0.307*	0.002	0.208***	0.036***	0.114***	0.009*	0.934	203.387
Small Growth	-0.017***	0.351	-0.009	0.242***	0.029*	0.163***	0.019***	0.930	162.343
Small Value	-1.011***	0.212	-0.016	0.168***	0.045	0.114***	0.019*	0.902	118.225

Table 12: Carhart regression augmented by liquidity and idiosyncratic risk. (Subperiod 2000-2010)

This table presents regression coefficients on value-weighted portfolios grouped by investment style for the idiosyncratic risk and liquidity augmented Carhart model. The sample period is January 2000 to December 2010. Regressions are performed considering the covariance matrix of Newey and West (1987). All alphas are annualised. Fund highlighted indicate significant idiosyncratic risk and liquidity factor at the 10% level.

	αi	Liquidity	Id. Risk	Mk. Ex. Re.	Size	Value	Momentum	Adj. R-squr.	F-stat.
Germany	-0.568***	-2.139***	-0.007**	0.078***	0.218***	-0.043**	0.127***	0.930	314.271
Large Blend	-0.224***	0.022	-0.005	0.876***	0.222***	0.089***	-0.018	0.765	547.213
Large Value	-0.504***	-0.692***	-0.026	0.805***	0.124***	0.053***	-0.022	0.895	299.326
Mid Blend	0.064**	-0.225	-0.015	0.832***	0.470***	0.045**	0.008	0.934	167.176
Mid Growth	-1.186*	-0.563	0.022	0.595***	0.566***	-0.005	0.043	0.745	238.125
Small Blend	-1.181***	-0.563	-0.007	0.363***	0.293***	0.073**	-0.081*	0.833	184.611
Small Growth	1.004*	-0.759	-0.015	0.848***	0.495***	0.073	-0.179*	0.867	187.476
Italy	-1.208***	-0.427***	-0.138***	0.585***	0.147***	-0.104***	0.040***	0.934	274.421
Large Blend	-0.296***	-0.782***	-0.293**	0.348***	0.007*	-0.249***	0.136**	0.878	347.282
Large Value	-1.706***	-0.404***	-0.173***	0.601***	0.092***	-0.118***	0.054***	0.977	316.708
Mid Blend	-1.901***	-0.488***	-0.304***	0.508***	0.182***	-0.202***	0.084*	0.899	104.930
Mid Value	-1.497***	-0.258**	-0.017	0.655***	0.212***	-0.054**	0.026	0.888	192.200
Small Blend	-0.889***	-0.489***	0.102	0.538***	0.354***	0.052**	-0.109***	0.878	140.500
Small Value	-0.395**	-0.789*	-0.420*	0.891***	0.415***	-0.280***	0.261	0.915	74.614
Spain	-0.187	0.255***	-0.073***	0.728***	0.157***	0.029***	0.016***	0.958	327.205
Large Blend	-1.212***	-0.047	-0.045	0.645***	0.135***	-0.042***	0.005	0.944	161.749
Large Growth	-0.897***	-0.358	0.043	0.627***	0.183***	-0.157***	-0.026	0.976	367.751
Large Value	-0.069**	0.235***	-0.067***	0.783***	0.137***	0.019***	0.010*	0.978	415.707
Mid Blend	-0.045*	1.009***	-0.189**	0.560***	0.231***	0.234***	0.051*	0.988	97.133
Mid Value	0.019*	0.601	-0.117	0.689	0.249	0.125	0.045	0.767	276.289
Small Value	-0.484**	0.493	-0.086	0.386***	0.279***	0.145***	0.039	0.923	43.388
Netherlands	-0.562***	-2.219***	-0.102*	0.669***	0.155***	-0.048***	-0.077***	0.914	190.189
Large Blend	0.612*	0.873	0.132	0.211**	-0.305*	-0.034	0.116	0.810	38.409
Large Value	-1.263***	-1.203***	-0.189***	0.717***	0.096***	-0.072***	-0.029	0.914	263.723
Mid Value	-1.029**	-3.465**	0.204	0.895***	0.291***	0.084	-0.176*	0.840	365.011
Small Blend	-2.038***	-4.150***	0.211	0.456***	0.310***	-0.041	-0.156*	0.913	225.019
Small Value	-0.238***	-4.161***	0.097	0.562***	0.335***	0.011	-0.205***	0.877	279.162
France	-0.165***	-0.519***	-0.034***	0.725	0.183***	0.009**	-0.030***	0.966	339.320
Large Blend	0.168**	-1.009***	-0.087***	0.665***	0.187***	-0.044	-0.050***	0.852	183.099
Large Growth	0.079	-0.631**	0.006	0.833***	0.256***	-0.018	-0.093***	0.870	262.737
Large Value	-0.197***	-0.356***	-0.020**	0.772***	0.143***	0.017***	-0.029***	0.934	450.012
Mid Blend	0.003**	-1.063***	-0.083*	0.601***	0.320***	-0.029	-0.033	0.876	113.969
Mid Value	-0.245*	-0.676***	-0.042	0.619***	0.342***	0.007	-0.031*	0.906	186.205
Small Blend	-1.200**	-0.592	-0.075	0.327***	0.294***	-0.065**	0.013	0.887	166.749
Small Value	-1.181**	-0.861	0.001	0.415***	0.278***	-0.065*	0.081*	0.856	178.145
UK	-0.678***	-0.325***	-0.017**	0.725***	0.181***	-0.035***	0.031***	0.945	234.282
Large Blend	-1.596***	-0.205***	0.006***	0.761***	0.085***	-0.040***	0.025***	0.906	313.998
Large Growth	-1.368***	-0.357***	-0.016	0.754***	0.111***	-0.072***	0.026***	0.977	246.744
Large Value	-0.563***	-0.414***	0.002	0.647***	0.112***	-0.004	0.035***	0.860	183.827
Mid Blend	-0.071***	-0.347***	-0.009	0.705***	0.282***	-0.033***	0.034***	0.922	199.250
Mid Growth	-0.137***	-0.364***	-0.008	0.688***	0.214***	-0.063***	0.021	0.856	166.019
Mid Value	-0.641***	-0.376**	0.039	0.669***	0.224***	0.012	0.063***	0.907	157.096
Small Blend	-0.653***	-0.557***	-0.086**	0.664***	0.464***	-0.014	0.052***	0.934	167.418
Small Growth	-1.863***	-0.595***	-0.168***	0.751***	0.584***	-0.052***	-0.014	0.975	229.189
Small Value	-0.837***	-1.041***	-0.079	0.631***	0.539***	0.023	0.083***	0.945	111.030

Table 13: Performance after and before management fees

This table presents average alphas for every value-weighted investment style portfolio after costs and before costs are deducted from fund returns. All alphas are annualised. Significance at the 1%, 5%, 10% level is denoted by ***, ** and *, respectively. The sample period is from January 1988 to December 2010.

	After fees Alpha	Before fees Alpha
Germany	-0.234***	1.203***
Large Blend	-0.678***	0.548***
Large Value	-0.678***	0.495***
Mid Blend	-0.833***	0.657***
Mid Growth	-1.238***	0.337***
Small Blend	-1.077***	0.285***
Small Growth	-0.443***	1.357***
Italy	-1.225***	0.656***
Large Blend	-1.027***	0.999***
Large Value	-0.686***	1.164***
Mid Blend	-0.678***	1.259***
Mid Value	-1.106***	0.694***
Small Blend	-0.733***	1.142***
Small Value	-0.222***	1.578***
Spain	-0.834***	1.100***
Large Blend	-1.009***	0.785***
Large Growth	-1.753***	0.197***
Large Value	-1.559***	0.304***
Mid Blend	-0.221***	1.579***
Mid Value	-0.567***	1.397***
Small Value	-0.124***	2.109***
Netherlands	-0.003***	1.168***
Large Blend	0.117**	1.317**
Large Value	-0.356***	0.647***
Mid Value	-0.779***	0.471***
Small Blend	-0.688***	0.437***
Small Value	-0.889***	0.391***
France	-1.067***	0.829***
Large Blend	-1.022***	0.566***
Large Growth	-0.876***	0.724***
Large Value	-0.606***	0.968***
Mid Blend	-0.499***	1.613***
Mid Value	-0.688***	1.440***
Small Blend	-0.998***	0.882***
Small Value	-0.188***	2.205***
UK	-1.056***	0.248***
Large Blend	-1.440***	-0.145***
Large Growth	-1.233***	-0.060***
Large Value	-0.586***	0.759***
Mid Blend	-0.844***	0.362***
Mid Growth	-0.644***	0.698***
Mid Value	-0.598***	0.811***
Small Blend	-0.665***	0.625***
Small Growth	-0.468***	0.773***
Small Value	-0.687**	0.635**