Hamburg Financial Research Center

Can Investors Benefit from the Performance of Alternative UCITS?

Michael Busack | Wolfgang Drobetz | Jan Tille

HFRC Working Paper Series No.13 – March 2015

Hamburg Financial Research Center e.V. | c/o Universität Hamburg | Von-Melle-Park 5 | 20146 Hamburg
Tel. 0049 (0)40 42838 2421 | Fax: 0049 (0) 42838 4627 | info@hhfrc.de | www.hhfrc.de

Can Investors Benefit from the Performance of Alternative UCITS?

Michael Busack[a], Wolfgang Drobetz[b], and Jan Tille[c,*]

This version: March 2015

Abstract

We study the performance persistence of a large sample of alternative UCITS funds that is largely free of survivorship bias. Using contingency tables, we find that performance persists for up to two years following ranking. However, persistence is much stronger in the short run, and ranked portfolio tests indicate that investors profit from the persistence for only up to one year. For example, when quartile portfolios are formed based on funds' prior 52-week Sharpe ratios, the top quartile outperforms the bottom quartile over the following 52 weeks by 3.2% per annum, measured by a seven-factor alpha. Furthermore, we link several fund characteristics to performance persistence, and find that offshore experience greatly enhances persistence, both statistically and economically.

Keywords: Alternative mutual funds, UCITS funds, hedge funds, performance measurement, performance persistence

JEL classification codes: G11, G14, G23

[a] Absolut Research GmbH, Grosse Elbstrasse 277a, 22767 Hamburg, Germany.

[b] Faculty of Business Administration, Hamburg University, Von-Melle-Park 5, 20146 Hamburg, Germany.

[c] Absolut Research GmbH, Grosse Elbstrasse 277a, 22767 Hamburg, Germany.

* Corresponding contact information: Tel.: +49 (0) 40 3037790; E-mail: jan.tille@absolut-research.de

Can Investors Benefit from the Performance of Alternative UCITS?

This version: March 2015

Abstract

We study the performance persistence of a large sample of alternative UCITS funds that is largely free of survivorship bias. Using contingency tables, we find that performance persists for up to two years following ranking. However, persistence is much stronger in the short run, and ranked portfolio tests indicate that investors profit from the persistence for only up to one year. For example, when quartile portfolios are formed based on funds' prior 52-week Sharpe ratios, the top quartile outperforms the bottom quartile over the following 52 weeks by 3.2% per annum, measured by a seven-factor alpha. Furthermore, we link several fund characteristics to performance persistence, and find that offshore experience greatly enhances persistence, both statistically and economically.

Keywords: Alternative mutual funds, UCITS fund, hedge funds, performance measurement, performance persistence

JEL classification codes: G11, G14, G23

I. Introduction

The alternative mutual fund sector has experienced consistently robust growth in recent years. Investors can choose from a large variety of mutual funds that offer strategies previously only available to hedge fund investors. Especially in Europe, where investors demand a higher level of protection since the recent financial crisis, alternative funds have begun taking advantage of the freedom offered by the new UCITS framework (Busack et al., 2014). In fact, the dramatic growth of alternative UCITS funds led Morningstar to introduce a new "Alternatives" category in 2012. The growing popularity has already led to a great deal of research on the performance and risk characteristics of these funds. For example, Agarwal et al. (2009) analyze a sample of U.S. alternative mutual funds. Tuchschmid et al. (2010), Tuchschmid and Wallerstein (2013), Dewaele et al. (2013), and Busack et al. (2014) analyze samples of European alternative UCITS funds. The latter study finds that alternative UCITS differ significantly from offshore hedge funds and from traditional long-only investments.

However, no study thus far has analyzed the persistence of these funds. We aim to fill this gap by using a sample of funds that is largely free of survivorship bias. To our knowledge, this is the first study that examines the long-term performance persistence for a large and comprehensive set of European alternative mutual funds. We apply two different methodologies to test for persistence by means of six performance measures, two return measures, and four risk measures. We first use non-parametric contingency tables that show whether winners remain winners and losers remain losers. Second, we follow Hendricks et al. (1993) and construct ranked portfolios to compare the performance differences between top performing and losing funds. This analysis is implemented to assess the value-added to investors wishing

to invest in top performing funds. Alternative mutual funds are highly liquid, so if persistence exists, even if only short-term in nature, investors will be able to profit from it by quickly redeeming money from losers and reallocating it to winners. This is contrary to hedge funds, which usually feature long notice periods, lock-up periods, and redemption intervals that can prevent investors from capturing positive short-term effects (Agarwal and Naik, 2000).

We find persistence of up to two years after ranking funds on a variety of different performance and risk measures. Persistence in risk is more pronounced. Unfortunately, ranked portfolio tests, which simulate the investment performance of choosing prior winners, indicate that investors can profit from persistence for only about one year. Using performance over the prior 52 weeks to form portfolios, we find that the spread in annualized returns (alphas) between the top and bottom quartile portfolios reaches values of up to 3% (3.5%) per annum for holding periods of one year, depending on the performance measure used. In the short run, persistence is even more pronounced (i.e., for holding periods of up to six months), and annualized returns (alphas) can become as high as 4.7% (5.1%).

Brown et al. (1999) document that persistence is nonexistent for hedge funds if one controls for strategy-specific effects. As a robustness check, we test for performance persistence using the two largest fund categories, Equity Long/Short and Fixed Income. We find that the persistence of alternative UCITS funds remains significantly positive even after controlling for strategy-specific effects in the overall sample.

In the past, performance persistence has been tested by using a few standard measures, such as raw returns, alpha, or the information ratio. However, there is an ongoing debate in the literature whether the performance measure used influences the performance evaluation of

hedge funds and mutual funds (Eling and Schuhmacher, 2007; Eling, 2008; Zakamouline, 2011; Ornelas et al., 2012; Adcock et al., 2014). Using absolute measures, such as the Sharpe ratio, the Omega ratio, and the Calmar ratio, as well as benchmark-oriented measures, such as alpha and the appraisal ratio, we also document that the applied measure affects performance persistence, especially for longer ranking periods.

Boyson (2008) links hedge fund performance persistence to fund characteristics, such as size and age. As there is limited research on this topic, we further contribute to this strand of the literature by linking the performance persistence of our unique sample of alternative UCITS funds to a set of qualitative fund characteristics (e.g., whether the strategy is also available in an offshore vehicle). Agarwal et al. (2009) document that alternative mutual funds, whose management has offshore experience, tend to outperform similar funds whose management lacks this experience. Dewaele et al. (2013) show similar results for alternative UCITS funds. We find that performance persistence can be enhanced, both statistically and economically, if funds are sorted according to offshore experience and past fund performance. This result is consistent with Agarwal et al.'s (2009) skills hypothesis. Furthermore, we estimate a panel logit model, and report that offshore experience enhances the probability of being a winner in two consecutive periods. In contrast to Boyson (2008), we further conclude that larger alternative UCITS funds are more likely to exhibit performance persistence. This difference from hedge fund findings is consistent with Busack et al. (2014), who show that alternative UCITS and hedge funds can have significantly different risk-return profiles.

Except Otten and Bams (2002) and Ferreira et al. (2013), only few studies have focused on European fund performance. Ferreira et al. (2013) argue that, due to structural differences

between the U.S. mutual fund industry and that in other countries (such as fund size, age, or state of industry development), performance determinants can differ quite dramatically. Otten and Bams (2002) find that performance persistence is limited to U.K. funds, while Ferreira et al. (2013) report it only for U.S. funds. Both studies exclude funds from Luxembourg and Ireland, which are the two major fund domiciles in Europe. Therefore, a final contribution of our analysis is that it enhances knowledge about the performance and the determinants of performance of the European mutual fund industry.

The remainder of this article is structured as follows. Section II provides a brief overview of the UCITS framework. Section III describes the data and provides summary statistics. Our methodology is presented in section IV. Section V shows our main empirical results for the performance persistence tests using contingency tables as well as for the ranked portfolio tests. Section VI presents results from a panel logit model, which relates persistence to fund characteristics. Finally, section VII concludes.

II. The UCITS framework and alternative investment strategies

This section gives a brief overview of the UCITS framework. A more detailed description can be found in Tuchschmid and Wallerstein (2013), Dewaele et al. (2013), and Busack et al. (2014). UCITS ("Undertakings for Collective Investments in Transferable Securities") is a coordinated pan-European regulatory framework for mutual funds focused on investor protection, which allows for the cross-border marketing of funds inside the European Union. The framework was established in 1985 (85/611/EEC), and has been subject to continuous development. Under the UCITS framework, funds are allowed to invest in liquid transferable secu-

rities (e.g., stocks and bonds), and to use cash-settled derivatives for investment purposes (2001/108/EC). These rules enable funds to apply financial leverage (via margin deposits, but not via outright leverage through borrowing) and use "synthetic" short-selling (e.g., contracts for difference, put and call options, etc.). Both techniques were formerly available only to hedge funds. Busack et al. (2014) report that the bulk of alternative funds were launched in the wake of the 2008 financial crisis. As some funds were structured to use total return swaps and reference to a portfolio of otherwise ineligible assets, regulators raised concerns about maintaining adequate investor protection. These concerns recently led to further modifications (2012/832 ESMA), requiring more transparency and the enforcement of stricter rules on the use of total return swaps and index-tracking UCITS.

In addition to the use of derivatives, UCITS funds are permitted to charge management and performance fees, which allows for the well-known hedge fund fee structure.[1] However, as Simmonds (2011) notes, unlike hedge funds, they are required to guarantee liquidity on at least a two-week basis. In addition, UCITS funds must limit leverage via derivatives in accordance with a binding risk management process, and they are prohibited from taking large undiversified bets, or gaining any influence over company operations.

As a result, as documented in Busack et al. (2014), UCITS funds are not considered perfect substitutes for hedge funds. Instead, they can have different exposures to systematic risk factors, and therefore exhibit different risk-return profiles. In summary, alternative mutual funds regulated by UCITS standards are something of a cross between traditional mutual funds and

[1] This is in contrast to U.S. Act 40 mutual funds, which are not permitted to charge performance fees.

hedge funds. Put briefly, UCITS funds are regulated like mutual funds, but they can use strategies formerly available only to hedge funds.

III. Data and descriptive statistics

A. Sample selection and database biases

We use a sample of alternative UCITS funds similar to that used in Busack et al. (2014).[2] Our main source of information on alternative UCITS is the Alternative Strategy Funds database from Absolut Research GmbH, which began in June 2009 and has become one of the largest sources available. As of April 2014, the database contains information on 1,466 individual funds. It excludes funds that ceased to exist prior to 2009, but it has archived information on funds that ceased to exist after June 2009.[3] To account for any survivorship bias issues prior to database inception, Busack et al. (2014) conducted an extensive keyword-based search for defunct alternative UCITS funds that existed prior to 2009. We added these funds (34) to our initial sample. We added another 47 funds, which we obtained after manually reclassifying a snapshot of "Absolute Return" funds from Morningstar.[4] As a result, our initial sample contains 1,547 funds (both live and defunct).

Absolut Research only maintains qualitative fund information (such as fund names, strategies, ISIN identifiers, domiciles, etc.), but it does not offer performance data. To compute

[2] We briefly summarize the sample selection in this section. Interested readers are referred to Busack et al. (2014) for more information.

[3] "Individual" fund means that only one share class per fund is included. Fund companies commonly launch different share classes for different investor groups (e.g., retail and institutional).

[4] The Morningstar database snapshot was taken before Morningstar's introduction of the "Alternative" category in May 2011. Prior to this date, alternative mutual funds were categorized either as "Long/Short" or "Absolute Return."

fund performance, we use weekly total return data from the Morningstar Direct database. Moreover, to obtain as long a sample as possible, we use the oldest fund share class.[5] When it closed, but other classes remained active, we selected a different share class according to the procedure described in footnote 5, and merged the return histories to extend the time series.[6] We also checked for incomplete or unreliable data (77 cases)[7]. To fill in missing data points, we used Bloomberg's data. However, in 13 cases, we were not able to fill in, so we excluded them from our analyses.

Similarly to Busack et al. (2014), we also exclude short biased funds (6), as well as funds of funds (160). Short biased funds are excluded because they only profit from falling markets. Funds of funds are omitted because of their double fee layer, a structural disadvantage, which may bias results toward persistence. Contrary to Busack et al. (2014), we exclude systematic rules-based funds because their returns come from investing in systematic risk premia, and are not due to investment management skills.[8]

Our sample period is January 2004 through April 2014. We use weekly returns data, and we require a minimum of 52 weekly returns in order to improve the precision of our estimates on the performance measures used to assess performance persistence. We also exclude 5 funds

[5] For multiple share classes with the same inception date, we use either 1) the share class whose net asset value was calculated using the fund's base currency, or 2) if there were still multiple share classes left, the one with the lowest management fee. However, if a share class showed a 0% management fee, we used the one with the next lowest published management fee. This approach guarantees a fair net-of-fee comparison for all funds.

[6] We counted 48 cases where the oldest share class had closed, while others remained active.

[7] To detect unreliable returns, we checked every weekly return that was more than 10 standard deviations away from a fund's mean return. For example, one fund had a return of 29.17% in one week and –20.12% in the next, while its weekly mean return was 0.08%. We only eliminated extreme outliers because, during times of crisis, it was not unusual for funds to incur weekly losses of more than three standard deviations below the mean.

[8] Rules-based in this case means funds that adhere to predefined and transparent trading rules.

with bimonthly returns, and 161 funds with a track record of less than 52 weeks. As a result, our final sample consists of 1,129 funds with a minimum of 52 weekly returns.

Unlike in the U.S., UCITS funds do not share the same base currency. To make our results comparable, we convert returns into weekly excess returns over the local one-month interbank offered rate, i.e., the interest rate denominated in the same currency as that of the fund (Tuchschmid et al., 2010; Tuchschmid and Wallerstein, 2013; Dewaele et al., 2013). One-month interest rates come from Bloomberg. This approach relies on the assumption that Covered Interest Rate Parity (CIRP) holds, and converts fund returns into the returns of an investor who is perfectly hedged against exchange rate risks.[9]

As already noted, we account for survivorship bias by including a sample of defunct funds prior to database inception. This bias is well documented for mutual funds and for hedge funds in other literature.[10] Busack et al. (2014) document that the attrition rate for alternative mutual funds is quite high as well, and has recently reached values of up to 7%. Furthermore, they document that the cross-sectional return difference between the average live and average defunct fund is approximately 4% per annum. Neglecting survivorship bias in a study of the performance persistence of alternative mutual funds could lead to results that are biased toward persistence. However, there is a debate in the literature whether non-surviving funds should be included in studies on performance persistence. Some authors argue that persistence is more pronounced in survivorship bias-free samples (Hendricks et al., 1993; Carhart,

[9] We use one-month LIBOR rates for Euro-, USD-, GBP-, JPY-, and CHF-denominated funds, and one-month STIBOR, CIBOR, and NIBOR rates for SEK-, DKK-, and NOK-denominated funds, respectively, because LIBOR rates were unavailable. A caveat is that this simple approach does not lead to complete systematic hedges unless the fund return is known in advance.

[10] For example, see Brown and Goetzmann (1995), Malkiel (1995), Elton et al. (1996), Ackerman et al. (1999), Brown et al. (1999), Fung and Hsieh (2000), and Malkiel and Saha (2005), among others.

1997; Carpenter and Lynch, 1999), while others find that neglecting ceased funds biases results towards persistence (Brown et a., 1992; Malkiel and Saha, 2005).

Carpenter and Lynch (1999) show that tests using contingency tables are more robust to survivorship bias than alternative tests for performance persistence. Nonetheless, they also find that ranked portfolio tests, which mirror the performance of a hypothetical investment strategy, have more power. Therefore, we use these two measures of performance persistence to account for sample biases and to determine the economic significance of our findings.

The backfill or incubation bias was documented in Fung and Hsieh (2000), among others, for hedge funds, and Evans (2010) for mutual funds. This bias can arise when a fund enters a database only after it has achieved a series of good past returns. We do not account for this bias since eliminating return histories prior to database entry, or eliminating several months by an ad hoc rule, is, given this immature industry segment, costly in terms of performance track records, and can introduce other forms of biases (Fung and Hsieh, 2009). Kosowski et al. (2007) report that their results for hedge fund performance remain qualitatively unchanged when the first 12 months' of data are eliminated. We thus believe any adverse effects from this bias would be small.

Neglecting funds with less than 52 weeks' of returns may introduce the so-called multi-period sampling bias, as discussed in Ackerman et al. (1999) and Fung and Hsieh (2000). However, Ackerman et al. (1999) conclude that effects on the overall sample are negligible. Moreover, if funds close within a short period after inception, they probably failed to capture investor attention and were thus never real investment alternatives. Fung and Hsieh (2000) argue that, if this is the case and investors require a minimum return history, neglecting funds

that do not reach the required history will not induce wrong inferences. We only require 52 weeks' of return history, while many studies on hedge fund performance and performance persistence require at least 24 months of data (Ackerman et al., 1999; Fung and Hsieh, 2000; Kosowski et al., 2007; Boyson, 2008). Arguably, using a shorter minimum return history further mitigates this bias.

B. Descriptive statistics

Because there is no definitive alternative mutual fund categorization, we follow Busack et al. (2014), who classify funds first by asset class (e.g., equity or fixed income), and second by strategy. However, as these authors show, different alternative fixed income strategies exhibit quite similar exposures toward systematic risk factors. To obtain a sufficiently large fund category, we combine all fixed income funds into one group. Table I contains a summary of the statistical time series properties of funds' (excess) returns over the full sample period. Returns, standard deviations, and alphas are annualized from weekly data. Alpha is estimated via OLS regression using a seven-factor model. The model is similar to the six-factor model used in Edwards and Caglayan (2001) to evaluate the performance and persistence of hedge funds. In particular, the seven factors consist of the four stock market factors used in Carhart's (1997) model, which come from Kenneth French's website:[11] (1) the stock market return minus the one-month Treasury bill rate (R_m–R_f), (2) the excess return of small- over large-cap stocks (SMB), (3) the excess return of value over growth stocks, as measured by the book-to-market ratio (HML), and (4) the momentum factor (UMD), which is the excess return of stocks with the highest return over stocks with the lowest return during the past

[11] See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

year. The other three factors are: (5) the weekly change in the 10-year constant-maturity U.S. government bond yield, (6) the weekly change in the Moody's Baa-Aaa corporate yield spread, and (7) the weekly change in the slope of the term structure (10-year minus 1-year U.S. government bond yield). These data are from the Federal Reserve Bank of St. Louis.[12] The change in the 10-year constant-maturity U.S. government bond yield (not included in Edwards and Caglayan's (2001) model) captures investor demand for safe-haven assets.

The trend-following factors presented in Fung and Hsieh (2001, 2004) are not available at weekly intervals. These factors are used to evaluate the performance of alternative mutual funds in Agarwal et al. (2009), Tuchschmid and Wallerstein (2013), and Busack et al. (2014). However, their findings suggests that trend-following factors only play a minor role in evaluating alternative mutual fund performance. In addition, our seven-factor model is denominated in terms of USD-based factors, but we are confident that the relevant risk factors are also adequate for alternative UCITS funds. First, as described in section III.A, we use fund returns in excess of the local one-month interbank offered rate, assuming an investor who is perfectly hedged against exchange rate risks. Second, alternative UCITS funds invest in regulated and sufficiently liquid market. We can thus safely assume that they invest in globally integrated market, implying that the relevant asset pricing factors are the same across different markets (Bekaert and Harvey, 1995).

Looking at panel A of Table I, it is obvious that fund performance was muted during our sample period. The average fund delivered a 0.2% return per year and exhibits a negative (annualized) alpha of -1.8%. Event Driven and Equity Long/Short funds delivered the highest

[12] See http://research.stlouisfed.org/fred2/

raw returns, at 1.5% and 1.8% per year, respectively. FX (-4.1%) and Multi-Asset CTA funds (-3.0%) delivered the worst performance. In terms of alpha, only funds in the fixed income category were able to produce a slightly positive average value (0.3% per year). There are two possible explanations for the weak performance. First, the sample period contains two severe crises, the subprime crisis and the European debt crisis. In sample periods that partially overlap with ours, Tuchschmid and Wallerstein (2013), Dewaele et al. (2013), and Busack et al. (2014) also find poor performance for alternative strategies, both for UCITS and for hedge funds. Second, it is possible that good and bad performance cancel each other out. For example, the 75th percentile of returns for Equity Long/Short funds is 5.75%, while the 25th percentile of returns is -2.03% (not tabulated). This observation suggests that the market environment alone cannot explain the low average performance. The return difference may be due either to manager skill or to some lucky managers reaching an ex post good performance. In any case, this difference motivates our search for performance persistence.

Panel A of Table I additionally shows that weekly UCITS fund returns are not normally distributed. Funds from each category show negative skewness and positive excess kurtosis. The null hypothesis of normally distributed returns is rejected for 85% of the funds using the Jarque-Bera test (confidence interval of 10%). This may indicate that performance measures, which take into account higher moments, such as the Omega ratio developed in Keating and Shadwick (2002), are more suitable for evaluating alternative mutual fund performance. However, unlike for hedge funds, as documented in Getmansky et al. (2004) or Kosowski et al. (2007), autocorrelation of returns does not play a major role for liquid alternative funds. The *p*-value of the Durbin-Watson statistic that tests for first-order autocorrelation is 0.1 or

less for only 15% of the funds. Because high illiquidity exposure is not allowed under the UCITS framework, and return smoothing is ruled out by the fact that independent third-party service providers regularly calculate funds' net asset values, autocorrelation, which according to Getmansky et al. (2004) is influenced mainly by illiquidity exposure and return smoothing, plays only a minor role in our sample.

Panel B of Table I reports the number of live and defunct funds together with their average return and standard deviation. Of our 1,129 funds with more than 52 weeks of returns, as of the end of April 2014, there are 671 live and 458 defunct funds. The performance difference between the two groups is substantial. The average surviving fund return is 2.5% per year, while a defunct fund lost 3.3% per year. This large difference is in line with Malkiel and Saha's (2005) results for hedge funds, and with Busack et al.'s (2014) results for alternative mutual funds. Given the large number of defunct funds and their poor performance, it is likely that non-surviving funds exhibit poor performance over an extended period prior to cessation, possibly leading to a bias in empirical results toward persistence. In fact, Agarwal and Naik (2000) find that losing funds drive the persistence among hedge funds. Malkiel and Saha (2005), however, find more pronounced persistence if funds that ceased to exist are excluded from the analysis.

[Insert Table I here]

Alternative mutual funds that apply hedge fund-like strategies are sometimes managed by firms that also manage offshore funds. Agarwal et al. (2009) and Dewaele et al. (2013) argue that having experience with long/short strategies could be beneficial when managing alternative mutual funds. They present evidence that offshore experience positively affects perfor-

mance of alternative mutual funds, at least gross of fees. A caveat is that the samples in both studies are relatively small. Agarwal et al. (2009) analyze 52 alternative mutual funds (27 with and 25 without offshore experience), and Dewaele et al. (2013) use 182 funds with offshore experience in their sample, of which 63 had direct offshore equivalents. Moreover, due to short fund histories, Dewaele et al. (2013) aggregate funds into portfolios and mainly test the differences over time.

Because our sample of 289 alternative UCITS funds with offshore experience is much larger, our results can shed new light on the question of whether manager skills are related to offshore experience.[13] We focus on funds that directly replicate offshore funds, because this is a more direct test of whether offshore experience translates into higher skills. First, the UCITS framework has its own special restrictions. Therefore, offshore experience gained by managing a relatively arbitrary strategy may not translate into outperformance for a different strategy that must be managed in a significantly more constrained environment. Second, funds that are managed by larger companies (e.g., Goldman Sachs, J.P. Morgan, etc.), which manage both traditional funds as well as hedge funds, may dilute the "offshore effect."

Summary statistics are presented in panel C of Table I. At least on average, we find that alternative UCITS with offshore experience achieved higher returns (1.05% versus -0.13% per year), but they also exhibit higher standard deviations (7.6% versus 6.3% per year). However, we find further evidence that is consistent with Agarwal et al.'s (2009) offshore skills hy-

[13] We include all funds that featured a similar strategy and were available in an offshore format (e.g., a fund domiciled in the Cayman Islands), or funds that changed their legal structure (e.g., by re-domiciliation) to comply with the UCITS framework.

pothesis. While 35% of the funds with offshore experience ceased to exist, that number is higher at 42% for those funds without offshore experience.

IV. Empirical methodology

To test for persistence, we use two different methodologies. First, we use the cross-product ratio (CPR), defined as $\frac{WW*LL}{WL*LW}$, which is based on contingency tables of winners (W) and losers (L). This ratio has been used in empirical studies on performance persistence both in the mutual and the hedge fund literature (Brown et al., 1992; Brown and Goetzmann, 1995; Brown et al., 1999; Agarwal and Naik, 2000; Edwards and Caglayan, 2001). Winning (losing) funds are defined as funds with above (below) median performance for a given measure. We denote performance as persistent if a fund is a winner (loser) in two consecutive periods, where the first period is referred to as the ranking period, and the second is the evaluation period. The number of all consecutive winners and losers is labelled WW and LL, respectively. The test statistic is defined as $z = \frac{\ln(\frac{WW*LL}{WL*LW})}{\sigma_{\ln(CPR)}}$, and normally distributed under the null hypothesis of no persistence ($z = 0$).[14] Accordingly, each of the four combinations is equally likely to appear if fund performance is random. According to Carpenter and Lynch (1999), a look-ahead bias can lead to results being biased toward persistence. To avoid this problem, we only require funds to cover the ranking period.[15]

[14] Based on Agarwal and Naik (2000), $\sigma_{\ln(CPR)} = \sqrt{\frac{1}{WW} + \frac{1}{WL} + \frac{1}{LW} + \frac{1}{LL}}$ is the standard error of the natural logarithm of the CPR.

[15] However, this can lead to another problem. In particular, as funds cease to exist, there are not always enough weekly returns in the evaluation period to calculate performance measures. For example, when a fund does not last more than eight weeks in an evaluation period, we would not be able to calculate a value for the seven-

Our second test for persistence follows Hendricks's et al. (1993) methodology. After each ranking period, funds are sorted into equally-weighted quartile portfolios based on their performance over the ranking period. The top quartile portfolio contains funds with performance measures at or above the 0.75 percentile, and the bottom quartile portfolio has funds with performance at or below the 0.25 percentile. There is no universally accepted methodology to determine which percentiles are used as cutoff points. Hendricks et al. (1993) use octiles, Kosowski et al. (2007) use deciles, and Boyson (2008) uses quintiles. Otten and Bams (2002) use different cutoffs depending on the number of funds per country sub-sample, ranging from terciles to deciles. We chose quartiles because, especially during the earlier years of our sample, there are not enough funds to obtain portfolios of meaningful size if more granular portfolios were used.

We then calculate portfolio performance during the evaluation period, while ensuring portfolio weights remain equally-weighted. If funds cease to exist, the weights of the remaining funds increase accordingly. After the end of the evaluation period, we rank the funds again according to their performance over the next ranking period. To evaluate persistence, we assess the statistical significance (*t*-value) of the return and the seven-factor alpha of the top-bottom quartile spread portfolios. This test neglects any frictions, such as subscription or redemption fees, and evaluates the investment performance of an investor who repeatedly constructs portfolios of past winners in the hope that their outperformance versus loser funds will continue. This procedure has been applied in several studies of mutual and hedge fund per-

---

factor alpha. To solve this problem, we follow Malkiel and Saha (2005) and consider funds that fail to last over the entire evaluation period as losers (*L*). As shown above, defunct UCITS funds significantly underperform surviving funds, which justifies this procedure.

formance persistence (Brown and Goetzmann, 1995; Gruber, 1996; Carhart, 1997; Bams and Otten, 2002; Kosowski et al., 2007; Boyson, 2008). According to simulation-based results, Carpenter and Lynch (1999) find that this is the most powerful test when compared to alternative tests of performance persistence.

We use two different lengths (52 and 104 weeks) for our ranking periods and a variety of different evaluation period lengths. For the one-year ranking period, we evaluate performance over the next 26, 39, and 52 weeks. For the two-year ranking period, we also evaluate 78- and 104-week holding periods. Our first ranking period begins in January 2004, and it ends in December 2004 (52 weeks) and December 2005 (104 weeks), respectively. Accordingly, the first evaluation period begins in January 2005 and January 2006, respectively. For all possible combinations, the evaluation periods are non-overlapping, which ensures results are less biased towards persistence and, according to Carpenter and Lynch (1999), these tests are more powerful.[16]

In the existing literature on performance persistence, a few standard performance measures, such as raw returns, Sharpe ratio, or alpha, are typically used to calculate fund performance. Sometimes, the appraisal ratio is also used as an additional performance measure. Brown and Goetzmann (1995), Brown et al. (1999), Agarwal and Naik (2000), Kosowski et al. (2007), and Boyson (2008), among others, use this ratio, defined either as the ratio of a fund's excess return over its standard deviation, or the *t*-value of alpha. Only a few authors, such as Kat and

[16] In other words, if, for example, we use 52 weeks for the ranking and 26 weeks for the evaluation period, the first evaluation period would be from January 2005 to June 2005. After this, funds would again be ranked from July 2004 to June 2005, and performance persistence would be evaluated from July 2005 to December 2005.

Menexe (2003) and Herzberg and Mozes (2003), consider persistence in risk measures. Both find that risk persistence is usually more pronounced than return persistence.

A recent strand of the literature analyzes how the choice of the performance measure impacts performance evaluation. For example, Eling and Schuhmacher (2005, 2007) find that the choice of performance measure has no impact for hedge funds. Eling (2008) shows the same for mutual funds. However, Zakamouline (2011) and Ornelas et al. (2012) document that rankings of hedge and mutual funds can differ significantly when the performance measure varies, and that it is more pronounced when return distributions deviate from normality. Adcock et al. (2014) introduce a multivariate test on the correlation of performance measures, and find that different measures can produce significantly different rankings. In light of these somewhat conflicting findings, and given that alternative UCITS exhibit negative skewness as well as high excess kurtosis, it is not clear ex ante whether the choice of performance measure has an influence on performance persistence. We thus use a variety of risk, return, and performance metrics to study persistence. We apply the more prominent measures, e.g., a seven-factor alpha, the appraisal ratio, and the *t*-statistic of alpha.[17] We also consider the Sharpe ratio (Sharpe, 1966) ratio, the Omega ratio (Keating and Shadwick, 2002), and the Calmar ratio (Young, 1991), which is a drawdown-based performance measure. Moreover, we analyze persistence for risk and return measures. To limit the number of possible alternatives, we only use the risk and return components which are contained in the performance measures (i.e., average raw returns, average positive and negative excess returns,[18] standard

[17] For the sake of simplicity, we did not adjust standard errors for autocorrelation. We believe this is appropriate, given that, as we have shown, autocorrelation is not an issue for alternative mutual funds. Furthermore, this is likely to be closer to the procedure of an average investor, who uses alpha estimates from, e.g., Morningstar.

[18] More technically, these measures are the higher and lower partial moments of order one (with zero threshold).

deviation, maximum drawdown, and residual or idiosyncratic volatility). Formal definitions of all variables are reported in Table A.1 in the appendix.

To rank funds consistently when the numerator of a performance measure is negative, we apply a correction as proposed in Israelsen (2005).[19] To determine whether the use of several measures can provide additional insights for persistence, we follow Eling and Schuhmacher (2007) as well as Eling (2008) and calculate the Spearman rank correlation between the different performance measures using the entire sample.[20] Results are shown in Table II.

[Insert Table II here]

Note that the rank correlations between the different performance measures are quite high, particularly those between the Sharpe, Omega, and Calmar ratios (0.95 to 0.99). This finding is consistent with results in both Eling and Schuhmacher (2005, 2007) and Eling (2008). Zakamouline (2011) and Ornelas et al. (2012) challenge these findings, although they also find relatively high rank correlations between these measures.[21] Examining the other performance measures (alpha, the *t*-value of alpha, and the appraisal ratio) shows that rank correla-

[19] In the presence of negative excess returns, ranking funds on performance measures that are increasing in excess returns and decreasing in risk can lead to rankings that appear counterintuitive. For example, consider two funds, one with a negative excess return of –5% and a standard deviation of 10%, and another with a negative excess return of –10% and a standard deviation of 30%. Without the adjustment, the first fund would have a Sharpe ratio of –0.5, while the second fund would have a Sharpe ratio of –0.3. To correct for negative values of the numerator in a performance measure, Israelsen (2005) adds a correction term to the performance measure's denominator. In this example, the Sharpe ratio would take the following form: $SR_i = r_i / \hat{\sigma}_i^{(r_i/|r_i|)}$, where r_i is the fund's excess return, and $\hat{\sigma}_i$ the fund's estimated standard deviation. The two Sharpe ratios would then be $-5\% \times 10\% = -0.005$ and $-10\% \times 30\% = -0.03$. Assuming that investors prefer higher returns, in this case losing less, and lower risks, this correction leads to the correct ranking order ($-0.005 > -0.03$). In the case of positive excess returns, the correction would yield the standard Sharpe ratio.

[20] Lower ranks are associated with better performance, i.e., a fund ranked first was the best fund. This means that, for return and performance measures as well as for maximum drawdown, we rank in descending order; for standard deviation, idiosyncratic volatility, and lower partial moments, we ranked in ascending order.

[21] The differences they find are due to lower correlations between the Sharpe ratio and a variety of some newer measures that are not yet widely used.

tions, albeit still high at above 0.7, are substantially lower. Rank correlations between performance measures and average returns are high, in particular for the Sharpe, Omega, and Calmar ratios (all correlations are around 0.95). Risk measures also tend to exhibit high rank correlations. Rank correlations between performance and risk measures are usually positive, but substantially lower than between performance measures and average returns.

Although, in our case, rank correlations between performance measures tend to be high, there are several instances where the correlation is sufficiently away from 1. Adcock et al. (2014) show that even if the null hypothesis of unit correlation cannot be rejected, ranks can still change with the performance measure. Taken together, this justifies the use of different performance measures to evaluate the performance persistence of alternative UCITS funds.

V. Empirical Results

Evidence on performance persistence is generally mixed, both in the mutual fund and the hedge fund literature. Some authors find persistence over shorter intervals only, such as Hendricks et al. (1993), Agarwal and Naik (2000), Bollen and Busse (2004), Kosowski et al. (2006), while Gruber (1996), Kosowksi et al. (2007) or Boyson (2008) document significant persistence over longer time periods. However, others argue that there is little or no evidence of persistence (Carhart, 1997; Brown et al., 1999; Malkiel and Saha, 2005). Malkiel (1995) and Brown and Goetzmann (1995) show that persistence is time-varying. However, all this research focused on U.S. mutual funds or hedge funds.

Otten and Bams (2002) state that research on European mutual fund performance persistence is scarce. They find some evidence of persistence, but it is limited primarily to U.K. mutual

funds. Ferreira et al. (2013) conduct an international study on mutual fund performance, and report that persistence is limited to U.S. mutual funds. Both studies excluded funds domiciled in Ireland and Luxembourg, however, which, as we noted earlier, are the most important domiciles for the European mutual fund industry.[22] Therefore, it is likely that both studies are leaving out a significant portion of the market.

Boyson (2008) finds that portfolios formed of top-performing hedge funds, measured either by a seven-factor alpha or by the *t*-statistic of alpha, outperform portfolios formed of the worst-performing funds for as long as two years. However, this finding is mainly driven by smaller and younger hedge funds outperforming larger and older ones. Smaller funds tend to be better able to invest in smaller and more illiquid markets. Furthermore, smaller funds may simply be profiting from the smaller market impact of their trades, which could allow for more concentrated portfolios (Berk and Green, 2004; Naik et al., 2007). Due to UCITS funds' minimum liquidity and diversification requirements, gaining exposure to illiquid assets or investing a large percentage of a portfolio in only a few assets is strictly limited, which shrink possible advantages of smaller UCITS funds. Busack et al. (2014) show that alternative UCITS funds have statistically different risk-return profiles than hedge funds. Compared to long-only mutual funds, their investment strategies are clearly different.

Because the segment of alternative UCITS funds is still in its infancy, only a few funds have long track records. To obtain a large enough and meaningful sample size, we assess performance persistence over our entire fund sample. Brown et al. (1999) document that, after controlling for different hedge fund investment strategies, performance persistence is less signifi-

[22] According to the European Fund and Asset Management Association, as of the end of 2013, funds domiciled in Luxembourg accounted for 32% of total net UCITS assets; funds from Ireland accounted for 15%.

cant or even nonexistent. They attribute this finding to the differences in systematic risk factor exposures. Although Agarwal and Naik (2000), Edwards and Caglayan (2001), Kosowksi et al. (2007), and Boyson (2008) find that persistence also exists in different strategy groups, as a robustness check, we also present the results for our two largest categories, Equity Long/Short and Fixed Income funds, separately to assess whether our overall results are driven by strategy performance.

A. Contingency tables

This subsection presents results for persistence using 2x2 contingency tables. For the sake of brevity, Table III reports aggregated percentages of repeat winners (WW) and repeat losers (LL), and the *z*-statistics of CPR-tests for different ranking and evaluation periods. Panel A contains all sample funds. Most importantly, we observe that the performance of alternative UCITS funds persists for up to two years after ranking. The percentages for the WW and LL groups are similar, indicating that persistence can be found at both ends of the performance spectrum. Consistent with Agarwal and Naik (2000), we further find that performance persistence is less significant when we extend the length of the evaluation period.

Comparing persistence between performance and risk measures, we find that persistence in risk is much stronger than persistence in performance. The percentages for WW and LL lie between 26% and 30% for performance measures (the rows from the Sharpe ratio to the Calmar ratio), and between 33% and 41% for risk measures (the rows containing standard deviation, lower partial moment, maximum drawdown, and idiosyncratic volatility). The corresponding *z*-statistics are also higher for risk measures than for performance measures. High persistence in risk is consistent with findings in Kat and Menexe (2003) and Herzberg and

Mozes (2003), who show that persistence in risk lasts up to three years. In line with Gruber (1996), among others, raw returns exhibit the least degree of persistence.

[Insert Table III here]

Furthermore, if funds are ranked over 52 weeks, persistence is more pronounced than over a 104-week ranking period, keeping evaluation periods equal. Both the percentages of *WW* and *LL*, and the *z*-statistics, are lower if one uses 104 weeks to rank UCITS funds. Our result may be attributable to the fact that funds have different exposure to systematic risk factors. As the market environment changes, which is more likely after a longer period of time, so does the fund's performance. Using 52 weeks as the length for the ranking period, we observe that persistence seems to be independent of the performance measure used. When funds are ranked over 104 weeks, persistence is slightly more pronounced when benchmark-adjusted performance measures are used (alpha, the *t*-value of alpha, and the appraisal ratio) than when absolute return performance measures are applied (Sharpe, Omega, and Calmar ratios). This finding is consistent with Kosowski et al. (2007), who argue that persistence is more pronounced when more complex methodologies are used to evaluate performance. One reason may be that these performance measures account for systematic risk exposures.[23] Together with the results from Table II, our findings provide evidence that the measure used does matter. In contrast, for risk, no measure exhibits more pronounced persistence than any other.

As argued in Brown et al. (1999), one explanation for the pronounced persistence may be strategy-specific effects. In panels B and C of Table III, we provide the results for our Equity

[23] Another possibility is that some funds have exposures to factors that are not captured in the model, and thus have persistently higher alphas and lower R-squared values. However, it is likely that the idiosyncratic volatility would also be higher, which should be accounted for by using the appraisal ratio.

Long/Short and Fixed Income groups. The funds from these two groups account for roughly 50% of all funds in our sample (see panel B of Table I). Due to data availability, the sample period for these two panels begins in January 2005.[24] The results are similar to those in panel A, indicating that performance persistence is not driven by purely strategy-specific returns.

B. Ranked portfolio tests

Our results so far show evidence of statistically significant performance persistence. Next, we discuss whether investors can profit from it. To test this conjecture, we follow the ranked portfolio method used in Hendricks et al. (1993).[25] Our results are shown in panel A of Table IV, and contain the annualized returns and the annualized seven-factor alphas of the top-bottom quartile portfolio spread. Of course, this is solely for illustrative purposes, as one cannot sell alternative UCITS funds short. The analysis further does not include transaction costs. To account for any possible strategy-specific effects, we report results separately for Equity Long/Short and Fixed Income funds in panels B and C, respectively.

Panel A, with the results for the full sample, reveals that investors can profit from performance persistence, but only for about a 12-month period. This time span is less than indicated by results in Table III, but is consistent with Kosowski et al. (2006, 2007). Based on raw returns, seven-factor alphas, and statistical significance, we note that persistence is strongest for

[24] We require that the sample for our initial ranking period contains at least 20 funds to ensure meaningful results. Brown et al. (1999) have 43 funds in their initial 1989-1990 period, and Malkiel and Saha (2005) begin their sample in 1996 with 18 winner funds.

[25] An example illustrates the methodology for ranking funds over 52 weeks and evaluating performance over the following 26 weeks. At the beginning of January 2005, we sort funds into equally-weighted quartile portfolios according to their prior 52-week performance. Portfolio weights remain equally-weighted during the evaluation period, and the first period for which portfolio returns are calculated ends in June 2005. Subsequently, funds are sorted according to their performance from July 2004 until June 2005, and new equally-weighted portfolios are formed. This is procedure repeated until the end of the sample period.

the 26-week evaluation period. This result corroborates our findings in the contingency tables, where we also document that short-term persistence is more pronounced. Agarwal and Naik (2000) further confirm that persistence tends to fade when the evaluation period is extended. If we use 104 weeks to form fund portfolios, we only observe persistence for up to 39 weeks. Outperformance is not only statistically significant, but also high in absolute terms. For example, using the 52-week Sharpe ratio, we find that the top quartile funds outperform the bottom quartile funds by 4.4%, 2.7%, and 2.5% per year for evaluation periods of 26, 39, and 52 weeks, respectively. Using the appraisal ratio, return differences are 2.6%, 2.0%, and 1.7% per year, respectively. Moving from returns to the estimated seven-factor alphas of the spread portfolios, there is even stronger outperformance of the top-performing funds, reaching values above 5% for annualized alphas.[26] Although we have documented in Table III that persistence in risk is more pronounced, the results in Table IV suggest that selecting high risk funds yields neither significant outperformance nor significant underperformance.

[Insert Table IV here]

When we rank funds over 52 weeks, it does not appear to matter whether portfolios are formed on raw returns or risk-adjusted performance. Gruber (1996) documents similar results for U.S. mutual funds, but it seems more common to analyze the persistence of risk-adjusted performance.[27] Nevertheless, there are differences in outperformance depending on the type of performance measure used. When we use contingency tables, we find that persistence is

[26] Note that we do not consider subscription or redemption fees. For retail investor share classes, subscription fees can easily be as high as 5%. Institutional investors are not typically subject to subscription fees, as these are primarily used to pay the brokerage bank.

[27] Hendricks et al. (1993), Brown and Goetzmann (1995), Carhart (1997), Bollen and Busse (2004), Kosowski et al. (2006, 2007), and Boyson (2008) use risk-adjusted performance to sort funds into portfolios.

more pronounced for the benchmark-related performance measures. In contrast, when we use ranked portfolios and use the prior 52 weeks, the selection of absolute performance measures delivers higher returns and seven-factor alphas, at least for evaluation periods of up to 39 weeks. When we use 104 weeks to form portfolios, we find that both past returns and absolute performance measures are not good predictors of future performance. We further observe that sorting on relative performance measures still leads to significant outperformance for top quartile funds. Accordingly, relative performance measures tend to do better than absolute performance measures when the ranking period is extended.

Results could again be driven by strategy-specific returns. However, panels B and C in Table IV show that, even after controlling for strategy-specific effects, performance persists for up to 52 weeks after portfolio formation, although it is less pronounced. For Long/Short Equity funds the pattern is similar to the overall sample. Especially in the long-run, portfolios of Fixed Income funds with higher risk achieve significant outperformance, which is strongest for as long as 104 weeks after portfolio formation. Therefore, it is possible that the high risk Fixed Income funds were able to capture some persistent structural effects in the fixed income markets that paid off in the long-run due to higher risk premia.[28]

Overall, we find persistence in the full sample as well as for funds with similar strategies.[29] Kosowski et al. (2007) and Boyson (2008) find that performance persistence among hedge funds is more pronounced than in the alternative UCITS space shown in our analyses. The

[28] For example, consider higher exposure to long-term debt or higher-yielding credit securities.

[29] As another robustness check, we re-run the ranked portfolio tests for the Equity Long/Short sub-sample, but let the first ranking period begin in July 2005 instead of January 2005. It is possible that our results for the 52 (104) week ranking and 52 (104) week evaluation combinations might be influenced by the fact that we constantly rank funds from January-December. Results (not tabulated) remain qualitatively unchanged.

difference is consistent with Busack et al.'s (2014) finding that alternative UCITS and hedge funds are not perfect substitutes for each other. However, as shown in panel C of Table I and reported in Agarwal et al. (2009) and Dewaele et al. (2013), the fact that some managers have more experience with alternative strategies may affect performance persistence. In fact, these funds are supposedly closer to hedge funds, and we would expect them to exhibit a higher degree of persistence.

VI. Hedge fund experience and performance persistence

In this section, we analyze whether managers with more offshore experience exhibit a higher degree of performance persistence and repeat the ranked portfolio methodology. We use independent two-way sorts and form two extreme portfolios, containing: 1) high performing funds from the top quartile that also have offshore experience, and 2) low performing funds that have no offshore experience. This method is similar to that used in Boyson (2008), who sorts funds independently on performance and qualitative characteristics, such as size and age. Sorting independently on two criteria may imply there are not enough funds that meet both criteria (e.g., both delivering top-quartile performance and having offshore experience). As Equity Long/Short is the only group with a substantial number of offshore experienced funds, we can only use it to control for strategy-specific effects.

Table V presents annualized mean returns and seven-factor alphas for the spread portfolios (winner funds with offshore experience versus loser funds without offshore experience). Because we have already shown that performance persistence is generally more pronounced in the short-term, we only present results for the two 52-52-week and 104-104-week combina-

tions. The portfolio with funds that are both in the top quartile and offshore experienced generate higher returns during the evaluation period than the portfolio with funds from the bottom quartile without offshore experience. Again, persistence only lasts up to one year for every performance measure considered. However, mean returns and alphas are much higher than the comparable values in Table IV. For example, we form portfolios using the 52-week Omega ratio, and then evaluate the spread portfolio over the following 52 weeks. This strategy delivers outperformance of 5.6% per year in returns and 5.8% in seven-factor alphas, if we compare portfolios of top quartile funds with offshore experience to those of bottom quartile funds without offshore experience; both differences are statistically significant at the 1% level. Sorting funds on the Omega ratio alone, as in Table IV, we find that the portfolio of top quartile Omega funds outperforms the bottom quartile funds by only 1.9% and 2.0%, respectively. The same pattern holds when we only consider Equity Long/Short funds. Our results thus provide support for the skills hypothesis (Agarwal et al., 2009). However, persistence is still limited to evaluation periods of up to one year, consistent with the findings in Kosowski et al. (2007) for hedge funds.

[Insert Table V here]

Persistence is a result of management skill, which cannot be measured per se. Therefore, we use a predictive pooled panel logit model, where being a repeat winner in two consecutive periods is linked to several fund characteristics that can proxy for management skill (e.g., offshore experience).[30] As we noted earlier, persistence is strongest up to 52 weeks, thus we

[30] We use a pooled panel model instead of a fund fixed-effects model, because some variables (e.g., fund domicile, performance fees, and offshore experience) are time invariant. Furthermore, we re-estimate the model as a probit model and find very similar results.

only estimate the model for ranking and evaluation periods of 52 weeks. We do not choose shorter intervals because, as Hendricks et al. (1993) argue, if skill is present, it may take some time to separate itself from luck. From an investor viewpoint, short-term outperformance is usually not exploitable, and thus the longer outperformance lasts, the more relevant it becomes for investors.

Agarwal et al. (2009) and Dewaele et al. (2013) identify variables that are related to superior performance of alternative mutual funds. Boyson (2008) relates fund size and age to hedge fund performance persistence. Brown and Goetzmann (1995) and Malkiel and Saha (2005) conduct a probit regression for fund demise, and use performance, fees, age, and assets as predictive variables. Ferreira et al. (2013) use a variety of fund characteristics, such as fund size, age, and expense ratios. Following these prior studies, we use, in addition to an offshore dummy variable, the natural logarithm of the fund's assets at the end of the ranking period, the log of the fund's age at the end of the ranking, the fund's management fee, the fund's performance fee, and a dummy variable equal to 1 if a fund is domiciled in Ireland (and 0 otherwise). Our dependent variable is WW and equal to 1 if a fund achieves performance above the median in two consecutive periods, i.e., in the ranking and the evaluation periods.

Boyson (2008) finds that smaller hedge funds are more persistent than larger ones, but it is also conceivable that managers of larger funds possess greater skills. Berk and Green (2004) argue that investors can recognize greater skill levels, and ultimately deliver more money to these funds, which can lead to funds reaching suboptimal sizes. However, as UCITS funds are more restrictive in terms of illiquidity than hedge funds, being larger does not necessarily mean that performance will decline. Moreover, Ferreira et al. (2013) study an international

sample of mutual funds and document that outperformance of small funds is solely a U.S. phenomenon. On the one hand, younger funds need to attract money to survive, thus younger funds may have a greater incentive to work harder. On the other hand, fund age can be a proxy for manager tenure and experience, which may lead to older funds outperforming younger ones. Skilled managers should also be able to charge higher fees, and should be more likely to profit from performance-based fees. Lastly, we use a domiciliation dummy for funds from Ireland, a global leader in hedge fund administration services. According the Irish Funds Industry Association (2013), roughly 40% of global hedge fund assets are administered in Ireland. More experienced and skilled managers may choose Ireland as their fund domicile because they desire to have access to these more experienced administrators.

Our results are shown in Table VI. The negative constant term indicates that it is more likely on average for winners not to repeat. Considering that the percentage of repeat winners in Table III was approximately 30% for performance measures and 40% for risk measures, this result is no surprise. Contrary to Boyson (2008), who finds that smaller hedge funds deliver more persistent performance, we find that larger alternative UCITS funds are more likely to be repeat winners. This finding is consistent with Ferreira et al. (2013), documenting a small-fund effect only in the U.S. It is also somewhat consistent with Malkiel and Saha (2005), who find that larger funds are less likely to cease activity. The estimated coefficients on age are negative for performance measures and positive for risk measures. This means that younger funds tend to exhibit more persistent risk-adjusted performance, while older funds are more likely to be repeat winners in terms of standard deviation (i.e., have below median risk).

[Insert Table VI here]

The coefficient on the offshore dummy variable is positive and statistically significant for the performance measures and the raw returns. This finding is consistent with results in Table V and also with the skills hypothesis (Agarwal et al., 2009). In terms of risk, it seems that funds with offshore experience are neither systematically more nor less risky than median funds. Higher management fees reduce the probability of persistent performance, which is consistent with results in Ferreira et al. (2013). Nonetheless, there is slight evidence that funds with higher performance fees are more likely to deliver persistent performance. This effect could be because skilled managers rely more on incentive fees to generate income, and they are more confident in their ability to earn them.

We estimate the model for a subset of performance measures only. Our results are similar and do not depend much on the performance measure used. Moreover, the percentages of correct predictions are quite similar among the models, at 71% for the performance measures and around 68% for the risk measures. Overall, our results indicate that performance of alternative UCITS persists. We find that investors can profit from this performance, as it is also economically significant. Our findings further reveal that there are several qualitative fund characteristics, which are related to performance persistence and arguably reflect investment management skill. For alternative UCITS, offshore experience seems a particularly important proxy for investment management skill. Ranked portfolio tests which incorporate offshore experience deliver even larger outperformance than if rankings were conducted solely on performance. Finally, our logit model reveals that having offshore experience increases the likelihood of being a repeat winner.

VII. Conclusions

We analyze performance persistence for a unique and comprehensive dataset of alternative UCITS mutual funds, which also accounts for survivorship bias. We use two different methodologies and a variety of performance and risk measures; in particular, six performance measures, two return measures, and four risk measures. Instead of using only benchmark-related measures, we also use the Sharpe, Omega, and Calmar ratios to focus on a fund's absolute returns. By using non-parametric contingency tables to test whether winners remain winners and losers remain losers, we find that performance persists for up to two years after ranking. However, we document that, by sorting the top-performing funds into portfolios and holding these portfolios afterward, investors can only profit from the performance persistence for up to 52 weeks (measured by means of both raw returns and a seven-factor alpha). Based on ranked portfolio tests, the spread in annualized returns (alphas) reaches values of up to 3% (3.5%) per year for this holding period, depending on the performance measure used. Persistence is even more pronounced in the short term (up to six months). Annualized returns (alphas) of the spread portfolios reach values of up to 4.7% (5.1%). Our results are robust to strategy-specific effects.

We find that persistence in risk is more pronounced than persistence in performance. But low risk funds neither systematically underperform nor systematically outperform high risk funds if we use risk measures to form ranked portfolios. Using different performance measures, we further show that performance persistence can differ depending on the measure used. Relative performance measures, such as alpha, the *t*-statistic of alpha, and the appraisal ratio, deliver better results if we extend the evaluation period.

Finally, we document that several fund characteristics are linked to performance persistence. We find that larger funds as well as funds with offshore experience are positively correlated with the probability of delivering above median performance in two consecutive periods. Forming portfolios on independent sorts of both offshore experience and performance enhances persistence. In fact, the returns (alphas) of the spread of offshore experienced winners versus losers with no offshore experience in ranked portfolio tests reach values of up to 5.6% (5.8%) per year for 52-week evaluation periods.

We believe that choosing alternative UCITS on past performance can add value for investors over at least a short time interval. This result is more consistent with prior findings for mutual funds than for hedge funds. For the latter group, the literature documents somewhat longer periods of performance persistence, which again demonstrates the important differences between alternative UCITS and hedge funds. Therefore, if we consider alternative UCITS funds that are closer to traditional offshore hedge funds (i.e., funds with offshore experience), the differences appear less pronounced.

References

2001/108/EC. “Directive 2001/108/EC of the European Parliament and of the Council of 21 January 2002 amending Council Directive 85/611/EEC on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS), with regard to investments of UCITS.” The European Parliament and The Council of the European Union (2002).

2012/832 ESMA. “Guidelines for competent authorities and UCITS management companies - Guidelines on ETFs and other UCITS issues.” European Securities and Market Authority (2012).

85/611/EEC. “Council directive on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS).” Council of the European Communities (1985).

Ackerman, C., R. McEnally, and D. Ravenscraft. “The Performance of Hedge Funds: Risk, Return, and Incentives.” *Journal of Finance*, 54 (1999), 833-874.

Adcock, C., N. Areal, M.R. Armada, M. Ceu Cortez, B. Oliveira, and F. Silva. “New Tests of Correlation and the Choice of Measures of Portfolio Performance.” Working Paper, 2014.

Agarwal, V., N.M. Boyson, and N.Y. Naik. “Hedge Funds for Retail Investors? An Examination of Hedged Mutual Funds.” *Journal of Financial and Quantitative Analysis*, 44 (2009), 273-305.

Agarwal V., and N.Y. Naik. “Multi-Period Performance Persistence Analysis of Hedge Funds.” *Journal of Financial and Quantitative Analysis*, 35 (2000), 327-342.

Bekaert, G., and C.R. Harvey. “Time-Varying World Market Integration.” *Journal of Finance,* 50 (1995), 403-444.

Berk, J.B., and R.C. Green. “Mutual Fund Flows and Performance in Rational Markets.” *Journal of Political Economy*, 112-6 (2004), 1269-1295.

Bollen N.P.B., and J.A. Busse. “Short-Term Persistence in Mutual Fund Performance.”, *Review of Financial Studies,* 18 (2004), 569-597.

Boyson, N.M.. “Hedge Fund Performance Persistence: A New Approach.” *Financial Analysts Journal*, 64 (2008), 27-44.

Brown, S.J., and W.N. Goetzmann. “Performance Persistence.” *Journal of Finance,* 50 (1995), 679-698.

Brown, S.J., W.N. Goetzmann, and R.G. Ibbotson. “Survivorship Bias in Performance Studies.” *Review of Financial Studies*, 5 (1992), 553-580.

Brown, S.J., W.N. Goetzmann, and R.G. Ibbotson. “Offshore Hedge Funds: Survival and Performance, 1989-95.” *Journal of Business*, 72 (1999), 91-118.

Brown, S.J., W.N. Goetzmann, and B. Liang. “Fees on Fees in Funds of Funds.” Working Paper, Yale ICF, 2004.

Busack, M., W. Drobetz, and J. Tille. “Do Alternative UCITS Deliver What They Promise? A Comparison of Alternative UCITS and Hedge Funds.” *Applied Financial Economics,* 24 (2014), 949-965.

Carhart, M.M. “On Persistence in Mutual Fund Performance.” *Journal of Finance*, 52 (1997), 57-82.

Carpenter, J.N., and A.W. Lynch. “Survivorship Bias and Attrition Effects in Measures of Performance Persistence.” *Journal of Financial Economics*, 54 (1999), 337-374.

Dewaele, B., I. Markov, H. Pirotte, and N. Tuchschmid. “Does Manager Offshore Experience Count in the Alternative UCITS Universe?” *Journal of Alternative Investments*, 16 (2013), 72-85.

Edwards, F.R., and M.O. Caglayan. “Hedge Fund Performance and Manager Skill.” *Journal of Futures Markets*, 21 (2001), 1003-1028.

Eling, M. “Does the Measure Matter in the Mutual Fund Industry?” *Financial Analysts Journal*, 64 (2008), 54-66.

Eling, M., and F. Schuhmacher. “Performance-Maße für Hedgefonds-Indizes – wie geeignet ist die Sharpe-Ratio?” *Absolut|report*, 29 (2005), 36-41.

Eling, M., and F. Schuhmacher. “Does the Choice of Performance Measure Influence the Evaluation of Hedge Funds?” *Journal of Banking and Finance*, 31 (2007), 2632-2647.

Elton, E., M.J. Gruber, and C. Blake. “Survivorship Bias and Mutual Fund Performance.” *Review of Financial Studies*, 9 (1996), 1097-1120.

European Fund and Asset Management Association. “Trends in the European Investment Fund Industry in the Fourth Quarter of 2013 and Results for the Full Year 2013.” *Quarterly Statistical Release*, 56 (2014).

Evans, R. “Mutual Fund Incubation.” *Journal of Finance*, 65 (2010), 1581-1611.

Fama, E.F., and K.R. French. “Common Risk Factors in the Returns on Stocks and Bonds.” *Journal of Financial Economics*, 33 (1993), 3-56.

Ferreira, M.A., A. Keswani, A.F. Miguel, and S.B. Ramos. “The Determinants of Mutual Fund Performance: A Cross-Country Study.” *Review of Finance*, 17 (2013), 483-525.

Fung, W., and D.A. Hsieh. “Performance Characteristics of Hedge Funds and Commodity Funds: Natural vs. Spurious Biases.” *Journal of Financial and Quantitative Analysis*, 35 (2000), 291-307.

Fung, W., and D.A. Hsieh. “The Risk in Hedge Fund Strategies: Theory and Evidence from Trend Followers.” *Review of Financial Studies*, 14 (2001), 313-341.

Fung, W., and D.A. Hsieh. “Hedge Fund Benchmarks: A Risk-Based Approach.” *Financial Analysts Journal*, 60 (2004), 65-80.

Fung, W., and D.A. Hsieh. “Measurement Biases in Hedge Fund Performance Data.” *Financial Analysts Journal*, 65 (2009), 36-38.

Getmansky, M., A.W. Lo, and I. Makarov. “An Econometric Model of Serial Correlation and Illiquidity in Hedge Fund Returns.” *Journal of Financial Economics*, 74 (2004), 529-609.

Gruber, M.J. “Another Puzzle: The Growth in Actively Managed Mutual Funds.” *Journal of Finance*, 51 (1996), 783-810.

Hendricks, D., J. Patel, and R. Zeckhauser. “Hot Hands in Mutual Funds: Short-Run Persistence of Relative Performance, 1974-1988.” *Journal of Finance*, 48 (1993), 93-130.

Herzberg, M.M., and H.A. Mozes. “The Persistence of Hedge Fund Risk: Evidence and Implications for Investors.” *Journal of Alternative Investments*, 6 (2003), 22-42.

Irish Funds Industry Association. “Monthly Statistics Factsheet.” December 2013.

Israelsen, C. “A Refinement to the Sharpe Ratio and Information Ratio.” *Journal of Asset Management*, 5 (2005), 423-427.

Jegadeesh, N., and S. Titman. “Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency.” *Journal of Finance*, 48 (1993), 65-91.

Kat, H.M., and F. Menexe. “Persistence in Hedge Fund Performance: The True Value of a Track Record.” *Journal of Alternative Investments*, 5 (2003), 66-72.

Keating, C., and W.F. Shadwick. “A Universal Performance Measure.” *Journal of Performance Measurement*, 6 (2002), 59-84.

Kosowski, R., N.Y. Naik, and M. Teo. “Do Hedge Funds Deliver Alpha? A Bayesian and Bootstrap Analysis.” *Journal of Financial Economics*, 84 (2007), 229-264.

Kosowski, R., A. Timmermann, R. Wermers, and H. White. “Can Mutual Fund “Stars” Really Pick Stocks? New Evidence from a Bootstrap Analysis.” *Journal of Finance*, 61 (2006), 2551-2596.

Malkiel, B.G. “Returns from Investing in Equity Mutual Funds 1971 to 1991.” *Journal of Finance*, 50 (1995), 549-572.

Malkiel, B.G., and A. Saha. “Hedge Funds: Risk and Return.” *Financial Analysts Journal*, 61 (2005), 80-88.

Naik, N.Y., T. Ramadorai, and M. Stromqvist. “Capacity Constraints and Hedge Fund Strategy Returns.” *European Financial Management*, 13 (2007), 239-256.

Newey, W.K., and K.D. West. “A Simple, Positive Semi-definite, Heteroskedasticity and Auto-correlation Consistent Covariance Matrix.” *Econometrica*, 55 (1987), 703-708.

Ornelas, J.R.H., A.F. Silva, Jr., and J.L.B. Fernandes. “Yes, the Choice of Performance Measure Does Matter for Ranking US Mutual Funds.” *International Journal of Finance & Economics*, 17 (2012), 61-72.

Otten, R., and D. Bams. “European Mutual Fund Performance.” *European Financial Management*, 8 (2002), 75-101.

Sharpe, W.F. “Mutual Fund Performance, Part 2: Supplement on Security Prices.” *Journal of Business*, 39 (1966), 119-138.

Simmonds, N. “UCITS – A Roadmap for Hedge Fund Managers.” 2011, Available at http://www.elexica.com/en/Resources/Microsite/UCITS-road-map.

Tuchschmid, N.S., and E. Wallerstein. “UCITS: Can They Bring Funds of Hedge Funds Onshore?” *Journal of Wealth Management*, 15 (2013), 94-109.

Tuchschmid, N.S., E. Wallerstein, and L. Zanolin. “Will Alternative UCITS Ever Be Loved Enough to Replace Hedge Funds?” Working Paper, HEG Geneva, 2010.

Young, T.W. “Calmar Ratio: A Smoother Tool.” *Futures*, 20 (1991), 40.

Zakamouline V. “The Performance Measure You Choose Influences the Evaluation of Hedge Funds.” *Journal of Performance Measurement*, 15 (2011), 48-64.

Tables

Table I
Summary statistics

This table reports the distributional properties of the sample of alternative mutual funds by investment strategy. Panel A provides annualized weekly average fund returns (column 1), standard deviations (column 2), and the alphas of a seven-factor regression (column 3). Returns are calculated in excess of the local one-month LIBOR rate. The seven factors are comprised of the four factors used in Carhart (1997), R_m–R_f, SMB (small minus big), HML (high minus low book-to market), and UMD (momentum factor), which come from K. French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_li-brary.html), the weekly change in the 10-year constant maturity U.S. government bond yield, the weekly change in the Moody's Baa-Aaa corporate yield spread, and the weekly change in the slope of the term structure (10-year – 1-year U.S. government bond yield), all taken from http://research.stlouisfed.org/fred2/. The average adjusted R-squared is reported in column 4. Columns 5 and 6 show average skewness and excess kurtosis of weekly fund returns. Column 7 contains the percentage of funds for which the null hypothesis of normally distributed returns is rejected by the Jarque-Bera (JB) test. Column 8 shows the percentage of funds for which the Durbin-Watson (DW) test rejects the null hypothesis of no first-order autocorrelation. Both tests are implemented using raw returns. In addition, panel B reports annualized weekly average raw returns and standard deviations for live and defunct funds. Finally, panel C provides annualized weekly average raw returns and standard deviations for alternative UCITS with and without an offshore vehicle. Total attrition (columns 7 and 8) is the percentage value of funds that ceased to exist during our sample period.

Panel A: Summary statistics and tests for normality and autocorrelation of returns	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Strategy	Return (% p.a.)	SD (% p.a.)	Alpha (% p.a.)	Adj. R-squared	Skew-ness	Excess kurtosis	% JB p<0.1	% DW p<0.1
Commodity	-2.62	7.69	-3.92	0.07	-0.19	2.24	76.47	11.76
Event Driven	1.49	4.49	-0.18	0.19	-1.12	9.15	88.89	16.67
Equity Long/Short	1.80	9.37	-2.16	0.28	-0.41	3.36	83.28	10.61
Equity Market Neutral	-1.17	5.17	-1.60	0.09	-0.25	4.51	82.50	15.00
Fixed Income	1.01	3.52	0.28	0.15	-0.43	5.66	91.57	36.55
FX	-4.14	7.36	-4.54	0.09	-0.35	6.19	90.24	6.10
Multi-Asset CTA	-2.96	9.41	-5.62	0.10	-0.18	2.31	67.16	2.99
Multi-Asset Global Macro	0.19	7.65	-2.54	0.25	-0.40	4.20	86.11	11.11
Multi-Asset Multi-Strategy	0.37	5.52	-1.43	0.21	-0.44	5.37	84.62	0.00
Volatility	0.14	5.03	-0.26	0.11	-0.38	10.96	91.67	0.00
Overall	0.18	6.65	-1.80	0.19	-0.40	4.87	85.39	15.27

Panel B: Live and defunct funds	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Strategy	# Funds	Live	Defunct	Return (live, % p.a.)	Return (defunct, % p.a.)	SD (live. % p.a.)	SD (defunct, % p.a.)
Commodity	17	11	6	-0.61	-6.32	7.66	7.75
Event Driven	36	28	8	2.43	-1.82	4.36	4.94
Equity Long/Short	311	194	117	4.70	-3.01	8.73	10.43
Equity Market Neutral	120	59	61	1.24	-3.50	4.77	5.56
Fixed Income	249	159	90	2.65	-1.90	3.29	3.92
FX	82	25	57	-1.37	-5.36	4.10	8.79
Multi-Asset CTA	67	40	27	-1.17	-5.61	9.19	9.74
Multi-Asset Global Macro	108	65	43	2.37	-3.10	7.56	7.79
Multi-Asset Multi-Strategy	91	62	29	1.63	-2.33	5.78	4.95
Volatility	48	28	20	1.85	-2.25	4.86	5.27
Overall	1129	671	458	2.53	-3.26	6.20	7.31

Panel C: Performance of alternative UCITS with and without offshore vehicle	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Strategy	# with offshore	Return (% p.a.)	SD (% p.a.)	# without offshore	Return (% p.a.)	SD (% p.a.)	Total attrition (with offshore)	Total attrition (without offshore)
Commodity	4	-6.83	8.47	13	-1.33	7.45	0.50	0.31
Event Driven	17	2.29	5.57	19	0.77	3.52	0.18	0.26
Equity Long/Short	126	3.45	8.90	185	0.68	9.68	0.29	0.44
Equity Market Neutral	40	-1.36	5.11	80	-1.08	5.20	0.50	0.51
Fixed Income	33	2.83	3.60	215	0.72	3.51	0.36	0.36
FX	12	-4.32	7.52	69	-4.17	7.42	0.75	0.68
Multi-Asset CTA	28	-3.32	10.63	39	-2.71	8.54	0.43	0.38
Multi-Asset Global Macro	16	-2.50	8.53	92	0.66	7.49	0.44	0.39
Multi-Asset Multi-Strategy	9	1.53	8.25	82	0.24	5.22	0.00	0.35
Volatility	4	-2.57	4.31	44	0.39	5.10	0.25	0.43
Overall	289	1.05	7.58	838	-0.13	6.34	0.35	0.42

Table II

Spearman rank correlations of various performance, return, and risk measures

This table presents the Spearman rank correlation coefficients between various performance, return, and risk measures over the entire sample period, including both live and defunct funds. Spearman's rank correlation are computed as the standard Pearson correlation coefficient, except that the variables have been converted into ranked variables. All returns are calculated in excess of the local one-month LIBOR rate. Performance measures are described in Table A.I in the appendix.

Performance measure	Risk-adjusted						Return		Risk			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Sharpe	1.00	0.79	0.79	0.80	0.95	0.99	0.95	-0.06	0.30	0.44	0.56	0.34
(2) Alpha	0.79	1.00	0.93	0.97	0.76	0.76	0.74	-0.12	0.31	0.45	0.45	0.30
(3) t (alpha)	0.79	0.93	1.00	0.90	0.83	0.78	0.74	0.00	0.20	0.34	0.42	0.19
(4) Appraisal	0.80	0.97	0.90	1.00	0.74	0.76	0.69	-0.30	0.49	0.60	0.57	0.48
(5) Omega	0.95	0.76	0.83	0.74	1.00	0.95	0.94	0.13	0.12	0.28	0.44	0.16
(6) Calmar	0.99	0.76	0.78	0.76	0.95	1.00	0.95	-0.01	0.26	0.40	0.60	0.30
(7) Return	0.95	0.74	0.74	0.69	0.94	0.95	1.00	0.18	0.05	0.21	0.38	0.10
(8) HPM	-0.06	-0.12	0.00	-0.30	0.13	-0.01	0.18	1.00	-0.95	-0.89	-0.60	-0.91
(9) SD	0.30	0.31	0.20	0.49	0.12	0.26	0.05	-0.95	1.00	0.97	0.76	0.97
(10) LPM	0.44	0.45	0.34	0.60	0.28	0.40	0.21	-0.89	0.97	1.00	0.78	0.96
(11) MDD	0.56	0.45	0.42	0.57	0.44	0.60	0.38	-0.60	0.76	0.78	1.00	0.76
(12) IV	0.34	0.30	0.19	0.48	0.16	0.30	0.10	-0.91	0.97	0.96	0.76	1.00

Table III

Contingency tables: Performance persistence of alternative UCITS funds for different ranking periods, evaluation periods, and performance measures

This table summarizes the percentages of cases where funds with above/below median performance in the ranking period also have above/below median performance in the evaluation period, together with the respective *z*-statistic. The *z*-statistic refers to the natural logarithm of $(WW \times LL)/(LW \times WL)$ relative to its standard error, measured as the square root of the sum of the inverse counts of WW, LL, LW, and WL (see footnote 14). Ranking periods are either 52 or 104 weeks. Evaluation periods are non-overlapping, and range from 26 to 104 weeks. Definitions of performance and risk measures are in Table A.I in the appendix. All returns are calculated in excess of the local one-month LIBOR rate. The sample period is January 2004 through December 2013. The first ranking period is January 2004 until December 2004 for the 52-week ranking period. The first evaluation period is January 2005 until June 2005 for the 26-week evaluation period. The next ranking period is subsequently shifted by the length of the evaluation period until it reaches the end of the sample period. Sample periods for panels B and C begin in January 2005 due to data availability. The interpretation is as follows. If funds are ranked, for example, according to their Sharpe ratio over the last 52 weeks, and then evaluated again after 52 weeks (row 5, column 6), then 28.4% would be repeat winners, and 28.3% would be repeat losers. Under the null hypothesis, only 25% are expected to fall into either bucket. The corresponding *z*-statistic of 7.4 indicates significance at the 99 % level. *z*-statistics of 1.64, 1.96, and 2.58 indicate significance at the 90%, 95%, and 99% levels, respectively.

Panel A: Full sample

	Ranking period															
	52						104									
Evaluation period	26		39		52		26		39		52		78		104	
Performance measure	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic
Sharpe	28.5 / 28.4	11.12	28.7 / 28.5	9.33	28.4 / 28.3	7.45	27.6 / 27.4	6.71	27.3 / 27.1	4.86	26.4 / 26.2	2.41	25.1 / 24.9	-0.03	26.5 / 26.3	1.75
Alpha	28.8 / 28.7	12.15	28.8 / 28.6	9.54	28.5 / 28.4	7.56	28.5 / 28.3	9.24	29.4 / 29.2	9.53	28.0 / 27.8	5.37	28.3 / 27.9	4.23	28.7 / 28.4	4.40
t (alpha)	29.1 / 28.9	12.82	29.0 / 28.8	10.06	28.7 / 28.7	8.16	28.4 / 28.3	8.97	28.6 / 28.4	7.91	28.0 / 27.7	5.29	27.7 / 27.4	3.47	29.3 / 29.1	5.10
Appraisal	29.2 / 29.1	13.33	29.4 / 29.3	11.21	28.5 / 28.4	7.66	28.9 / 28.8	10.38	29.5 / 29.4	9.91	28.9 / 28.7	7.04	28.7 / 28.4	4.86	28.7 / 28.5	4.46
Omega	30.2 / 27.3	11.93	28.8 / 28.6	9.63	28.9 / 28.8	8.45	28.1 / 28.0	8.24	27.3 / 28.2	6.16	27.0 / 26.8	3.53	25.7 / 25.4	0.79	26.6 / 26.4	1.88
Calmar	29.7 / 26.8	10.45	28.4 / 28.2	8.59	28.0 / 27.9	6.63	27.1 / 26.9	5.48	26.7 / 27.0	4.20	26.6 / 26.4	2.84	25.3 / 25.0	0.20	26.6 / 26.4	1.88
Return	28.1 / 28.0	9.82	27.7 / 27.6	6.88	28.0 / 28.0	6.66	26.9 / 26.7	4.86	26.5 / 26.4	3.26	25.4 / 25.2	0.52	24.3 / 24.0	-1.20	26.5 / 26.3	1.75
HPM	40.2 / 40.1	44.93	40.1 / 40.0	36.07	39.4 / 39.3	29.65	40.1 / 39.9	37.54	40.1 / 39.9	31.12	39.5 / 39.3	24.92	38.7 / 38.3	17.42	36.8 / 36.6	13.86

SD	41.5 / 41.4	47.83	40.8 / 40.6	37.33	40.3 / 40.2	31.14	40.9 / 40.8	39.23	40.2 / 40.1	31.35	39.9 / 39.7	25.47	38.8 / 38.5	17.56	36.1 / 35.9	13.07
LPM	40.2 / 40.1	44.88	39.8 / 39.6	35.45	39.2 / 39.2	29.37	39.8 / 39.7	36.97	39.4 / 39.2	29.92	38.8 / 38.6	23.95	38.3 / 38.1	17.09	36.5 / 36.3	13.53
MDD	36.5 / 36.4	35.29	36.3 / 36.1	27.92	36.0 / 35.9	23.36	35.7 / 35.6	27.85	35.1 / 35.0	21.84	34.9 / 34.7	17.67	34.7 / 34.4	12.72	33.2 / 32.9	9.75
IV	41.2 / 41.1	47.30	40.8 / 40.7	37.42	40.5 / 40.4	31.45	40.6 / 40.5	38.66	40.4 / 40.2	31.56	40.2 / 40.0	25.88	39.1 / 38.9	17.92	36.7 / 36.5	13.75
# observations	6478		4220		3070		4579		3147		2156		1171		950	

Panel B: Equity Long/Short

	Ranking period															
	52						104									
Evaluation period	26		39		52		26		39		52		78		104	
Performance measure	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic
Sharpe	30.3 / 29.9	8.14	30.1 / 29.5	6.34	30.5 / 29.9	5.68	28.3 / 27.7	3.95	29.8 / 29.0	4.44	30.3 / 29.3	4.22	29.2 / 28.2	2.17	26.9 / 24.8	0.41
Alpha	29.5 / 29.0	6.72	29.8 / 29.3	5.98	28.3 / 27.6	3.23	29.6 / 29.0	5.64	30.9 / 30.1	5.52	31.5 / 30.5	5.27	30.6 / 29.6	2.97	31.0 / 29.0	2.39
t (alpha)	29.1 / 28.7	6.28	29.7 / 29.2	5.87	27.9 / 27.2	2.80	29.4 / 28.8	5.40	30.3 / 29.5	4.90	30.9 / 29.9	4.75	29.2 / 28.2	2.17	31.0 / 29.0	2.39
Appraisal	30.1 / 29.7	7.85	31.1 / 30.5	7.63	28.6 / 27.9	3.52	29.7 / 29.1	5.76	31.5 / 30.7	6.14	31.1 / 30.1	4.93	30.1 / 29.2	2.70	31.7 / 29.7	2.71
Omega	31.1 / 30.6	9.36	30.3 / 29.7	6.63	30.8 / 30.1	5.96	28.8 / 28.2	4.61	30.1 / 29.2	4.67	30.1 / 29.1	4.05	29.6 / 28.2	2.30	28.3 / 26.2	1.07
Calmar	29.8 / 29.3	7.26	30.3 / 29.8	6.69	30.4 / 29.7	5.54	27.9 / 27.4	3.46	30.0 / 29.2	4.59	30.3 / 29.3	4.22	28.2 / 27.3	1.63	26.2 / 24.1	0.08
Return	28.8 / 28.3	5.69	29.1 / 28.5	5.04	28.4 / 27.8	3.38	26.3 / 25.8	1.40	28.4 / 27.6	3.03	26.5 / 25.5	0.85	25.9 / 25.0	0.27	21.4 / 19.3	-2.23
HPM	38.8 / 38.3	20.48	38.2 / 37.7	16.31	36.8 / 36.1	12.07	37.8 / 37.3	15.69	38.1 / 37.3	12.19	38.3 / 37.3	10.83	37.5 / 36.6	6.76	35.9 / 33.8	4.60
SD	40.1 / 39.7	22.16	40.4 / 39.9	18.55	40.0 / 39.3	14.92	39.8 / 39.2	17.74	39.3 / 38.5	13.21	39.9 / 38.9	11.97	39.8 / 38.9	7.86	38.6 / 36.6	5.76
LPM	40.1 / 39.7	22.09	39.9 / 39.4	18.10	39.4 / 38.8	14.48	38.9 / 38.3	16.79	38.7 / 37.9	12.71	39.7 / 38.7	11.83	39.4 / 38.4	7.65	40.0 / 37.9	6.30
MDD	37.2 / 36.7	18.33	38.4 / 37.9	16.50	36.9 / 36.3	12.20	36.0 / 35.4	13.59	36.7 / 35.9	10.98	37.3 / 36.3	10.07	35.2 / 34.3	5.56	34.5 / 32.4	3.98
IV	39.9 / 39.5	21.87	39.7 / 39.1	17.83	39.3 / 38.6	14.37	38.2 / 37.7	16.10	38.2 / 37.4	12.32	39.5 / 38.5	11.70	38.9 / 38.0	7.44	39.3 / 37.2	6.03
# observations	1609		1104		753		1078		641		499		216		145	

Panel C: Fixed Income

	Ranking period															
	52						104									
Evaluation period	26		39		52		26		39		52		78		104	
Performance measure	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic	WW(%) / LL(%)	CPR z-statistic
Sharpe	27.9 / 27.4	4.18	28.4 / 28.0	4.07	26.3 / 25.6	1.00	27.4 / 26.7	2.73	28.6 / 28.0	3.39	26.3 / 25.6	0.87	31.2 / 30.0	3.47	26.3 / 25.7	0.53
Alpha	29.6 / 29.1	6.81	30.1 / 29.7	6.27	28.6 / 27.9	3.50	29.3 / 28.6	5.24	28.4 / 27.8	3.24	28.6 / 27.9	2.96	29.1 / 27.9	2.22	29.7 / 29.1	2.33
t (alpha)	29.8 / 29.2	7.01	30.8 / 30.5	7.24	28.9 / 28.2	3.80	28.7 / 28.1	4.52	28.7 / 28.1	3.55	27.9 / 27.1	2.27	30.0 / 28.7	2.72	29.7 / 29.1	2.33
Appraisal	29.8 / 29.2	7.01	30.2 / 29.8	6.39	28.5 / 27.8	3.36	28.3 / 27.6	3.93	27.7 / 27.1	2.47	28.6 / 27.9	2.96	30.8 / 29.6	3.22	28.6 / 28.0	1.73
Omega	28.7 / 28.1	5.30	28.7 / 28.4	4.56	26.9 / 26.3	1.74	28.2 / 27.6	3.81	29.0 / 28.4	3.85	26.9 / 26.1	1.40	31.6 / 30.4	3.72	28.0 / 27.4	1.43
Calmar	27.8 / 27.3	3.98	28.4 / 28.0	4.07	26.0 / 25.3	0.70	27.0 / 26.3	2.19	27.1 / 26.5	1.85	26.7 / 25.8	1.13	31.2 / 30.0	3.47	26.9 / 25.7	0.68
Return	29.0 / 28.5	5.80	28.8 / 28.4	4.69	26.9 / 26.3	1.74	27.5 / 26.8	2.85	27.7 / 27.1	2.47	26.7 / 26.0	1.22	31.2 / 30.0	3.47	26.9 / 26.3	0.83
HPM	37.8 / 37.3	18.66	38.1 / 37.7	15.83	37.1 / 36.4	12.15	37.7 / 37.0	15.66	36.5 / 35.9	11.17	36.1 / 35.3	9.45	36.0 / 34.8	6.34	33.1 / 32.6	4.08
SD	39.2 / 38.7	20.48	39.5 / 39.1	17.21	38.7 / 38.0	13.64	38.0 / 37.4	16.07	37.3 / 36.7	11.84	38.5 / 37.8	11.39	36.8 / 35.6	6.79	36.6 / 36.0	5.74
LPM	36.0 / 35.5	16.28	36.5 / 36.1	14.05	35.3 / 34.6	10.45	34.9 / 34.2	12.38	35.0 / 34.4	9.78	35.1 / 34.4	8.66	34.4 / 33.2	5.41	35.4 / 34.9	5.20
MDD	32.5 / 32.0	11.18	33.4 / 33.0	10.44	31.9 / 31.2	6.98	30.7 / 30.1	7.12	29.3 / 28.7	4.16	30.9 / 30.2	5.02	31.6 / 30.4	3.72	29.1 / 28.6	2.03
IV	39.9 / 39.4	21.27	38.8 / 38.4	16.53	39.1 / 38.4	13.99	39.2 / 38.6	17.33	38.5 / 37.9	12.87	38.4 / 37.6	11.25	37.2 / 36.0	7.01	36.6 / 36.0	5.74
# observations	1532		1044		731		1107		668		499		247		175	

Table IV

Ranked portfolios: Performance persistence of alternative UCITS funds for different ranking periods, evaluation periods, and performance measures

This table shows annualized returns and seven-factor alphas for the return differentials between two equally weighted portfolios, containing 1) funds from the fourth (q >= 0.75) quartile according to a performance or risk measure, and 2) funds from the first (q <= 0.25) quartile. The seven factors for the OLS regression are comprised of 1) the four factors used in Carhart (1997), R_m–R_f, SMB (small minus big), HML (high minus low book-to market), and UMD (momentum factor), which come from Kenneth French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), as well as 2) the weekly change in the 10-year constant maturity U.S. government bond yield, 3) the weekly change in the Moody's Baa-Aaa corporate yield spread, and 4) the weekly change in the slope of the structure (10-year – 1-year U.S. government bond yield), all taken from http://research.stlouisfed.org/fred2/. HAC-standard errors (not reported), according to Newey and West (1987), were used for *t*-tests of portfolio performance. The sample period is January 2004 through April 2014. Ranking periods are either 52 or 104 weeks. Evaluation periods are non-overlapping, and range from 26 to 104 weeks. The first ranking period is January 2004 through December 2004 for the 52-week ranking period. The first evaluation period is January 2005 through June 2005 for the 26-week evaluation period. The next ranking period is subsequently shifted by the length of the evaluation period until the end of the sample is reached. Definitions of performance and risk measures are in Table A.I in the appendix. All returns are calculated in excess of the local one-month LIBOR rate. Sample periods for panels B and C begin in January 2005 due to data availability. *, **, and *** indicate significance at the 90%, 95%, and 99% levels, respectively.

Panel A: Full sample

	Ranking period															
	52						104									
Evaluation period	26		39		52		26		39		52		78		104	
Performance measure	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Sharpe	4.4***	5.1***	2.7**	3.3***	2.5*	3.2**	0.7	1.5	-0.3	0.8	-1.7	-0.5	-2.8	-1.3	0.1	1.2
Alpha	1.6	1.6	1.4	1.4	1.0	0.7	3.4***	3.7***	2.4**	2.9***	0.8	1.0	0.7	1.0	0.5	0.7
t (alpha)	2.6***	2.7***	2.2***	2.5***	2.0**	2.0**	1.9**	2.3***	1.3	1.7**	0.4	0.7	-0.5	0.0	0.8	0.9
Appraisal	2.6**	3.0***	2.0**	2.7***	1.7*	1.8*	2.5**	3.0***	1.8*	2.6***	-0.1	0.4	-0.3	0.4	0.1	0.6
Omega	3.2***	3.3***	3.0***	3.1***	1.9*	2.0**	1.8	2.1**	1.2	1.6	0.3	0.8	-1.5	-0.7	1.6	1.9*
Calmar	4.7***	4.9***	2.7**	3.2***	2.9*	3.5**	0.6	1.4	-0.2	0.7	-1.5	-0.4	-2.6	-1.1	0.4	1.2
Return	4.7***	4.9***	2.4	2.5	3.5**	3.7**	0.6	1.2	0.0	0.9	-1.7	-0.8	-3.2	-1.9	0.5	1.2
HPM	0.6	-0.9	0.8	-0.6	0.9	-0.4	1.9	0.8	1.6	0.5	1.6	0.6	1.1	0.1	1.4	0.5
SD	-0.1	-1.6	-0.2	-1.5	0.6	-0.8	1.1	-0.1	0.9	-0.3	1.4	0.2	1.4	0.2	1.3	0.3

LPM	-1.4	-2.9*	-1.0	-2.4	-0.4	-1.7	0.9	-0.4	1.1	-0.2	1.2	0.0	1.8	0.5	1.0	-0.1
MDD	1.5	2.9*	1.3	2.4*	1.0	2.2	-0.6	0.6	-1.1	0.3	-1.3	-0.1	-2.6	-1.2	-0.8	0.2
IV	-0.8	-2.1	-0.5	-1.7	-0.2	-1.3	0.7	-0.3	0.7	-0.3	1.2	0.3	1.1	0.2	0.9	0.2

Panel B: Equity Long/Short

	Ranking period															
	52						104									
Evaluation period	26		39		52		26		39		52		78		104	
Performance measure	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Sharpe	3.6	4.9***	2.1	3.2	1.6	2.4	0.3	1.2	0.4	0.6	-1.4	-0.1	1.0	0.7	-2.9	-1.3
Alpha	3.7*	3.9**	2.3	2.3	2.4	2.0	3.7	3.9*	4.3*	4.2*	0.8	1.0	0.8	0.9	-0.4	0.2
t (alpha)	3.5**	3.4**	3.3**	3.0**	3.3*	2.8	2.8	3.3*	3.4*	3.5**	1.3	1.5	1.1	1.1	1.1	1.5
Appraisal	4.7**	5.2***	3.5*	3.7**	4.0*	3.9*	4.6**	5.3**	4.1**	4.8**	1.4	1.8	2.1	2.7	0.2	1.0
Omega	3.8***	4.0***	2.7	3.0*	2.7*	2.8*	2.1	2.7	1.2	1.1	0.6	1.4	0.2	-0.1	-1.2	-0.1
Calmar	3.5	4.4**	2.5	3.3*	1.6	2.1	0.5	1.2	0.8	1.0	-1.2	-0.1	1.6	1.0	-1.8	-0.7
Return	3.2	3.6*	2.1	2.6	1.4	1.5	-1.3	-0.9	-1.9	-2.3	-1.7	-0.8	0.2	-1.0	-4.3	-3.3
HPM	0.2	-1.7	0.0	-1.8	-0.4	-2.0	0.1	-1.7	0.0	-1.8	1.1	-0.4	-0.6	-2.4	-0.7	-1.9
SD	0.0	-2.0	0.1	-1.8	0.3	-1.3	0.4	-1.2	0.3	-1.2	1.2	-0.3	-1.0	-2.2	-0.1	-1.5
LPM	-2.8	-4.8***	-1.3	-3.2*	-1.9	-3.6**	-1.7	-3.8*	-1.0	-2.9	0.6	-1.3	-1.9	-3.7*	1.8	-0.3
MDD	2.5	4.2***	2.4	4.1**	1.6	3.3*	-0.4	1.1	0.1	1.2	-0.8	0.9	0.7	1.3	-2.1	-0.6
IV	-0.3	-2.1	0.5	-1.2	0.8	-0.6	-1.5	-3.1*	-2.1	-3.4**	-0.4	-1.6	-0.6	-2.3	1.2	-0.5

Panel C: Fixed Income

	Ranking period															
	52						104									
Evaluation period	26		39		52		26		39		52		78		104	
Performance measure	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Sharpe	2.4	2.4*	1.7	2.1	1.6	1.5	2.4	2.8*	1.1	1.5	-2.1	-1.6	1.6	1.9	-4.9**	-4.4**
Alpha	3.3***	3.3***	1.8	1.9*	1.9*	1.6	1.7	2.2*	2.1*	2.2*	-1.2	-0.9	1.5	1.5	-1.3	-1.4
t (alpha)	3.0***	2.8***	1.9*	1.8*	1.4	1.1	1.5	1.5	1.2	0.9	0.0	0.0	0.8	0.7	-1.3	-1.5

Appraisal	2.9**	3.0**	1.4	1.7*	1.6	1.4	1.2	1.6	0.8	0.9	-1.5	-1.1	0.6	0.7	-2.4	-2.4
Omega	2.6*	2.5*	1.8	2.0	0.7	0.5	2.5	2.4	2.5	2.3	0.8	0.7	1.4	1.6	-4.7**	-4.4**
Calmar	2.4	2.4*	1.5	1.9	1.2	1.1	2.1	2.4	1.4	1.8	-1.9	-1.4	2.0	2.2	-3.8**	-3.3*
Return	2.5*	2.5*	1.7	2.0	1.6	1.4	2.5	2.9*	1.3	1.8	-1.3	-0.9	2.0	2.3	-3.4*	-3.0
HPM	2.9***	2.3***	2.5***	1.9**	2.6***	1.9**	3.1***	2.3***	3.1***	2.2**	3.9***	2.9***	3.4***	2.4***	5.1***	3.8***
SD	1.9**	1.4*	1.6*	0.9	2.0**	1.4*	3.1***	2.5**	3.6***	2.9***	3.4***	2.5**	3.5***	2.6**	5.6***	4.3***
LPM	0.9	0.5	1.2	0.5	1.8*	1.3	1.9*	1.2	3.5***	2.7***	3.4**	2.7**	2.5**	1.6	6.6***	5.5***
MDD	-0.2	0.2	0.0	0.8	-0.9	-0.6	-1.6	-1.0	-1.8	-1.2	-3.0**	-2.3*	-0.6	-0.1	-6.4***	-5.3***
IV	1.8**	1.4*	1.1	0.6	1.6*	1.2	2.7***	2.1**	2.8***	2.3**	2.3**	1.5	3.0**	2.3**	5.1***	3.9***

Table V

Performance persistence and offshore experience

This table shows annualized returns and seven-factor alphas for the return differentials between two equally-weighted portfolios. Funds are sorted into portfolios based on both performance and offshore experience. One portfolio contains funds with offshore experience that belong to the fourth performance quartile (q>= 0.75); the other contains funds without offshore experience, whose performance belongs to the first quartile (q<=0.25). For risk measures, quartiles are defined in reverse order, thus lower risk is better. The seven factors for the OLS regression are comprised of 1) the four factors used in Carhart (1997), R_m–R_f, SMB (small minus big), HML (high minus low book-to market), and UMD (momentum factor), which come from Kenneth French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), as well as 2) the weekly change in the 10-year constant maturity U.S. government bond yield, 3) the weekly change in the Moody's Baa-Aaa corporate yield spread, and 4) the weekly change in the slope of the structure (10-year – 1-year U.S. government bond yield), all taken from http://research.stlouisfed.org/fred2/. HAC-standard errors (not reported), according to Newey and West (1987), were used for *t*-tests of portfolio performance. Ranking periods are either 52 or 104 weeks. Evaluation periods are non-overlapping, and range from 26 to 104 weeks. The overall sample period is January 2004 through April 2014. The first ranking period is January 2004 through December 2004 for the 52-week ranking period. The first evaluation period is January 2005 through June 2005 for the 26-week evaluation period. The next ranking period is subsequently shifted by the length of the evaluation period until the end of the sample is reached. Definitions of performance and risk measures are in Table A.1 in the appendix. All returns are calculated in excess of the local one-month Libor rate. Sample periods for Equity Long /Short begin in January 2005 due to data availability. *, **, and *** indicate significance at the 90%, 95%, and 99% levels, respectively.

	Ranking period							
	All funds				Equity Long/Short			
	52		104		52		104	
Evaluation period	52		104		52		104	
Performance measure	Return	Alpha	Return	Alpha	Return	Alpha	Return	Alpha
Sharpe	4.8***	5.5***	0.8	2.1	3.8	4.7**	-4.0	-1.8
Alpha	3.2**	3.4**	-0.1	0.8	5.1**	5.6***	-1.5	0.1
t (alpha)	4.2***	4.5***	1.2	2.0*	3.9*	4.2**	1.1	2.2
Appraisal	3.8***	4.3***	0.5	1.6	4.6**	5.4***	0.1	1.7
Omega	5.6***	5.8***	2.3	2.8**	5.4**	5.6***	-2.3	-0.6
Calmar	4.8***	5.5***	1.4	2.5*	4.5*	5.4**	-1.7	0.0
Return	5.4***	5.8***	0.6	1.5	4.2	4.7*	-4.8	-2.8
HPM	2.7	1.7	0.0	-0.4	3.1	2.4	2.1	1.7
SD	1.0	2.4	0.2	1.3	2.0	4.0**	3.1	5.1**
LPM	1.5	2.8*	-0.1	1.2	4.3	6.4***	0.0	2.6
MDD	3.0	4.3***	1.2	2.5**	4.0	6.2***	-0.6	1.6
IV	1.3	2.5	0.6	1.5	0.8	2.7	1.9	4.1*

Table VI

Performance persistence and fund characteristics

This table shows the estimated coefficients from a pooled panel logit model, where the dependent variable is a dummy variable labelled WW. WW equals 1 if a fund reaches above median performance in two consecutive periods. For risk measures, the order is reversed. Independent variables are LogAuM, the natural logarithm of a fund's assets at the end of the ranking period; LogAge, the natural logarithm of the fund's age at the end of the ranking period; Offshore, a dummy variable that equals 1 if a fund is offshore experienced; Ireland, a dummy variable that equals 1 if a fund is domiciled in Ireland; MgmtFee, the fund's management fee; and PerfFee, the fund's performance fee. Definitions of performance and risk measures are in Table A.I in the appendix. Ranking and evaluation periods are 52 weeks. Evaluation periods are non-overlapping. All returns are calculated in excess of the local one-month Libor rate. The sample period ranges from January 2004 through December 2013. The sample period for Equity Long/Short begins in January 2005 due to data availability. To calculate standard errors, we use a robust Huber-White covariance matrix. *, **, and *** indicate significance at the 90%, 95%, and 99% levels, respectively.

Panel logit: dependent variable = WW

	Performance measure					
	Sharpe	Alpha	Omega	Return	SD	MDD
Constant	-4,722**	-4,899**	-4,627**	-2,944**	-5,499**	-4,966**
	0,645	0,636	0,638	0,630	0,633	0,642
LogAuM	0,258**	0,272**	0,262**	0,188**	0,286**	0,270**
	0,027	0,027	0,0269	0,026	0,027	0,026
LogAge	-0,104	-0,106	-0,153**	-0,216**	0,155**	0,079
	0,066	0,067	0,067	0,067	0,063	0,065
Offshore	0,235**	0,267**	0,339**	0,290**	-0,068	0,109
	0,116	0,117	0,114	0,114	0,116	0,118
Ireland	0,286**	0,017	0,166	0,221*	-0,256*	-0,201
	0,133	0,138	0,133	0,134	0,140	0,143
MgmtFee	-0,305**	-0,223**	-0,010	0,089	-1,098**	-1,211**
	0,086	0,086	0,084	0,082	0,087	0,091
PerfFee	0,008*	0,001	0,001	-0,002	0,008*	0,015**
	0,005	0,004	0,005	0,005	0,005	0,005
# observations	2899	2899	2899	2899	2899	2899
McFaddens R^2	0,0423	0,0408	0,0369	0,023	0,1094	0,1096
Log Likelihood	-1656	-1663	-1674	-1680	-1756	-1694
# funds	873	873	873	873	873	873
% correct predictions	71,40%	71,30%	71,10%	72,00%	66,80%	68,10%

Appendix

Table A.I
Definition of performance measures

This table provides the definitions of the risk, return, and performance measures used in this study. Returns are calculated in excess of the local one-month LIBOR rate. The seven factors for the OLS regression are comprised of 1) the four factors used in Carhart (1997), R_m–R_f, SMB (small minus big), HML (high minus low book-to market), and UMD (momentum factor), which are from Kenneth French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html), 2) the weekly change in the 10-year constant maturity U.S. government bond yield, 3) the weekly change in the Moody's Baa-Aaa corporate yield spread, and 4) the weekly change in the slope of the structure (10-year – 1-year U.S. government bond yield), all from http://research.stlouisfed.org/fred2/. For partial moments and the Omega ratio, we use a threshold value of zero. To rank funds consistently when the numerator is negative, we apply a correction proposed by Israelsen (2005) to the denominator of the Sharpe, Calmar, and appraisal ratios.

Measure		Definition
Absolute return measures	Sharpe ratio	$Sharpe_i = r_{i,t}/\widehat{\sigma_{i,t}}$
	Omega ratio	$Omega_i = HPM_i^{1,0}/LPM_i^{1,0}$
	Calmar ratio	$Calmar_i = r_i/MDD_i$
Benchmark-adjusted performance measures	Alpha	Estimated intercept from OLS regression: $r_{i,t} = \alpha_i + \sum_{k=1}^{7} \beta_{i,k} F_{k,t} + \varepsilon_{i,t}$
	t (alpha)	*t*-value of estimated alpha: $\hat{t} = \widehat{\alpha_i}/\sqrt{\frac{\widehat{\varepsilon_i'}\widehat{\varepsilon_i}}{T-k-1}(X'X)^{-1}_{1,1}}$ k: number of regressors = 7
	Appraisal ratio	$Appraisal = \widehat{\alpha_i}/\sqrt{\frac{\widehat{\varepsilon_i'}\widehat{\varepsilon_i}}{T-k-1}}$ k: number of regressors = 7

Return measures	Return	$\bar{r}_i = 1/T \sum_{t=1}^{T} r_{i,t}$
	Higher Partial Moment (order 1)	$HPM_i^{1,0} = 1/T \sum_{t=1}^{T} max(0 - r_{i,t}, 0)^1$
Risk measures	Standard deviation	$\widehat{\sigma_i} = \sqrt{1/(T-1) \sum_{t=1}^{T} (r_{i,t} - \bar{r}_i)}$
	Lower Partial Moment (order 1)	$LPM_i^{1,0} = 1/T \sum_{t=1}^{T} max(r_{i,t} - 0,0)^1$
	Maximum Drawdown	$MDD_i = \min_{\tau \in (0,T)} \left[\min_{t \in (0,\tau)} NAV_{i,t}/NAV_{i,\tau} - 1 \right]$ NAV: net asset value
	Idiosyncratic volatility	$\widehat{IV_i} = \sqrt{\frac{\widehat{\varepsilon_i}' \widehat{\varepsilon_i}}{T-k-1}}$ k: number of regressors = 7