Performance persistence in fixed interest funds: with an eye on the post-debt crisis period

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Abstract

We examine performance persistence in a sample of Portugal, Italy, Greece, and Spain (PIGS) government debt mutual funds. Performance persistence is measured for short-, medium-, and long-term periods using the conditional CAPM, the Sharpe ratio, and a modified version of the Sharpe ratio. "Cold hands" are found for both short- and medium-term periods, with non-parametric testing reinforcing our findings. While "hot hands" are proven a close second place, in the long-run performance persistence is gradually weakened. Ex-post tests, based on performance persistence results, suggest the possibility to achieve superior performance relative to the market average by sticking to winner and avoiding loser funds.

Keywords: performance persistence, mutual funds, debt crisis, Southern Europe bond markets, PIGS, Sharpe ratio

JEL classification: G11, G15, G23

1. Introduction

Fund of funds managers and large institutional investors like pension funds continually attempt to select the crème de la crème of mutual funds in order to enhance their portfolio returns. Since past performance measurements do not provide insights into the future upside potential of individual fund managers, academic research has shed light on the ability of professionally managed portfolios to consistently achieve above average performance. Fixed income assets are at the forefront of investment alternatives. Research on mutual fund performance, however, has been concentrated to the United States and the United Kingdom, leaving under-researched most of the other developed financial markets. Therefore, the questions of whether investors' money is properly invested or of the potential of achieving superior performance by identifying the best performers in bond markets in the context of active portfolio management call for further investigation (Redman and Gullett, 2007).

Bond funds engage in active portfolio management as evidenced by their high turnover rate relative to equity mutual funds (Moneta, 2013). This finding also holds for the fixed income asset management industry of the debt crisis inflicted countries of Southern Europe (i.e., Portugal, Italy, Greece, and Spain or PIGS). Since early 2010, when the European debt crisis erupted, and until mid 2013, PIGS, along with Ireland, encountering though country-specific difficulties,[1] had successively undergone downgrading of their sovereign debt ratings by credit rating agencies. Prior to the debt crisis, bond mutual funds had acted as a minimum risk investment. However, the outbreak of the recent European debt crisis severely impacted fixed income mutual funds performance, resulting in significant losses.

[1] Ireland primarily encountered difficulties in the structure of its banking system, thus is treated as a relatively separate case during the debt crisis in the eurozone.

Nonetheless, the debt crisis in the eurozone was short-lived, as evidenced by Greece having resumed long-term borrowing following the sale of a five-year bond issue (The Financial Times, 2014). The large and developed asset management sector in South Europe continues to seek investments in locally domiciled debt obligations. Moreover, European and global portfolios continue to allot to these markets their deserved share in a well-diversified portfolio. Their investment policies are motivated by volatility spillover effects and cross-sectional returns dispersion co-movement amongst South European markets (Skintzi and Refenes, 2006; Economou et al., 2011). Even during financially constrained periods, fund managers are inclined to engage in active portfolio management. Loss-averse investors are usually reluctant to "flee" from their fund allocations, being aware of the colossal losses they have already sustained. In this respect they may also expect fund managers to minimize any further future losses.

In the wake of the European debt crisis and the possible future opportunities that could arise for globally diversified or country-specific bond portfolios, in this study we examine the performance of fixed income investments in one of the last "yield havens", the Southern Europe. We believe that detecting past performance patterns may assist portfolio managers with unraveling idiosyncratic markets.

The specificity of the debt crisis in Southern Europe and the paucity in the literature examining performance persistence in any of these debt markets are not the sole reasons that render this research important.[2] We offer further evidence to the issue of performance persistence, especially over longer horizons. We test for performance persistence by using contingency tables constructed on the basis of two seminal performance measurement approaches: the Sharpe ratio and the conditional performance model. In this way, we attempt to

[2] Agudo and Magallon (2005) and Babalos et al. (2007) stress the need for further research into performance persistence in small developed markets.

elucidate whether the degree of performance persistence varies across different performance measures. To the best of our knowledge, no previous study has explored performance persistence employing these performance measures collectively.[3]

Moreover, we are the first to examine the performance persistence for PIGS, with specific focus on locally domiciled domestic debt fixed income funds. After analyzing potential refinements to the Sharpe ratio, we check for alterations in performance persistence as derived by our selected measures of performance. Our empirical results confirm that the choice of performance measure may in some cases significantly change the ranking of bond mutual funds.

The focus of our analysis is on short-, medium-, and long-term horizons and tests are performed over 6-, 12-, 24-, and 36-month periods. We measure performance and persistence relative to the median performance of the whole sample for each market. Our results indicate that performance persistence is evident in the short- and medium-term horizons for a large portion of our examined dataset; however, it becomes weaker for longer-term horizons. Over short-term horizons, persistent performance is the dominant pattern, with negative persistence more prominent for the modified version of the Sharpe ratio. In contrast, the original Sharpe ratio displays negative performance persistence being the second best most common outcome, with positive persistence being the norm. We also attempt to provide managerial implications by constructing viable investment strategies based on our results.

This paper proceeds as follows. In Section 2, we describe the pertinent literature. In Section 3, we present the dataset and the methodology used to evaluate past returns and measure performance persistence, after providing a brief description of the selected refinement to the original Sharpe ratio. In Section 4, we provide the performance persistence empirical evidence

[3] Cortez et al. (1999) used the Sharpe ratio and Jensen's alpha.

and discuss the potential investment strategies, while in Section 5 we summarize the main results and present useful inferences.

2. Literature Review

Performance measurement issues of bond funds still remain at the top of U.S. mutual fund research agenda. Du et al. (2009), employing a high-quality corporate bond portfolio dataset, find that fund managers' positive managerial skills are not sufficient enough to produce above average profits in the long-run after considering expenses. Ammann et al. (2010) find no deviation from a passive strategy returns, when examining convertible-bond funds. Contrarily, Chen et al. (2010), after confronting non-timing-related nonlinearities in the data that cause market timing to be underestimated, find significantly negative after cost returns, in line with the majority of prior studies (e.g., Ferson et al. (2006) and Polwitoon and Tawatnuntachai (2008) to name just a few).

Performance measurement studies that examine the European bond market are notably fewer than those examining U.S. fixed income markets. Indicatively, Dietze et al. (2009), utilizing a sample of European corporate bond portfolios, find no significant positive performance, corroborating similar findings by Maag and Zimmermann (2000) for the German market. Silva et al. (2003, 2005) analyzing European bond funds and Ferson et al. (2006) U.S. government bond funds are amongst the researchers who employ conditional models to assess bond fund performance and document comparable results to unconditional models. Hence, even though fixed income fund managers have been criticized by academia for failing to surpass passive benchmarks on an after cost basis, the question of what are the alternatives for an

investor in low risk assets is not as open. Quite the opposite actually, since an ideally diversified portfolio should contain high weightings of government and corporate bonds.

Empirical results, regarding the question of whether or not fixed income funds exhibit performance persistence vary from an absolute "no" for long-term horizons (Blake et al., 1993; Kahn and Rudd, 1995) to a probable "yes" for a sample of high yield bonds in the short-run (Philpot et al., 2000). Moreover, it varies from a likely "yes" for global bond funds (Polwitoon and Tawatnuntachai, 2006) to a certain "yes" for both government and corporate bond funds in the short-run (Droms and Walker, 2006) and to an emphatic still "yes" using even more recent bond portfolio data for the U.S. and Europe (Huij and Derwall, 2008; Du et al., 2009). Du et al. (2009) report that winner funds can produce positive abnormal returns before fees, while loser funds constantly underperform benchmark returns even before fees. Therefore, Berk and Green's (2004) finding that at least 80% of the poor performers manages to recover the expenses charged is questioned.

While the bond mutual fund performance literature seems to lend support to short-term persistence, studies on equity fund managers' performance evaluation provide mixed findings. Christopherson et al. (1998), using a conditional performance model to test for persistent returns, find statistically significant relative returns by fund managers. However, Carhart (1997) attributes persistence results found previously by Elton et al. (1996) and Gruber (1996) to differences in exposures to common risk factors, while Huij and Verbeek (2007) claim that short-term persistence can be supported beyond load fees, and can be mainly found in young small cap growth portfolios. Looking at other international markets, Bilson et al. (2005) and Bauer et al. (2006) examine Australian and New Zealand mutual funds, respectively and find significant short-term persistence.

Evidence on the performance persistence of bond funds in European markets is scant. Most European mutual fund studies examine performance persistence for equity funds in specific markets, with few exceptions focusing their research exclusively on bond funds (Silva et al., 2005). Agudo and Magallon (2005), when analyzing European equity funds domiciled in Spain, utilize parametric and non-parametric methods to reach the conclusion that no definite inferences can be made. In contrast, Cuthbertson et al. (2008) argue that most underperforming managers exhibit poor skills rather than bad luck, corroborating the existence of short-term performance persistence for U.K. equity mutual funds. Dahlquist et al. (2000) for Swedish money market funds and Cortez et al. (1999) for Portuguese equity mutual funds find performance persistence that is reduced when controlled for various dimensions of risk and longer time spreads. Babalos et al. (2007) and Giamouridis and Sakellariou (2008) examine Greek equity funds, while Otten and Bams (2002) employ equity funds data from Italy and Spain, among other countries, and find no evidence of "hot hands" in any of these markets that we also analyze.

3. Methodology and Data

3.1 The Sharpe ratio and its extensions

Sharpe (1966), Treynor (1965), and Jensen (1968) are amongst the first to assess mutual fund performance. In confronting the performance measurement questions, we find two broad categories of papers: those that focus on absolute measures of returns (e.g. Ferson and Schadt, 1996; Daniel et al., 1997; Becker et al., 1999 and Kothari and Warner, 2001) and those that gauge performance through the use of relative measures of returns (e.g., Modigliani and Modigliani, 1997; Sharpe, 1998; Muralidhar, 2000 and Rodriguez, 2008).

When employing the Sharpe ratio as a portfolio performance measure, the parameters of risk and return are well balanced and the model requires no previous validation. The Sharpe ratio though presupposes the total variability of returns, while the systematic risk factor is relatively neglected (Agudo and Magallon, 2005). In recent years the debate on whether the Sharpe ratio is a fair measure of ex-post returns has been magnified. Extensions of the Sharpe ratio theory, with different performance measurements that account for risk characteristics, can be found in Agudo and Marzal (2004), Israelsen (2005), Ledoit and Wolf (2008), and Krimm et al. (2012). The dispute over the Sharpe ratio's appropriateness stems from its apparent inconsistencies to provide justifiable results during periods of market anomalies (Lo, 2002). More particularly, it is not advisable to rely on Sharpe ratio's individual funds classifications during periods with negative average market returns (Scholz, 2007). Academic consensus though indicates that when average ex-post returns are non-negative, original Sharpe ratio results hold (Israelsen, 2005). Refinements to the Sharpe ratio have been examined accordingly in order to make inferences on their differences (Ledoit and Wolf, 2008).

The original Sharpe ratio measurement formula, Sr_i, is expressed as the excess return earned per unit of total risk, $r_i - r_f$, where total risk is measured by the standard deviation of the overall returns of the portfolio σ:

$$Sr_i = (r_i - r_f) / \sigma_i \tag{1}$$

During periods of negative average returns the original Sharpe ratio rationale might provide inaccurate portfolio rankings, thus offering misleading performance persistence results. In such cases the first partial derivative with respect to overall risk may become positive while, strikingly, portfolio returns above the risk-free rate are non-existent. This apparent abnormality

in the case of $r_i < r_f$ resulted in the proposed use of the relative premium r_i / r_f in the numerator of the original Sharpe ratio. In this way, the Agudo-Marzal (2004) modified ratio becomes:

$$Sr_i^{AM} = (r_i / r_f) / \sigma_i \tag{2}$$

Israelsen (2005) rightly acknowledges that both the Sharpe ratio and the Information ratio (Treynor and Black, 1973) are dysfunctional in the context of ranking funds according to the abovementioned performance measures. Sharpe (2007) affirms the inability of the Sharpe ratio to provide consistent rankings for funds experiencing non-normal distribution of returns.[4] While Sharpe's assertion refers primarily to mutual funds, even then empirical evidence depicts nearly identical rankings for hedge funds (Eling and Schuhmacher, 2005, 2007), questioning the growing concern around the validity of the traditional Sharpe ratio. This "Does the measure matter" debate is extensively addressed in Eling (2008). This author examines a large dataset consisting of over 30,000 funds for the 1996-2005 period and finds that the usage of a large number of proposed Sharpe ratio modifications produces almost identical to the original Sharpe ratio performance rankings. Eling and Faust (2010) find similar results. Zakamouline (2010) and Ornelas et al. (2012) revisit the issue and find heterogeneous results produced by alternative performance measures and ensuing rankings for hedge and mutual funds, respectively.[5]

Based on the above analysis, we also employ the Agudo-Marzal (2004) Sharpe ratio modification for performance ranking.[6] According to these authors, this is the only recently suggested Sharpe ratio modification that has been successfully used to examine a sample of fixed

[4] Lo (2002) previously confirmed the likeliness of a better approximation of mutual fund returns rather than those of hedge funds when using the Sharpe ratio. Mahdavi (2004) and Sharma (2004) provide further support for Lo's position.

[5] For a further in-depth analysis on alternative performance measurement methodologies, see Opdyke (2007).

[6] Ledoit and Wolf (2008) also consider the Israelsen and Agudo-Marzal models as the best possible recently suggested refinements to the original Sharpe ratio.

income funds.[7] Therefore, we test its compliance as an alternative mutual fund ranking mechanism, thus attempting to validate the appropriateness of the original Sharpe ratio in a fairly large sample of bond mutual funds.[8]

3.2 The conditional CAPM methodology

The Treynor Index and Jensen's alpha provide a sustainable basis for systematic risk evaluation, but assume that the power of the asset pricing model explains the parameters of risk and return. Even though Blake et al. (1993) extended the use of the traditional Jensen's alpha to bond funds, criticism on its appropriateness in performance measurement places emphasis on estimation errors, the benchmark choice, and the constant beta hypothesis (Jagannathan and Wang, 1996). Government bond portfolios are more susceptible to market timing than equity mutual funds since both future interest rate predictions and duration matching are essential elements of their active portfolio management strategy (Silva et al., 2003). According to Ferson and Schadt (1996), allowing for time-varying risk and returns, beta is required to be a linear function of a vector of conditional variables, leading to more accurate performance estimates.

The traditional Jensen's (1968) alpha methodology has the following form:

$$R_{p,t} = \alpha_p + \beta_p R_{m.t} + \varepsilon_{p,t} \tag{3}$$

where $R_{p,t}$ is the excess return of portfolio p at time t relative to the market return $R_{m.t}$, and α denotes a fund's abnormal return relative to the expected return the manager would earn had the available money resources been passively invested in the market index bearing the same risk level.

[7] In our methodology, we cater to the inconsistencies provided from the model when $r_i < 0$.

[8] Eling (2008) fails to include the Israelsen and Agudo-Marzal models in his comparative performance measurement testing, which shed light on the multitude of Sharpe ratio based hedge fund performance measurement models that have been suggested.

Agudo and Magallon (2005) test for performance persistence in Spain in a portfolio consisting of equity mutual funds by applying Jensen's alpha coupled with the Agudo-Marzal refinement of the Sharpe ratio as alternative performance measurement methodologies. They find that overall performance persistence results, using both models, are a close match, which we also examine. We avoid using the well-known extensions of the Jensen model for bond funds[9] due to evidence indicating almost identical fund ranking results, irrespective of the model used, for similar datasets in relatively small developed markets (Bauer et al., 2006).[10] However, accurate performance measurement and the necessity to surpass the time-varying beta limitation, posed by the traditional Jensen model, require the use of conditional variables in the context of Ferson and Schadt (1996) as follows:

$$R_{p,t} = \alpha_p + \beta_p R_{m,t} + \delta_p (R_{m,t} z_{t-1}) + \varepsilon_{p,t} \tag{4}$$

where z_{t-1} is a vector of the deviations of Z_{t-1}, which are the lagged public information variables, from the unconditional average values, α_p measures the risk-adjusted conditional performance, and δ_p represents the coefficients of the cross product of the market excess return variable with the vector z_{t-1} variables.

Following Ferson and Schadt (1996), we use as public information variables for the measurement of the conditional alpha, the yield of a 3-month note,[11] as a short-term yield variable; the difference in yields between the 10-year government bond and the 3-month note as a term spread variable; the dividend yield spread and a default spread variable defined as the

[9] The extensions include the Treynor-Mazuy (1966) quadratic model and the Jagannathan and Korajczyk (1986) cubic model that augmented the quadratic model with a cubic term to cater for better approximation of the market timing element.

[10] It must be noted that Ferson et al. (2006) point that the Treynor-Mazuy (1966) quadratic market timing model is capable of capturing the possible nonlinearities of constructed portfolios and market portfolio returns.

[11] Silva et al. (2003, 2005) use a 3-month interbank offered rate, as a component in constructing the term spread public information variable, in the case of Portugal and Italy. They use a 34-94 days Treasury bill yield when calculating the term spread public information variable in the case of Spain.

difference between BBB- and AAA-rated bonds. A dummy variable is also used to capture possible January effects in predicting bond fund abnormal returns.

3.3 Contingency tables and non-parametric statistical significance testing

To test for performance persistence in managers' ability to select bonds and time the market, we make use of two-way contingency tables, categorizing funds as winners (W) or losers (L) in six-monthly periods. Funds exhibiting performance above the median, in two consecutive periods, are characterized as winners (WW), while those appearing to produce below median performance are characterized as losers (LL). However, funds that perform better than the median in the first part of the examination period, but worse in the next one are characterized as winners-losers (WL). Finally, those funds shifting from the lower half of the performance distribution to the upper half are losers-winners (LW). In this way, during our 11-year examination period, 21 consecutive six-month periods were constructed when testing for short-run persistence, with individual funds ranked and named based on the four choices (WW, LL, WL, or LW).[12]

We extend this analysis to longer horizons by testing performance persistence for 12-, 24-, and 36-month periods. The aim is twofold. First, to test whether some managers, who do particularly well or poorly during a mid-term horizon (12-month periods) or long-term horizon (24-month and 36-month periods), will continue to do so in the future. In that case, the managers' aim is to exploit this information in the form of an investment strategy. Second, to explore whether performance persistence, which has been documented as being strong in the short-term (Bollen and Busse, 2005), still holds for less frequent intervals.

[12] Droms and Walker (2006) suggest the use of two extra categories of funds, catering for non survivors, those of winners-gone (WG) and losers-gone (LG).

The non-parametric tests employed include Kahn and Rudd (1995) and Brown and Goetzmann (1995) who, using relevant statistical measures, check whether performance persistence holds. More analytically, we use:

a) The Cross Product Ratio (CPR), which offers an odds estimation of recurring performers vis-à-vis non-recurring ones, as suggested by Brown and Goetzmann (1995):

$$CPR = \frac{Q_{WW} \times Q_{LL}}{Q_{WL} \times Q_{LW}} \tag{5}$$

where CPR is the ratio of the winners times the losers in two periods relative to the winners-losers times the losers-winners.

The Z-statistic is then calculated as:

$$Z = \frac{\ln(CPR)}{\sigma_{\ln(CPR)}} \tag{6}$$

where $\sigma_{\ln(CPR)} = \sqrt{1/WW + 1/WL + 1/LW + 1/LL}$

b) The chi-squared test (χ^2) by Kahn and Rudd (1995):

Considering that the probability of occurrence of one out of the four scenarios is equal, the chi-squared test is computed as follows:

$$\chi^2 = \frac{(Q_{WW} - Q/4)^2}{Q/4} + \frac{(Q_{WL} - Q/4)^2}{Q/4} + \frac{(Q_{LW} - Q/4)^2}{Q/4} + \frac{(Q_{LL} - Q/4)^2}{Q/4} \tag{7}$$

where Q denotes all bond mutual funds in the sample, and Q_{WW}, Q_{WL}, Q_{LW}, and Q_{LL} denote the observed frequency for each of the possible scenarios, respectively. Based on the results of the chi-squared test, the likelihood of occurrence is calculated and the ensuing performance persistence conclusion is reached.[13]

[13] Malkiel's (1995) Z test is another non-parametric statistical test. However, it produces almost identical results relative to the previous two tests (Giamouridis and Sakellariou, 2008), showing that the choice of parameters has no

Based upon the above analysis, investors and funds managers can potentially identify consistently good and bad performers and reach conclusions on portfolio performance.

3.4 Managerial skills and performance persistence

Performance persistence alone is of limited value to market practitioners and investors. In order to test for the practical significance of investing in winner funds in the four markets analyzed, we extend previous work by Bialkowski and Otten (2011) and check for possible abnormal returns achieved through an investment strategy, focusing on winner funds over 6-, 12-, 24-, and 36-month periods. We exploit information obtained from the performance persistence testing by creating portfolios consisting of winners in consecutive periods, which are continuously reallocated to cater for the need for portfolio rebalances, given the changing portfolio persistence results.

We test separately for the possibility of achieving above average returns by investing in winner funds on an ex-post basis, by calculating abnormal returns for all holding periods identified for performance persistence.[14] Average returns after expenses are calculated for the second half of 2000, forming the overall returns achieved for this constructed portfolio on an ex-post basis. For the next holding period (01/01/2001-30/06/2001), we use performance persistence results derived from 01/07/2000 to 30/06/2001. In a similar manner, calculations are performed for the rest of holding periods. Therefore, for each country, excess returns are calculated relative to the corresponding 10-year benchmark bond index. The same procedure is followed for loser

significant influence in overall results. For parsimonious reasons, it is not included in this study.

[14] The first holding period is 01/07/2000-31/12/2000 since for the first half of 2000 we have no performance persistence results. Likewise, the first holding period for the 12-month period is 01/01/2001-31/12/2001, for the 24-month period is 01/01/2002-31/12/2003, and for the 36-month period is 01/01/2003-31/12/2005. We ignore robustness test results since over 65% of our findings prove to be statistically robust, with non-significant time intervals being equally widespread throughout our sample.

funds with the aim to compare the derived returns from investing in winner and loser funds, respectively and determine their statistical significance through equality testing. All calculations are based on conditional alpha abnormal returns for each fund. The classical Sharpe ratio and the alternative Sharpe ratio fund ranking methodologies serve solely as a measure for identifying winners for every evaluation period.

In a few cases (e.g., Greece for the years 2009-2010), mutual funds sustain, on average, noteworthy losses. Therefore, we attempt to prove whether they are superior to fund universe average returns, by relying on winner funds as well as examining the magnitude of this effect. In a real investment scenario, no matter the horizon examined, the abnormal returns, by following a similar strategy, are not guaranteed. This could only be possible if one would follow a winner in one period on an ex-ante basis, and hopefully be right in his judgment as to how this fund is going to perform in the next period. Results are reported using all three ranking methodologies with the aim to test whether the identification of winner funds can produce superior performance to the average alpha derived from the conditional CAPM.

Abnormal returns for our constructed portfolios relative to a balanced portfolio of fixed income securities[15] enable us to identify the possibility for fund of funds managers to create portfolios consisting of winner funds in consecutive periods. At the same time, by avoiding poor performers, they would achieve even greater abnormal returns relative to the benchmark index. Performance persistence results and consequent excess returns in our investment portfolios can potentially be attributed to exceptional managerial skills.[16]

[15] As depicted by the use of the 10-year bond benchmark indices for each country.
[16] Du et al. (2009) suggest that usually winner funds are larger in size and employ more experienced managers. They infer that persistence could partly be attributed to managers' qualitative characteristics.

3.5 Data, expenses and survivorship bias

Our dataset consists of bond mutual funds domiciled in Portugal, Italy, Greece and Spain, investing primarily in country of origin, long-term government debt. Thus, for Italy, using relevant filters, the Bloomberg database provided us with 314 funds that offered the prescribed investment management services, at some stage, during the period 01/01/2000-31/12/2010. Only 82 funds survived during the 11-year examination period. The number of funds launched after 2000 outnumbers by 4 to 1 those that existed when the sample period begins. Surpassing in the same manner the main survivorship bias issue, weekly net asset value data from 202 funds were used for Spain, and additionally 24 and 39 government bond funds for Portugal and Greece, respectively. From those, 89, 11, and 14 funds, for Spain, Portugal, and Greece, survived throughout the examination period. Some survivorship bias elements still exist, since we excluded from our six-month period comparative performance methodology, funds that had fewer than one month's observations during a particular period. On the contrary, when merged funds existed, the acquiring fund's returns were carried forward, while the target fund was excluded from the dataset from that point onwards (Droms and Walker, 2006).

The taxation treatment of mutual funds was taken into consideration, since in the case of Italian mutual funds, domestic funds are obliged to pay tax on a daily basis (Sanova, 2006), thus quoted prices are reported net of taxation. Since this is not the case for the remaining three markets we examine, we adjusted quoted prices of Italian funds for the tax imposed,[17] so that all our sample data are treated in the same manner with regard to taxation.[18]

[17] Savona (2006) claims that this can be a factor responsible for discrepancies in returns documented in the Italian funds management industry, thereby foreign fund managers are incorrectly seen as better performers.
[18] In the case of foreign domiciled funds operating in Italy, the 12.5% tax still applies, but is withheld when capital gains are realized and not on a daily basis.

Applying appropriate mutual fund screening on Bloomberg, we trust that selection bias is minimal. We cross-checked our dataset by searching country-specific Institutional Investors Associations databases.[19] In Table 1, we summarize the profile of the mutual funds dataset used for each country. Excluding the massive losses sustained by Greek fund managers in 2010, Greece produces the highest average annual returns (2.96%), while Italian funds appear to hold the largest average portfolio in net assets (€171.15 million). The returns of non-surviving funds contradicts Ding's (2006) finding that, before a merger, funds tend to produce negative excess returns. This is more evident in the case of Greece.[20] Logarithmic returns are reported on an after fees basis. In this way, the well-known finding of marginal excess returns, insufficient enough to cover expenses (Chen et al., 2010), is surpassed. For the case of Greece, derived net asset values are quoted before fees. In order to calculate post-fee returns, we use the average expense ratio and an estimation for management fees, partly following Khorana et al. (2009).

For the risk-free rate, we use the one-month Euribor rate across all three ranking methodologies.[21] The benchmark indices we use are the 10-year government bond indices. In order to calculate the term spread variable, we employ different 3-month note yields for PIGS, that is, the Spanish Interbank rate, the Italian Treasury bill rate, the Lisbor rate for Portugal and the Greek Treasury bill rate.[22] We also use the 10-year government bond yields. The default

[19] Namely the Italian Association of Investment Management, the Spanish Association of Investment and Pension Funds, the Portuguese Association of Investment Funds, Pension Funds and Asset Management and the Hellenic Funds and Asset Management Association. In the case of Greece, we combined the Association's data in constructing the dataset since omissions were observed from the Bloomberg data.

[20] Dritsakis et al. (2006) consider that closures often occur as a result of mergers in the parent banking groups with asset management companies of the respective groups consequently merging themselves. Absorbed funds are often better performers than their counterparts in such cases.

[21] Leite and Cortez (2009) and Dietze et al. (2009) use the one-month Euribor rate as a risk-free rate for performance measurement. Huij and Derwall (2008) also use a 30-day rate as risk-free rate when measuring bond fund performance in a U.S. sample. Weekly returns are calculated as follows: $r_{f,t} = (\ln\left[1 + r_{a,ft}\right] / 52)$ where $r_{a,ft}$ is the annualized one-month euribor rate.

[22] Similar to Ferson and Schadt (1996) and Bauer et al. (2007) we use, as a short-term yield conditional variable, a time series that is different to the time series used as the risk-free rate.

spread, which is a measure of the default risk that may affect bond fund returns, is calculated as the difference between IBOXX BBB- and AAA-rated bonds. These indices represent the euro-denominated investment grade corporate bond market. They are used in the absence of country level credit rating indices, as in Silva et al. (2003, 2005), since the corporate bond market is still illiquid in the markets we examine.[23] The use of eurozone data for the default risk variable is further justified by the establishment of the European Monetary Union and the adoption of the euro, which have caused to a large extent the integration of European markets. Finally, we make use of the dividend yield as a proxy for corporate profitability and economic conditions. Conditional variables data were culled from Thomson Reuters Datastream and Bloomberg. Risk-free rate data were gathered from the European Central Bank.

INSERT TABLE 1 APPROXIMATELY HERE

4. Empirical Results

4.1 Measuring conditional alphas

In this section, we evaluate alternative performance measures in assessing the existence of performance persistence in the PIGS sample of long-term fixed income mutual funds. During the 11-year sample period, international markets went through major events. These are the 2001-2002 crisis, the mid 2000s cyclical bull stock market, the 2007-2009 global financial crisis, while early signs of the debt crisis in South Europe are also captured. We, therefore, believe our dataset adjusts for biases during the period we examine.

In Table 2, we summarize performance results using the Jensen model. Results show negative and statistically significant alphas for Spain, Italy and Portugal, from a meager -0.01% for Italy to a slightly lower -0.18% for Portugal. These findings are in line with the recent

[23] Dietze et al. (2009) underline the suitability of using IBOXX indices in research since they are being used as benchmarks by banks offering index-tracking exchange-traded funds.

literature, which reports underperformance relative to benchmark portfolios for all sorts of fixed income funds (e.g., Polwitoon and Tawatnuntachai, 2008; Dietze et al., 2009; Du et al., 2009).

INSERT TABLE 2 APPROXIMATELY HERE

Table 2 also contains the conditional CAPM abnormal returns that are used in performance persistence testing thereafter. Conditional alpha results are statistically significant at the 5% level for Italy and Spain, while Portuguese funds display a significant conditional alpha at the 1% level. Italy still presents the highest alpha of 0.01%, while Greece, Portugal and Spain display negative conditional alphas. These results are at odds with Berk and Green (2004), who highlight the ability of fund managers to recover at least their charged management fees. On the contrary, the negative performance estimates for Spanish bond funds are in accordance with Silva et al. (2003).

Table 3 presents the cross-sectional averages of the conditional variables. The 3-month Treasury note yield coefficient is negative and significant for Portugal and Greece, indicating a negative impact on mutual fund returns, in line with Sawicki and Ong (2000). The dividend yield displays some explanatory power over mutual fund returns as evidenced by the positive and significant coefficient for Greece. However, the results for Spain and Portugal show an adverse effect of the economic conditions variable, with the derived coefficient being negative although not significant. The term structure of interest rates coefficients are mostly negative, however, statistically significant only for Greece at the 5% level. Greece is the only country exhibiting a positive and significant default risk coefficient, reflecting possibly the economic distress situation. This finding further highlights the role of default as a significant determinant of fund performance for low creditworthy countries. The widespread notion of no clear January effect role in explaining government bond portfolios returns seems to hold (Silva et al., 2003).

INSERT TABLE 3 APPROXIMATELY HERE

4.2 Performance persistence over short-term horizons

As mentioned in Sections 3.2 and 3.3, we employ alternative performance measures in order to assess performance persistence. Table 4 outlines the funds analyzed in every short-term period following our rationale for survivorship bias explained in Section 3.5.

INSERT TABLE 4 APPROXIMATELY HERE

Tables 5, 6, and 7 depict the contingency tables of performance persistence results when using the original Sharpe ratio, the alternative Sharpe ratio, and the conditional CAPM, respectively, for the short-term horizon. Estimated results capture WW, LL, LW, and WL funds for each six-month period with figures quoted in percentages. The alternative Sharpe ratio results (Table 6) provide contradictory results relative to the original Sharpe ratio results (Table 5). More specifically, we find that when using the original Sharpe ratio, persistent winner funds, in consecutive periods, outnumber persistent loser ones (a cross-country average of 43.86% for WW relative to 26.50% for LL), whereas when using the alternative Sharpe ratio, loser funds exceed the number of winner funds by far (47.12% for LL vs. 23.61% for WW). Consequently, in the short-run, for all countries under examination, when using the two Sharpe ratio approaches, WL and LW funds represent a significantly smaller percentage in the overall sample. Based on the above results, which are statistically significant for Spain and Italy, we can assert the presence of continuous patterns of returns for most of our sample; Portugal and especially Greece, representing much smaller parts of the sample, exhibit non-significant results for the majority of the sub-periods analyzed.

The sign reversal phenomenon, that is from persistent winners to persistent losers when moving from the original Sharpe ratio to the alternative one, is particularly evident in Spain. In this market, throughout the 21 subperiods, 63.83% (21.78%) of funds appear to be persistent winners (losers), using the original Sharpe ratio, while 63.88% (22.79%) are repeatedly losers (winners) employing the alternative Sharpe ratio. These findings are in line with Agudo and Magallon (2005), who document persistently loser funds to be the norm in a sample of Spanish equity mutual funds when using the alternative Sharpe ratio approach. The percentage of LW and WL funds in Spain is low, with 14.39% switching performance sides in consecutive periods when using the original Sharpe ratio and 13.33% when employing the alternative Sharpe ratio. This sign reversal phenomenon is less apparent for Italy, although still very strong, while it is marginally observable for Portugal. For Greece, funds are mostly continuous losers using both Sharpe ratio methodologies.

INSERT TABLES 5-6-7 APPROXIMATELY HERE

In Table 7, the results for the conditional CAPM, on average, support negative performance persistence in the case of Spain. Italy displays mostly negative performance persistence during the period 2000-2002. In the case of Greece (Portugal), performance persistence is supported by the non-parametric testing in only two (three) six-month periods out of the 21 analyzed. Greece is the only case where repeated winners are the prevalent outcome. In the other sample countries funds exhibiting positive persistence represent the second best most common outcome. The weak evidence of fund industry performance persistence in Portugal, is consistent with Cortez et al. (1999).[24]

The alternative Sharpe ratio results, coupled with those from the conditional CAPM methodology, allow us to infer that negative performance persistence prevails for most of the

[24] Alves and Mendes (2011) find short-term performance persistence in Portuguese equity mutual funds.

dataset. In effect, the alternative Sharpe ratio results do, on average, coincide with those of the conditional performance model, in line with the findings of Agudo and Magallon (2005), who employ a simple CAPM coupled with the Agudo-Marzal modified Sharpe ratio. Untabulated performance persistence results, using the single factor CAPM, show that over short-term horizons no clear inferences can be made regarding the existence of robust persistence. However, marginally positive persistence can be found for Portugal and strongly negative for Spain; Italy and Greece do not exhibit persistent results.

4.3 Performance persistence over longer horizons

We also conduct performance persistence testing for 12-, 24-, and 36-month periods to evaluate for medium- to long-term performance persistence. When examining persistence over longer-term horizons, we observe a gradual decline in performance persistence. However, it remains predominant either on the positive or negative side, when measured by all three applied methodologies. The conditional CAPM results show that the chances of capturing performance persistency still lean towards continuous losing funds. More specifically, Table 8 shows that over the medium-term horizon (i.e., 12-month holding periods), Portugal has mostly continuous losers, while Greece has a slight superiority of continuous winners over consecutive 12-month periods. Nonetheless, results are not significant for over 75% of the periods analyzed for both countries.

Persistent loser funds remain the prevalent category across two of the three models for Spain, but the magnitude of the derived results is gradually weakening relative to the short-term horizon. In the case of Italy, negative performance persistence can only be tracked when using the alternative Sharpe ratio since conditional CAPM results are not significant on average. The

clear message from the above results is the support of the continuous patterns of performance in subsequent periods for a significant part of our sample. Contrary to the pertinent literature that finds no persistence over longer horizons, performance persistence is evident in Spain and to a lesser extent in Italy, over 12-month periods. Sign reversal is as strong as for the short-term horizon results, as indicated in Section 4.2, while overall results show that two of the three fund ranking methodologies we employ still produce mostly losers in consecutive periods; the Sharpe ratio renders winners in consecutive periods as its predominant finding.

INSERT TABLE 8 APPROXIMATELY HERE

Table 9 reports that for 24-month periods in Italy and Spain, sign reversal becomes gradually stronger, with the movement from winners to losers being notable, when using the conditional alpha. However, negative persistence remains the dominant pattern, but only the results from the alternative Sharpe ratio are significant for both countries. The same applies during all the medium- to long-term periods examined. Positive performance persistence is still found when employing the Sharpe ratio ranking method for Spain (61.94%). Winners in consecutive periods are found for the other country funds; however, the results are not significant on average. Portugal also exhibits noteworthy sign reversal from winners to losers and vice versa (45%), when using the Sharpe ratio.

INSERT TABLE 9 APPROXIMATELY HERE

Performance persistence is marginally weaker but still existent over long horizons (i.e., 36-month periods) for the largest part of the sample, as shown in Table 10. The Sharpe ratio continues to produce positive performance persistence in Spain, while in Portugal, Italy, and Greece winners in consecutive periods are the majority (though marginally significant). On the contrary, the alternative Sharpe ratio shows strong negative performance persistence for both

Italy and Spain. For all four markets, sign reversal is around 50%, as found from the conditional CAPM, ranging from 41.67% in Greece to 52.81% in Spain. This finding provides support for Casarin et al. (2008), who report robust sign reversal over long-term time horizons in a sample of Italian mutual funds (almost 45% of Italian funds in our sample show sign reversal when using the conditional CAPM).

INSERT TABLE 10 APPROXIMATELY HERE

The aggregate sample non-parametric testing results for performance persistence are outlined in Table 11. With the exception of the conditional CAPM results for Italy, the vast majority of the aggregate performance persistence results for Spain and Italy, representing funds constituting over 90% of the overall sample, are statistically significant. However, as indicated previously when analyzing performance persistence for the separate examination periods, aggregate results for Portugal and Greece are not statistically significant. Conditional CAPM results for Spain are marginally significant at the 10% level.

INSERT TABLE 11 APPROXIMATELY HERE

Overall, performance persistence is evident both in short-, medium-, and long-term periods for Italy and Spain, when using the original Sharpe ratio and the Agudo-Marzal refinement, even though results for the former lean towards positive, while for the latter lean towards negative. Portugal and Greece largely follow similar patterns of returns, but statistical significance is scarcely found. When using the conditional CAPM, some evidence of performance persistence is found for Spain, although weaker in magnitude relative to the other employed models. The clear signal is that performance persistence weakens, but is not diluted completely, over the longer term. This long-lived persistence is in line with Gutierrez et al. (2009) who also claim that this finding is unique to bond funds.

4.4 Performance persistence during the crisis

On average, results are statistically significant during the 2007-2009 financial crisis for the largest part of our sample. More specifically, during the annual time intervals surrounding the 2008 credit crunch, we find statistically significant results for Italy and Spain, as indicated in Tables 5, 6, and 7, proving persistence to be the dominant trend when using all three performance measurement methods. The Sharpe ratio and modified Sharpe ratio persistence results are similar to those of the aggregate sample. When using the conditional CAPM, the results from the 01/01/2008-31/12/2008 period for Italy and Spain show that WW funds outnumber LL ones in contrast to the overall sample results (Table 7). During the 01/07/2008-30/06/2009 period, Spain, Greece, and Italy display sign reversal results, which are not statistically significant on average. While for most individual examination periods Portugal and Greece exhibit non-significant results around the 2007-2009 crisis, the 12-month contingency tables (Table 8) indicate performance persistence favoring mainly winner funds for both countries.

The final year of our examination period (2010), which captures some early debt crisis evidence, generates weaker results in magnitude that lack of statistical significance, on average, relative to previous periods. During this last time interval of the 6-month contingency tables, persistent performance of winner funds can only be found when utilizing the Sharpe ratio for Spanish funds (Table 5). The apparent absence of statistical significance markedly underlines the deterioration of performance persistence on the eve of the debt crisis. When comparing debt crisis performance persistence estimates with overall sample averages, the number of persistent funds is smaller than the average estimates. The latter is evident in the short-term horizon, since overall Sharpe ratio results for Spain produce a distinguishable 63.83% and 21.78% for WW and

LL, respectively (Table 5). In contrast, in 2010 WW and LL data represent collectively 70.79%, a 17.3% decrease in the number of persistent funds relative to sample averages.

When considering the medium-term performance persistence results, during the latest debt crisis, early evidence, as depicted in Table 8, shows a significantly smaller performance persistence trend. This is evident in the case of Italy and Portugal even when using the original Sharpe ratio, which normally, during other periods, shows continuous winners outweigh other outcomes by far. In fact, for Italy, sign reversal phenomena are more evident, especially with WL cases becoming very common. A similar switch from apparent performance persistence to no persistence around the debt crisis period in the medium-term horizon is also depicted in Spain using all three fund ranking methodologies. Greece shows evidence of continuous losers prevailing over winners when employing the two Sharpe ratio models. Knowing that mutual funds investing in Greek government fixed income vehicles have been incurring overall losses since the end of 2009, one possible explanation for our results could be the quest for safe havens by investors. This leads them to the big fixed income funds,[25] as performance is alleged to increase with fund size (Chen et al., 2004).[26] We trust that long-term performance persistence testing, that is 24-month and 36-month evaluation periods, does not highlight debt crisis period evidence due to our sample period limitation.

[25] Unreported evidence shows that in Greece, bearing the brunt of the crisis, there was a movement towards investments in fixed income funds on the part of large fund families, triggering the overall negative performance persistence results during this last period. Returns before expenses were significantly negative for the period in question; since the outburst of the crisis in November 2009, and until the end of our dataset, Greek fixed income mutual funds lost approximately 25% of their net asset value.

[26] Du et al. (2009) provide contradictory results, finding a negative correlation between excess returns and mutual fund family size.

4.5 Investment strategy using performance persistence results

In Section 3.4, we briefly described our objective, which aims at providing direct inferences about portfolio investment strategies to fund of funds managers. Thus, it would be useful to examine the results of an investment strategy, where one would invest in winner funds and avoid poor performers, relying on previous period results. Bialkowski and Otten (2011), after determining "hot hands" for domestically oriented Polish equity and mixed funds, find that an investment strategy of buying last year's top funds and selling last year's worst funds yields an annual return between 13.44% and 17.52%.

Our ex-post investment strategy results, whereby a fund manager would have invested in persistent winners alone, show that superior abnormal returns relative to mean conditional and unconditional alphas could have been achieved. In reality, an investor would have to follow ex-ante winners in one period (whether this is 6, 12, 24, or 36 months) and hopefully be right in his judgment as to how they would perform. Reported alphas are mean conditional alphas of WW funds as reported using all three ranking methodologies. In most cases, the identification of winner funds can produce slightly superior results compared with those derived from the conditional performance model as shown in Table 2. Therefore, if you invest ex-ante, by previously locating winner funds relative to median performance in the recent past, you are likely to achieve above average performance. Moreover, this strategy could at least lead to smaller than average losses in a downside market for bonds as the one experienced in 2009-2012 for Greek bonds.

Results in Table 12 show the ex-post investment strategy results for winners and losers, as measured by conditional alphas. Italy shows significant results with regard to the alternative Sharpe ratio and for the 6-month period when utilizing the Sharpe ratio. Spain is the only country

exhibiting statistically significant results throughout the sample periods and across all models. In the context of the proposed investment strategy, not all three performance ranking methodologies manage to surpass conditional alphas reported in Table 2. More specifically, on an ex-post basis, the conditional CAPM methodology managed to offer higher abnormal returns for winner fund seekers relative to the Sharpe ratio and the alternative Sharpe ratio over all horizons. The Sharpe ratio offers the second best estimates in performance ranking based on the achieved return.

INSERT TABLE 12 APPROXIMATELY HERE

The inability of the Sharpe ratio and especially the alternative Sharpe ratio to identify the best performing funds, as indicated from average outperformance results, is particularly true for most performance persistence measurement horizons in Spain. In the case of Greece and Portugal, derived differences in potential returns are very small among the different ranking methodologies, and are not significant. In Italy, by relying on performance persistence results derived from the Sharpe ratio approach in the short-term horizon, we observe that an annual outperformance of 0.44% could be achieved. In contrast, when following persistent winner funds, as reported by the alternative Sharpe ratio method, outperformance would only amount to 0.10% per annum.

Spanish persistent winners fund managers outperform the conditional CAPM averages for all horizons. However, returns are much smaller as we move from short-term to medium- and long-term horizons. During longer horizons, the conditional CAPM fund ranking methodology provides statistically significant outperformance only slightly above mean conditional CAPM values. More specifically, abnormal returns of 0.36% and 0.26% can be achieved by relying on performance persistence estimates over 12-month and 24-month periods. In contrast, the Sharpe ratio and alternative Sharpe ratio estimates furnish, on average, negative results. Consequently,

in this case, a strategy whereby one would choose to fully replicate the universe of mutual funds with the same investment objectives, could potentially prove more profitable than investing in persistent winners.

Unreported results for the ex-post investment strategy show that the early evidence of the recent debt crisis appear to positively affect the ability of persistent winner funds to boost overall returns. In 2010, for Italy, when exploiting short-term performance persistence using Sharpe ratio estimates, outperformance exceeds the 1% margin, whereas throughout the 11-year period it is just over 0.4%. This finding is particularly strong in the cases of Spain and Portugal with notable positive returns in 2010, when opting to follow the identified as winner funds for that period. Collectively, ex-post analysis, during this first year of the debt crisis period, reveals potentially abnormal returns being achieved for all sample countries.

Overall, following the suggested investment strategy, a well-diversified portfolio of investment ingredients from the PIGS fixed income markets could achieve above average performance. This ability, however, is not definite. Some below average conditional model alphas observable especially when using the long-term performance persistence results, critically underline that the ex-post investment strategy is not an “always right” investment policy. The possibility of abnormal returns may be increased by investing in Spanish WW bond funds, as shown from the conditional CAPM fund ranking method. Besides the conditional CAPM, no guaranteed above average performance can be achieved by investing in winner funds.

The above normal positive coefficients could potentially indicate the existence of some managerial skills as those identified by Du et al. (2009). Moreover, the horizon parameter of performance persistence results plays a critical role in determining the ability of the suggested

strategy to produce above average performance since abnormal returns gradually diminish over the long-run.

Table 12 also reports mean conditional alpha returns of a strategy of investing in continuous loser funds. The derived results for LL funds serve as a good indication of what one may "suffer" if he fails to avoid those funds, which are apparently the norm in our overall sample.

To determine statistical significance of the differences in the derived results for winner and loser funds, we perform equality tests utilizing the two-tailed test for differences in means and the Wilcoxon Mann-Whitney test for differences in medians. Results, outlined in Table 13, underline the robustness of the findings in Table 12, of statistically significant outperformance of the strategy of investing in winners relative to losers, especially for Italian and Spanish fund managers.

INSERT TABLE 13 APPROXIMATELY HERE

5. Conclusions

It is an open question whether performance persistence is observable in government debt mutual funds, and whether a potential exploitation of such clues can produce sustainable investment management strategies in fixed income securities. The eurozone debt crisis points the finger to fund managers, among others, to come up with potentially abnormal profits or in some cases at least achieve smaller than expected losses, as in the case of the Greek debt restructuring of 2012.

Our analysis utilizes the Sharpe ratio modification, previously implemented on bond funds, to assess performance persistence consistency relative to the original Sharpe ratio. The conditional CAPM is also used to test for performance persistence as in Bauer et al. (2006).

Empirical evidence signals that average bond funds' alphas are close to zero, falling short of offering noteworthy risk-adjusted profits that exceed the returns of the benchmark index. However, conditional alphas' distribution marginally shifts to the right region of performance, when compared with the unconditional Jensen model, as in Silva et al. (2003). The conditional variables employed are in some cases statistically significant, with short-term interest rates negatively affecting fixed income portfolio returns.

The outcome of performance persistence testing points towards the conditional alpha approach and the alternative Sharpe ratio methodology producing almost identical results. Both approaches lean towards negative performance persistence with results appearing more robust for the alternative Sharpe ratio over the short-run horizon. This finding is in line with Agudo and Magallon (2005) who apply, however, the Jensen's alpha in lieu of the conditional CAPM. Positive performance persistence is found, on average, when using the traditional Sharpe ratio, thus appearing to provide a contradiction to the CAPM fund ranking. This result, by itself, creates skepticism on the ability of one performance measurement methodology alone to provide consistent performance ranking results (Ornelas et al., 2012), especially during periods of negative returns as the one confronted in South European debt instruments in recent years.

Furthermore, performance persistence is undeniably observable at medium- to long-term intervals, with results supporting primarily negative performance persistence for Spain and Italy. The empirical evidence that indicates consistency in Spanish bond fund performance corroborate those found by Silva et al. (2005). As suggested by the ex-post investment strategy results, higher mean alphas can be achieved when utilizing the conditional alpha fund ranking methodology. However, if we focus on the latter methodology's evidence, from the medium- to long-run horizon, performance persistence gradually diminishes, in line with Bollen and Busse

(2005). Short-term performance persistence is significantly weaker during the 2009-2010 period, a result that is seemingly related to falling bond prices, especially in Greece.

Despite the fact that performance persistence is relatively weaker in long-term horizons, our findings allow us to infer that performance persistence phenomena could be exploited in the context of an ex-post strategy of investing in persistent winners, especially when using 6-month performance persistence testing. The recent eurozone debt crisis does not seem to limit such opportunities, since the suggested strategy managed to bring about even more positive results. Comparative testing, of average conditional alphas achieved when investing ex-post in persistent winner funds relative to persistent losers, further strengthens our findings. Nonetheless, differences in average outperformance across different horizons casts reasonable doubts as to whether performance persistence evidence is exploitable under all fund ranking methodologies and for all examined horizons.

To sum up, it is natural for international fixed income portfolio managers to be skeptical in investing in government debt in Southern Europe. However, as recent evidence regarding falling bond yields show (The Financial Times, 2014), in the long-run it is inevitable that markets will resume smooth operation. We present new evidence that could possibly be implemented in an investment strategy, whereby continuously winning portfolios could be selected in favor of poor performing ones. While achieving acceptable diversification levels, fund managers could potentially ensure above average performance on an ex-ante basis, bearing though in mind that the ability to beat the market is marginally possible. These findings could be generalized on different datasets, comprised of global government debt or investment-grade corporate debt investment instruments. However, this remains to be determined by future research.

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Appendix

Table 1. Summary statistics for the sample of PIGS fixed income mutual funds.

	No of funds	Surviving	Non surviving	Average Net Assets (in € millions)	Average annual returns (%)
Italy	314	82	232	171.15	2.65
Spain	202	89	113	86.93	2.24
Portugal	24	9	15	64.10	2.25
Greece	39	14	25	56.49	0.47

Data spans the period 2000-2010. Average Net Assets denotes average assets under management as at 31/12/2010 for surviving funds. The investment focus of included funds is domestic government bonds. Average annual return for Greece was 2.96% when examining the period before the European debt crisis began (2000-2009).

Table 2. Summary performance results for the period 2000-2010.

	Unconditional model				Conditional model			
	Alpha (α)	**SD (α)**	**Beta**	**R^2**	**Alpha (α)**	**SD (α)**	**Beta**	**R^2**
Italy	-0.0001**	0.0363	0.1980	0.4213	0.0001**	0.0356	0.4167	0.4509
Spain	-0.0012**	0.0220	0.1054	0.3681	-0.0012**	0.0215	0.1282	0.4054
Portugal	-0.0018***	0.0181	0.0820	0.4163	-0.0016***	0.0172	0.2516	0.3503
Greece	-0.0011	0.0446	0.3002	0.5754	-0.0003	0.0409	0.2010	0.6399

Results depict the reported by model 3 and model 4 mean alphas of funds in each country. The coefficient beta measures funds' systematic risk, while R squared results report the average adjusted R squared.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 3. Cross-sectional averages of the conditional variable coefficients.

	Italy	Spain	Portugal	Greece
Term structure	-0.8193	0.1726	-0.2742	-0.1225**
Short-term interest rate	-0.5207	-0.0226	-0.2338*	-0.0209*
Dividend yield	0.1893	-0.1282	-0.6608	0.3814**
Default risk	0.2619	-0.1352	-0.2988	0.1476**
January dummy	0.0120	-0.0398	-0.1104	1.1687

In this table the results related to public information variables coefficients are reported, as derived from model 4 empirical testing. Dividend yield represents the respective dividend yield impact for each country; Term structure measures the difference in the yield of 10-year government bonds relative to a 3-month note; Short-term interest rate is the 3-month note yield; Default risk measures the difference in returns between BBB- and AAA-rated corporate bonds, while the January dummy represents the January effect coefficient estimate. Variables are appropriately demeaned following Ferson and Schadt (1996).
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 4. Number of funds employed during every examination period.

Subperiods	Italy	Spain	Portugal	Greece
01/01/2000-31/12/2000	216	143	23	26
01/07/2000-30/06/2001	234	161	19	32
01/01/2001-31/12/2001	241	168	20	29
01/07/2001-30/06/2002	228	155	18	36
01/01/2002-31/12/2002	226	153	16	38
01/07/2002-30/06/2003	212	139	20	33
01/01/2003-31/12/2003	220	147	22	28
01/07/2003-30/06/2004	207	134	21	26
01/01/2004-31/12/2004	202	129	23	24
01/07/2004-30/06/2005	190	117	20	25
01/01/2005-31/12/2005	200	127	19	21
01/07/2005-30/06/2006	196	123	17	24
01/01/2006-31/12/2006	204	131	19	21
01/07/2006-30/06/2007	188	115	18	27
01/01/2007-31/12/2007	183	110	20	25
01/07/2007-30/06/2008	195	122	21	22
01/01/2008-31/12/2008	187	114	19	19
01/07/2008-30/06/2009	179	106	19	23
01/01/2009-31/12/2009	175	102	17	18
01/07/2009-30/06/2010	172	99	17	17
01/01/2010-31/12/2010	170	97	16	15
Average	**201**	**128**	**19**	**25**

This table shows the number of funds used in performance persistence estimates. The number of funds included in our calculations for each subperiod differs, depending on the funds' attrition rate. Funds are included in every examination period if they contain net asset value data for at least one month for each of the two six-monthly periods.

Table 5. Results of persistence using the original Sharpe ratio for 6-month horizons.

	Sharpe ratio															
	Italy				Spain				Portugal				Greece			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2000	**53.66**	**25.61**	**14.63**	**6.10**	**68.54**	**28.09**	**2.25**	**1.12**	**44.44**	**33.33**	**11.11**	**11.11**	28.57	35.71	14.29	21.43
01/07/2000-30/06/2001	42.68	25.61	6.10	25.61	**69.66**	**23.60**	**5.62**	**1.12**	**44.44**	**33.33**	**11.11**	**11.11**	42.86	28.57	28.57	0.00
01/01/2001-31/12/2001	26.83	17.07	34.15	21.95	**68.54**	**22.47**	**2.25**	**6.74**	**44.44**	**33.33**	**11.11**	**11.11**	21.43	14.29	14.29	50.00
01/07/2001-30/06/2002	**48.78**	**31.71**	**7.32**	**12.20**	**62.92**	**25.84**	**3.37**	**7.87**	44.44	22.22	22.22	11.11	21.43	28.57	35.71	14.29
01/01/2002-31/12/2002	**45.12**	**36.59**	**7.32**	**10.98**	**62.92**	**25.84**	**7.87**	**3.37**	44.44	22.22	11.11	22.22	42.86	28.57	14.29	14.29
01/07/2002-30/06/2003	**48.78**	**32.93**	**14.63**	**3.66**	**68.54**	**23.60**	**5.62**	**2.25**	44.44	22.22	22.22	11.11	35.71	14.29	28.57	21.43
01/01/2003-31/12/2003	**54.88**	**23.17**	**13.41**	**8.54**	**71.91**	**22.47**	**3.37**	**2.25**	**55.56**	**22.22**	**11.11**	**11.11**	21.43	14.29	21.43	42.86
01/07/2003-30/06/2004	**62.20**	**19.51**	**12.20**	**6.10**	**70.79**	**20.22**	**4.49**	**4.49**	33.33	22.22	11.11	33.33	21.43	28.57	28.57	21.43
01/01/2004-31/12/2004	52.44	23.17	2.44	21.95	**73.03**	**16.85**	**7.87**	**2.25**	33.33	33.33	22.22	11.11	35.71	35.71	14.29	14.29
01/07/2004-30/06/2005	**51.22**	**26.83**	**18.29**	**3.66**	**71.91**	**15.73**	**3.37**	**8.99**	44.44	22.22	22.22	11.11	28.57	28.57	21.43	21.43
01/01/2005-31/12/2005	**60.98**	**26.83**	**3.66**	**8.54**	**67.42**	**20.22**	**4.49**	**7.87**	44.44	22.22	11.11	22.22	42.86	28.57	21.43	7.14
01/07/2005-30/06/2006	**62.20**	**23.17**	**12.20**	**2.44**	**69.66**	**24.72**	**3.37**	**2.25**	33.33	33.33	11.11	22.22	35.71	21.43	14.29	28.57
01/01/2006-31/12/2006	**67.07**	**21.95**	**3.66**	**7.32**	**65.17**	**25.84**	**1.12**	**7.87**	33.33	33.33	22.22	11.11	28.57	35.71	14.29	21.43
01/07/2006-30/06/2007	**64.63**	**21.95**	**7.32**	**6.10**	**65.17**	**30.34**	**3.37**	**1.12**	22.22	22.22	22.22	33.33	**35.71**	**42.86**	**14.29**	**7.14**
01/01/2007-31/12/2007	**62.20**	**20.73**	**7.32**	**9.76**	**62.92**	**28.09**	**3.37**	**5.62**	22.22	33.33	22.22	22.22	35.71	35.71	14.29	14.29
01/07/2007-30/06/2008	**57.32**	**24.39**	**6.10**	**12.20**	**59.55**	**23.60**	**10.11**	**6.74**	33.33	33.33	22.22	11.11	28.57	35.71	14.29	21.43
01/01/2008-31/12/2008	**50.00**	**31.71**	**4.88**	**13.41**	**49.44**	**25.84**	**4.49**	**20.22**	22.22	22.22	22.22	33.33	28.57	35.71	21.43	14.29
01/07/2008-30/06/2009	20.73	17.07	28.05	34.15	32.58	21.35	24.72	21.35	22.22	22.22	33.33	22.22	28.57	21.43	28.57	21.43
01/01/2009-31/12/2009	29.27	35.37	15.85	19.51	**55.06**	**8.99**	**33.71**	**2.25**	22.22	22.22	22.22	33.33	21.43	28.57	14.29	35.71
01/07/2009-30/06/2010	13.41	30.49	24.39	31.71	**68.54**	**8.99**	**2.25**	**20.22**	22.22	33.33	22.22	22.22	14.29	50.00	14.29	21.43
01/01/2010-31/12/2010	21.95	39.02	23.17	15.85	**56.18**	**14.61**	**14.61**	**14.61**	22.22	33.33	22.22	22.22	14.29	42.86	28.57	14.29
Average	**47.44**	**26.42**	**12.72**	**13.41**	**63.83**	**21.78**	**7.22**	**7.17**	34.92	27.51	18.52	19.05	29.25	30.27	20.07	20.41

This table presents in percentage format the segment of funds categorized as WW, WL, LW, and LL for each country in our sample in successive 6-monthly periods, using the original Sharpe ratio for fund ranking. Calculations for fund ranking are, therefore, based on the formula $Sr_i = (r_i - r_f)/\sigma_i$, where the excess portfolio return $r_i - r_f$ is measured per unit of total risk, denoted by the standard deviation σ of the overall returns of the portfolio. Average percentages per segment for the whole period, are provided at the end of the table. Statistically significant performance persistence results at the 5% level for each

consecutive period, based on the Brown and Goetzmann Z statistic and/or Kahn and Rudd chi-squared, are indicated in bold.

Table 6. Results of persistence using the alternative Sharpe ratio for 6-month horizons.

	Alternative Sharpe ratio															
	Italy				**Spain**				**Portugal**				**Greece**			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2000	**26.83**	**68.29**	**4.88**	**0.00**	**30.34**	**67.42**	**2.25**	**0.00**	22.22	33.33	22.22	22.22	21.43	42.86	7.14	28.57
01/07/2000-30/06/2001	**25.61**	**67.07**	**1.22**	**6.10**	**26.97**	**67.42**	**0.00**	**5.62**	33.33	33.33	22.22	11.11	14.29	42.86	28.57	14.29
01/01/2001-31/12/2001	**24.39**	**65.85**	**7.32**	**2.44**	**25.84**	**69.66**	**3.37**	**1.12**	22.22	33.33	11.11	33.33	21.43	50.00	7.14	21.43
01/07/2001-30/06/2002	**26.83**	**65.85**	**2.44**	**4.88**	**24.72**	**65.17**	**5.62**	**4.49**	**22.22**	**55.56**	**11.11**	**11.11**	21.43	35.71	35.71	7.14
01/01/2002-31/12/2002	**24.39**	**60.98**	**9.76**	**4.88**	**20.22**	**61.80**	**7.87**	**10.11**	22.22	44.44	22.22	11.11	28.57	35.71	7.14	28.57
01/07/2002-30/06/2003	**24.39**	**56.10**	**9.76**	**9.76**	**23.60**	**62.92**	**8.99**	**4.49**	22.22	33.33	22.22	22.22	28.57	28.57	35.71	7.14
01/01/2003-31/12/2003	**25.61**	**62.20**	**3.66**	**8.54**	**25.84**	**66.29**	**1.12**	**6.74**	22.22	33.33	22.22	22.22	14.29	14.29	21.43	50.00
01/07/2003-30/06/2004	**20.73**	**67.07**	**3.66**	**8.54**	**22.47**	**70.79**	**2.25**	**4.49**	22.22	22.22	33.33	22.22	14.29	42.86	21.43	21.43
01/01/2004-31/12/2004	**20.73**	**62.20**	**13.41**	**3.66**	**16.85**	**73.03**	**2.25**	**7.87**	22.22	33.33	11.11	33.33	28.57	21.43	42.86	7.14
01/07/2004-30/06/2005	**24.39**	**64.63**	**1.22**	**9.76**	**16.85**	**70.79**	**10.11**	**2.25**	**22.22**	**55.56**	**11.11**	**11.11**	35.71	21.43	7.14	35.71
01/01/2005-31/12/2005	**15.85**	**67.07**	**7.32**	**9.76**	**21.35**	**65.17**	**7.87**	**5.62**	**22.22**	**55.56**	**11.11**	**11.11**	28.57	35.71	21.43	14.29
01/07/2005-30/06/2006	**17.07**	**64.63**	**12.20**	**6.10**	**25.84**	**65.17**	**5.62**	**3.37**	22.22	33.33	33.33	11.11	21.43	21.43	28.57	28.57
01/01/2006-31/12/2006	**19.51**	**70.73**	**0.00**	**9.76**	**30.34**	**64.04**	**4.49**	**1.12**	33.33	22.22	22.22	22.22	21.43	35.71	14.29	28.57
01/07/2006-30/06/2007	**18.29**	**78.05**	**2.44**	**1.22**	**31.46**	**64.04**	**1.12**	**3.37**	33.33	22.22	22.22	22.22	21.43	50.00	14.29	14.29
01/01/2007-31/12/2007	**18.29**	**69.51**	**9.76**	**2.44**	**25.84**	**65.17**	**2.25**	**6.74**	33.33	22.22	22.22	22.22	28.57	42.86	21.43	7.14
01/07/2007-30/06/2008	**25.61**	**69.51**	**2.44**	**2.44**	**21.35**	**65.17**	**6.74**	**6.74**	**44.44**	**33.33**	**11.11**	**11.11**	35.71	35.71	14.29	14.29
01/01/2008-31/12/2008	**19.51**	**41.46**	**30.49**	**8.54**	**19.10**	**65.17**	**6.74**	**8.99**	33.33	22.22	22.22	22.22	14.29	21.43	28.57	35.71
01/07/2008-30/06/2009	25.61	29.27	20.73	24.39	**20.22**	**57.30**	**16.85**	**5.62**	33.33	22.22	22.22	22.22	21.43	21.43	35.71	21.43
01/01/2009-31/12/2009	30.49	39.02	14.63	15.85	**21.35**	**49.44**	**13.48**	**15.73**	33.33	22.22	22.22	22.22	28.57	28.57	14.29	28.57
01/07/2009-30/06/2010	**10.98**	**30.49**	**24.39**	**34.15**	14.61	48.31	16.85	20.22	22.22	11.11	33.33	33.33	14.29	42.86	14.29	28.57
01/01/2010-31/12/2010	14.63	35.37	29.27	20.73	13.48	57.30	11.24	17.98	22.22	22.22	22.22	33.33	14.29	42.86	28.57	14.29
Average	**21.89**	**58.83**	**10.05**	**9.23**	**22.79**	**63.88**	**6.53**	**6.80**	26.98	31.75	20.63	20.63	22.79	34.01	21.43	21.77

This table presents in percentage format the segment of funds categorized as WW, WL, LW, and LL for each country in our sample in successive 6-monthly periods, using the Agudo-Marzal modification of the Sharpe ratio. Fund ranking calculations take the form of $Sr_i^{AM} = (r_i / r_f) / \sigma_i$ whereby we calculate excess returns in relative rather than absolute terms. Average percentages per segment for the whole period are provided at the end of the table. Statistically significant performance persistence results at the 5% level for each consecutive period, based on the Brown and Goetzmann Z statistic and/or Kahn and Rudd chi-squared, are indicated in bold.

Table 7. Results of persistence using conditional CAPM model for 6-month horizons.

	Conditional CAPM															
	Italy				**Spain**				**Portugal**				**Greece**			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2000	**23.17**	**68.29**	**0.00**	**8.54**	24.72	40.45	21.35	13.48	22.22	22.22	22.22	33.33	14.29	35.71	42.86	7.14
01/07/2000-30/06/2001	**20.73**	**71.95**	**4.88**	**2.44**	39.33	8.99	44.94	6.74	**33.33**	**44.44**	**11.11**	**11.11**	35.71	28.57	14.29	21.43
01/01/2001-31/12/2001	**8.54**	**19.51**	**54.88**	**17.07**	80.90	15.73	0.00	3.37	**33.33**	**44.44**	**11.11**	**11.11**	35.71	35.71	14.29	14.29
01/07/2001-30/06/2002	**58.54**	**28.05**	**8.54**	**4.88**	**74.16**	**11.24**	**7.87**	**6.74**	22.22	33.33	22.22	22.22	**42.86**	**42.86**	**7.14**	**7.14**
01/01/2002-31/12/2002	31.71	21.95	10.98	35.37	30.34	8.99	8.99	51.69	11.11	33.33	22.22	33.33	42.86	50.00	0.00	7.14
01/07/2002-30/06/2003	23.17	36.59	20.73	19.51	**22.47**	**49.44**	**11.24**	**16.85**	11.11	44.44	22.22	22.22	14.29	14.29	42.86	28.57
01/01/2003-31/12/2003	30.49	29.27	26.83	13.41	**19.10**	**62.92**	**3.37**	**14.61**	22.22	44.44	22.22	11.11	21.43	21.43	21.43	35.71
01/07/2003-30/06/2004	47.56	15.85	26.83	9.76	**20.22**	**61.80**	**15.73**	**2.25**	22.22	44.44	11.11	22.22	28.57	28.57	28.57	14.29
01/01/2004-31/12/2004	39.02	20.73	4.88	35.37	**22.47**	**55.06**	**8.99**	**13.48**	22.22	33.33	33.33	11.11	35.71	21.43	21.43	21.43
01/07/2004-30/06/2005	19.51	40.24	15.85	24.39	**20.22**	**65.17**	**3.37**	**11.24**	22.22	33.33	11.11	33.33	42.86	42.86	0.00	14.29
01/01/2005-31/12/2005	18.29	47.56	17.07	17.07	**16.85**	**70.79**	**5.62**	**6.74**	**22.22**	**55.56**	**11.11**	**11.11**	42.86	28.57	28.57	0.00
01/07/2005-30/06/2006	25.61	24.39	40.24	9.76	**16.85**	**74.16**	**3.37**	**5.62**	22.22	44.44	22.22	11.11	**64.29**	**21.43**	**7.14**	**7.14**
01/01/2006-31/12/2006	32.93	23.17	10.98	32.93	**16.85**	**77.53**	**2.25**	**3.37**	22.22	44.44	11.11	22.22	21.43	14.29	14.29	50.00
01/07/2006-30/06/2007	23.17	9.76	46.34	20.73	10.11	37.08	43.82	8.99	22.22	44.44	22.22	11.11	14.29	21.43	42.86	21.43
01/01/2007-31/12/2007	41.46	14.63	15.85	28.05	15.73	15.73	30.34	38.20	22.22	11.11	44.44	22.22	21.43	21.43	21.43	35.71
01/07/2007-30/06/2008	**46.34**	**24.39**	**18.29**	**10.98**	39.33	20.22	33.71	6.74	55.56	22.22	11.11	11.11	28.57	28.57	28.57	14.29
01/01/2008-31/12/2008	**40.24**	**25.61**	**9.76**	**24.39**	**53.93**	**23.60**	**3.37**	**19.10**	55.56	22.22	11.11	11.11	42.86	28.57	14.29	14.29
01/07/2008-30/06/2009	4.88	23.17	26.83	45.12	19.10	25.84	16.85	38.20	55.56	22.22	11.11	11.11	28.57	14.29	28.57	28.57
01/01/2009-31/12/2009	19.51	46.34	21.95	12.20	**24.72**	**60.67**	**3.37**	**11.24**	11.11	11.11	22.22	55.56	28.57	0.00	42.86	28.57

01/07/2009-30/06/2010	**28.05**	**53.66**	**4.88**	**13.41**	15.73	38.20	33.71	12.36	22.22	44.44	22.22	11.11	50.00	7.14	21.43	21.43
01/01/2010-31/12/2010	19.51	2.44	64.63	13.41	28.09	39.33	11.24	21.35	33.33	22.22	33.33	11.11	28.57	14.29	14.29	42.86
Average	28.69	30.84	21.49	18.99	**29.11**	**41.09**	**14.93**	**14.87**	26.98	34.39	19.58	19.05	32.65	24.83	21.77	20.75

This table presents in percentage format the segment of funds categorized as WW, WL, LW, and LL for each country in our sample in successive 6-monthly periods, using model 4 for fund ranking. The conditional CAPM used takes the form of $R_{p,t} = \alpha_p + \beta_p R_{m,t} + \delta_p (R_{m,t} z_{t-1}) + \varepsilon_{p,t}$. Average percentages per segment for the whole period, are provided at the end of the table. Statistically significant performance persistence results at the 5% level for each consecutive period, based on the Brown and Goetzmann Z statistic and/or Kahn and Rudd chi-squared, are indicated in bold.

Table 8. Collective results of persistence using all three fund ranking methodologies in 12-month horizons.

Sharpe ratio																
	Italy				**Spain**				**Portugal**				**Greece**			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2001	**50.00**	**26.83**	**10.98**	**12.20**	**69.66**	**28.09**	**2.25**	**0.00**	**44.44**	**33.33**	**11.11**	**11.11**	28.57	42.86	28.57	0.00
01/01/2001-31/12/2002	40.24	24.39	14.63	20.73	**69.66**	**25.84**	**2.25**	**2.25**	**44.44**	**22.22**	**22.22**	**11.11**	42.86	28.57	14.29	14.29
01/01/2002-31/12/2003	**51.22**	**32.93**	**12.20**	**3.66**	**68.54**	**26.97**	**1.12**	**3.37**	55.56	22.22	11.11	11.11	28.57	28.57	14.29	28.57
01/01/2003-31/12/2004	**56.10**	**20.73**	**15.85**	**7.32**	**69.66**	**22.47**	**7.87**	**0.00**	44.44	22.22	11.11	22.22	21.43	35.71	21.43	21.43
01/01/2004-31/12/2005	**63.41**	**24.39**	**3.66**	**8.54**	**70.79**	**20.22**	**2.25**	**6.74**	44.44	22.22	22.22	11.11	35.71	35.71	21.43	7.14
01/01/2005-31/12/2006	**65.85**	**28.05**	**4.88**	**1.22**	**66.29**	**25.84**	**1.12**	**6.74**	33.33	22.22	11.11	33.33	**42.86**	**35.71**	**7.14**	**14.29**
01/01/2006-31/12/2007	**64.63**	**23.17**	**6.10**	**6.10**	**66.29**	**30.34**	**2.25**	**1.12**	33.33	33.33	22.22	11.11	35.71	28.57	21.43	14.29
01/01/2007-31/12/2008	50.00	21.95	7.32	20.73	**53.93**	**22.47**	**8.99**	**14.61**	33.33	33.33	11.11	22.22	**50.00**	**28.57**	**14.29**	**7.14**
01/01/2008-31/12/2009	21.95	14.63	28.05	35.37	42.70	17.98	19.10	20.22	**11.11**	**11.11**	**44.44**	**33.33**	21.43	21.43	14.29	42.86
01/01/2009-31/12/2010	18.29	23.17	26.83	31.71	46.07	16.85	21.35	15.73	11.11	22.22	22.22	44.44	21.43	35.71	28.57	14.29
Average	48.17	24.02	13.05	14.76	**62.36**	**23.71**	**6.85**	**7.08**	35.56	24.44	18.89	21.11	32.86	32.14	18.57	16.43
Alternative Sharpe ratio																
	Italy				**Spain**				**Portugal**				**Greece**			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2001	**29.27**	**69.51**	**0.00**	**1.22**	**30.34**	**67.42**	**0.00**	**2.25**	33.33	33.33	22.22	11.11	21.43	42.86	21.43	14.29

01/01/2001-31/12/2002	**24.39**	**64.63**	**6.10**	**4.88**	**28.09**	**66.29**	**3.37**	**2.25**	22.22	33.33	11.11	33.33	**35.71**	**50.00**	**7.14**	**7.14**
01/01/2002-31/12/2003	**20.73**	**59.76**	**9.76**	**9.76**	**29.21**	**64.04**	**4.49**	**2.25**	22.22	33.33	33.33	11.11	14.29	28.57	28.57	28.57
01/01/2003-31/12/2004	**24.39**	**64.63**	**4.88**	**6.10**	**22.47**	**66.29**	**0.00**	**11.24**	33.33	22.22	22.22	22.22	35.71	35.71	21.43	7.14
01/01/2004-31/12/2005	**15.85**	**68.29**	**2.44**	**13.41**	**21.35**	**71.91**	**5.62**	**1.12**	22.22	33.33	11.11	33.33	42.86	28.57	14.29	14.29
01/01/2005-31/12/2006	**15.85**	**71.95**	**9.76**	**2.44**	**25.84**	**65.17**	**7.87**	**1.12**	22.22	22.22	44.44	11.11	28.57	35.71	7.14	28.57
01/01/2006-31/12/2007	**20.73**	**68.29**	**6.10**	**4.88**	**29.21**	**65.17**	**1.12**	**4.49**	33.33	22.22	11.11	33.33	21.43	42.86	21.43	14.29
01/01/2007-31/12/2008	**23.17**	**56.10**	**17.07**	**3.66**	**23.60**	**65.17**	**4.49**	**6.74**	**33.33**	**44.44**	**11.11**	**11.11**	35.71	28.57	28.57	7.14
01/01/2008-31/12/2009	29.27	37.80	21.95	10.98	**21.35**	**55.06**	**16.85**	**6.74**	33.33	33.33	22.22	11.11	21.43	14.29	21.43	42.86
01/01/2009-31/12/2010	17.07	21.95	26.83	34.15	15.73	58.43	3.37	22.47	22.22	22.22	22.22	33.33	21.43	28.57	28.57	21.43
Average	**22.07**	**58.29**	**10.49**	**9.15**	**24.72**	**64.49**	**4.72**	**6.07**	27.78	30.00	21.11	21.11	27.86	33.57	20.00	18.57

Conditional CAPM

	Italy				**Spain**				**Portugal**				**Greece**			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2001	15.85	34.15	39.02	10.98	**71.91**	**14.61**	**10.11**	**3.37**	22.22	33.33	22.22	22.22	21.43	35.71	28.57	14.29
01/01/2001-31/12/2002	39.02	24.39	20.73	15.85	47.19	12.36	5.62	34.83	22.22	33.33	22.22	22.22	**42.86**	**42.86**	**7.14**	**7.14**
01/01/2002-31/12/2003	37.80	25.61	14.63	21.95	19.10	34.83	12.36	33.71	22.22	33.33	22.22	22.22	21.43	21.43	28.57	28.57
01/01/2003-31/12/2004	**42.68**	**43.90**	**3.66**	**9.76**	**25.84**	**60.67**	**7.87**	**5.62**	**33.33**	**44.44**	**11.11**	**11.11**	35.71	28.57	21.43	14.29
01/01/2004-31/12/2005	25.61	35.37	18.29	20.73	**21.35**	**60.67**	**5.62**	**12.36**	22.22	44.44	11.11	22.22	35.71	21.43	21.43	21.43
01/01/2005-31/12/2006	28.05	26.83	29.27	15.85	**15.73**	**68.54**	**4.49**	**11.24**	**22.22**	**55.56**	**11.11**	**11.11**	**42.86**	**35.71**	**7.14**	**14.29**
01/01/2006-31/12/2007	35.37	18.29	24.39	21.95	6.74	26.97	52.81	13.48	22.22	22.22	44.44	11.11	35.71	21.43	28.57	14.29
01/01/2007-31/12/2008	39.02	29.27	10.98	20.73	**50.56**	**28.09**	**12.36**	**8.99**	**55.56**	**22.22**	**11.11**	**11.11**	**57.14**	**28.57**	**7.14**	**7.14**
01/01/2008-31/12/2009	**6.10**	**20.73**	**29.27**	**43.90**	**12.36**	**17.98**	**19.10**	**50.56**	44.44	22.22	11.11	22.22	28.57	14.29	21.43	35.71
01/01/2009-31/12/2010	15.85	45.12	19.51	19.51	19.10	41.57	26.97	12.36	22.22	22.22	22.22	33.33	28.57	14.29	35.71	21.43
Average	28.54	30.37	20.98	20.12	**28.99**	**36.63**	**15.73**	**18.65**	28.89	33.33	18.89	18.89	35.00	26.43	20.71	17.86

This table presents in percentage format the segment of funds categorized as WW, WL, LW, and LL for each country in our sample in successive 12-month periods, using all three fund ranking methodologies employed throughout the paper. Average percentages per segment for the whole period, are provided at the end of the table. Statistically significant performance persistence results at the 5% level for each consecutive period, based on the Brown and Goetzmann Z statistic and/or Kahn and Rudd chi-squared, are indicated in bold.

Table 9. Collective results of persistence using all three fund ranking methodologies in 24-month horizons.

	Sharpe ratio															
	Italy				Spain				Portugal				Greece			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2003	40.24	18.29	19.51	21.95	**68.54**	**28.09**	**1.12**	**2.25**	44.44	22.22	22.22	11.11	28.57	28.57	21.43	21.43
01/01/2001-31/12/2004	**50.00**	**26.83**	**14.63**	**8.54**	**68.54**	**26.97**	**2.25**	**2.25**	44.44	22.22	11.11	22.22	35.71	21.43	14.29	28.57
01/01/2002-31/12/2005	46.34	17.07	23.17	13.41	**67.42**	**21.35**	**8.99**	**2.25**	**55.56**	**22.22**	**11.11**	**11.11**	28.57	28.57	21.43	21.43
01/01/2003-31/12/2006	48.78	15.85	19.51	15.85	**67.42**	**26.97**	**2.25**	**3.37**	33.33	22.22	22.22	22.22	35.71	35.71	14.29	14.29
01/01/2004-31/12/2007	**62.20**	**23.17**	**7.32**	**7.32**	**64.04**	**23.60**	**0.00**	**12.36**	33.33	11.11	22.22	33.33	35.71	28.57	21.43	14.29
01/01/2005-31/12/2008	51.22	20.73	10.98	17.07	**60.67**	**26.97**	**3.37**	**8.99**	33.33	22.22	22.22	22.22	35.71	14.29	35.71	14.29
01/01/2006-31/12/2009	47.56	18.29	12.20	21.95	**50.56**	**28.09**	**7.87**	**13.48**	22.22	22.22	22.22	33.33	35.71	35.71	7.14	21.43
01/01/2007-31/12/2010	20.73	20.73	17.07	41.46	**48.31**	**25.84**	**10.11**	**15.73**	22.22	11.11	33.33	33.33	35.71	21.43	7.14	35.71
Average	45.88	20.12	15.55	18.45	**61.94**	**25.98**	**4.49**	**7.58**	36.11	19.44	20.83	23.61	33.93	26.79	17.86	21.43

	Alternative Sharpe ratio															
	Italy				Spain				Portugal				Greece			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2003	**26.83**	**64.63**	**6.10**	**2.44**	**29.21**	**65.17**	**3.37**	**2.25**	22.22	33.33	22.22	22.22	28.57	35.71	21.43	14.29
01/01/2001-31/12/2004	**21.95**	**64.63**	**4.88**	**8.54**	**29.21**	**66.29**	**2.25**	**2.25**	**33.33**	**44.44**	**11.11**	**11.11**	21.43	35.71	21.43	21.43
01/01/2002-31/12/2005	20.73	65.85	1.22	12.20	**25.84**	**66.29**	**1.12**	**6.74**	22.22	33.33	22.22	22.22	**42.86**	**35.71**	**14.29**	**7.14**
01/01/2003-31/12/2006	**21.95**	**69.51**	**3.66**	**4.88**	**31.46**	**67.42**	**1.12**	**0.00**	33.33	33.33	22.22	11.11	21.43	35.71	21.43	21.43
01/01/2004-31/12/2007	**19.51**	**73.17**	**4.88**	**2.44**	**25.84**	**66.29**	**6.74**	**1.12**	22.22	33.33	22.22	22.22	28.57	28.57	14.29	28.57
01/01/2005-31/12/2008	**21.95**	**62.20**	**12.20**	**3.66**	**23.60**	**62.92**	**4.49**	**8.99**	22.22	22.22	22.22	33.33	42.86	35.71	21.43	0.00
01/01/2006-31/12/2009	**23.17**	**64.63**	**10.98**	**1.22**	**24.72**	**60.67**	**6.74**	**7.87**	**33.33**	**44.44**	**11.11**	**11.11**	21.43	35.71	21.43	21.43
01/01/2007-31/12/2010	17.07	41.46	24.39	17.07	**15.73**	**59.55**	**12.36**	**12.36**	33.33	33.33	22.22	11.11	21.43	14.29	21.43	42.86
Average	**21.65**	**63.26**	**8.54**	**6.55**	**25.70**	**64.33**	**4.78**	**5.20**	27.78	34.72	19.44	18.06	28.57	32.14	19.64	19.64

	Conditional CAPM															
	Italy				Spain				Portugal				Greece			

Subperiods	WW	LL	LW	WL	WW	LL	LW	WL	WW	LL	LW	WL	WW	LL	LW	WL
01/01/2000-31/12/2003	24.39	24.39	36.59	14.63	38.20	10.11	10.11	41.57	22.22	22.22	33.33	22.22	14.29	35.71	21.43	28.57
01/01/2001-31/12/2004	32.93	31.71	15.85	19.51	**12.36**	**7.87**	**11.24**	**68.54**	22.22	44.44	22.22	11.11	28.57	28.57	14.29	28.57
01/01/2002-31/12/2005	26.83	19.51	19.51	34.15	23.60	44.94	6.74	24.72	33.33	33.33	11.11	22.22	28.57	42.86	21.43	7.14
01/01/2003-31/12/2006	**34.15**	**48.78**	**2.44**	**14.63**	**16.85**	**70.79**	**5.62**	**6.74**	**33.33**	**44.44**	**11.11**	**11.11**	35.71	35.71	21.43	7.14
01/01/2004-31/12/2007	28.05	20.73	32.93	18.29	**14.61**	**65.17**	**4.49**	**15.73**	22.22	11.11	44.44	22.22	21.43	35.71	14.29	28.57
01/01/2005-31/12/2008	17.07	21.95	41.46	19.51	7.87	26.97	50.56	14.61	22.22	11.11	44.44	22.22	28.57	14.29	28.57	28.57
01/01/2006-31/12/2009	26.83	24.39	14.63	34.15	12.36	42.70	38.20	6.74	**55.56**	**22.22**	**11.11**	**11.11**	35.71	35.71	28.57	0.00
01/01/2007-31/12/2010	17.07	23.17	18.29	41.46	19.10	23.60	17.98	39.33	22.22	11.11	22.22	44.44	35.71	21.43	21.43	21.43
Average	25.91	26.83	22.71	24.54	**18.12**	**36.52**	**18.12**	**27.25**	29.17	25.00	25.00	20.83	28.57	31.25	21.43	18.75

This table presents in percentage format the segment of funds categorized as WW, WL, LW, and LL for each country in our sample in successive 24-month periods, using all three fund ranking methodologies employed throughout the paper. Average percentages per segment for the whole period, are provided at the end of the table. Statistically significant performance persistence results for each consecutive period, based on the Brown and Goetzmann Z statistic and/or Kahn and Rudd chi-squared, are indicated in bold.

Table 10. Collective results of persistence using all three fund ranking methodologies in 36-month horizons.

	Sharpe ratio															
	Italy				**Spain**				**Portugal**				**Greece**			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2005	**58.54**	**20.73**	**14.63**	**6.10**	**69.66**	**26.97**	**2.25**	**1.12**	44.44	22.22	22.22	11.11	28.57	28.57	21.43	21.43
01/01/2001-31/12/2006	43.90	15.85	26.83	13.41	**67.42**	**26.97**	**2.25**	**3.37**	33.33	22.22	22.22	22.22	28.57	21.43	14.29	35.71
01/01/2002-31/12/2007	45.12	15.85	21.95	17.07	**61.80**	**26.97**	**1.12**	**10.11**	33.33	22.22	11.11	33.33	**42.86**	**35.71**	**7.14**	**14.29**
01/01/2003-31/12/2008	**59.76**	**21.95**	**4.88**	**13.41**	**58.43**	**23.60**	**4.49**	**13.48**	33.33	11.11	22.22	33.33	42.86	28.57	21.43	7.14
01/01/2004-31/12/2009	52.44	17.07	12.20	18.29	**55.06**	**24.72**	**5.62**	**14.61**	33.33	22.22	22.22	22.22	28.57	35.71	21.43	14.29
01/01/2005-31/12/2010	47.56	20.73	12.20	19.51	**50.56**	**30.34**	**6.74**	**12.36**	22.22	33.33	22.22	22.22	28.57	28.57	21.43	21.43
Average	51.22	18.70	15.45	14.63	**60.49**	**26.59**	**3.75**	**9.18**	33.33	22.22	20.37	24.07	33.33	29.76	17.86	19.05
	Alternative Sharpe ratio															
	Italy				**Spain**				**Portugal**				**Greece**			

Subperiods	WW	LL	LW	WL	WW	LL	LW	WL	WW	LL	LW	WL	WW	LL	LW	WL
01/01/2000-31/12/2005	**20.73**	**64.63**	**4.88**	**9.76**	**29.21**	**65.17**	**2.25**	**3.37**	22.22	44.44	22.22	11.11	28.57	35.71	14.29	21.43
01/01/2001-31/12/2006	**24.39**	**64.63**	**2.44**	**8.54**	**30.34**	**64.04**	**2.25**	**3.37**	33.33	22.22	22.22	22.22	**42.86**	**35.71**	**7.14**	**14.29**
01/01/2002-31/12/2007	**23.17**	**67.07**	**1.22**	**8.54**	**29.21**	**65.17**	**3.37**	**2.25**	**33.33**	**44.44**	**11.11**	**11.11**	21.43	28.57	28.57	21.43
01/01/2003-31/12/2008	**20.73**	**62.20**	**12.20**	**4.88**	**23.60**	**65.17**	**3.37**	**7.87**	22.22	33.33	22.22	22.22	21.43	21.43	35.71	21.43
01/01/2004-31/12/2009	**21.95**	**60.98**	**12.20**	**4.88**	**24.72**	**60.67**	**6.74**	**7.87**	22.22	22.22	22.22	33.33	28.57	21.43	28.57	21.43
01/01/2005-31/12/2010	21.95	57.32	18.29	2.44	**23.60**	**59.55**	**7.87**	**8.99**	33.33	33.33	22.22	11.11	21.43	21.43	28.57	28.57
Average	**22.15**	**62.80**	**8.54**	**6.50**	**26.78**	**63.30**	**4.31**	**5.62**	27.78	33.33	20.37	18.52	27.38	27.38	23.81	21.43

Conditional CAPM

	Italy				Spain				Portugal				Greece			
Subperiods	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**	**WW**	**LL**	**LW**	**WL**
01/01/2000-31/12/2005	23.17	39.02	13.41	24.39	**11.24**	**7.87**	**13.48**	**67.42**	22.22	33.33	22.22	22.22	28.57	21.43	14.29	35.71
01/01/2001-31/12/2006	28.05	30.49	13.41	28.05	10.11	35.96	14.61	39.33	**33.33**	**44.44**	**11.11**	**11.11**	28.57	28.57	14.29	28.57
01/01/2002-31/12/2007	32.93	23.17	8.54	35.37	20.22	49.44	7.87	22.47	22.22	33.33	22.22	22.22	28.57	28.57	28.57	14.29
01/01/2003-31/12/2008	18.29	23.17	40.24	18.29	10.11	26.97	48.31	14.61	22.22	11.11	44.44	22.22	28.57	21.43	35.71	14.29
01/01/2004-31/12/2009	19.51	26.83	31.71	21.95	12.36	37.08	38.20	12.36	22.22	11.11	44.44	22.22	28.57	28.57	28.57	14.29
01/01/2005-31/12/2010	23.17	42.68	15.85	18.29	19.10	42.70	29.21	8.99	33.33	22.22	33.33	11.11	**50.00**	**28.57**	**14.29**	**7.14**
Average	24.19	30.89	20.53	24.39	13.86	33.33	25.28	27.53	25.93	25.93	29.63	18.52	32.14	26.19	22.62	19.05

This table presents in percentage format the segment of funds categorized as WW, WL, LW, and LL for each country in our sample in successive 36-month periods, using all three fund ranking methodologies. Average percentages per segment for the whole period, are provided at the end of the table. Statistically significant performance persistence results for each consecutive period, based on the Brown and Goetzmann Z statistic and/or Kahn and Rudd chi-squared, are indicated in bold.

Table 11. Aggregate performance persistence non-parametric test results over all horizons.

	Sharpe ratio		Alternative Sharpe ratio		Conditional CAPM	
Subperiods	**B & G Z statistic**	**K & R X^2**	**B & G Z statistic**	**K & R X^2**	**B & G Z statistic**	**K & R X^2**
			Italy			
6M	1.7481*	2.5054	1.9652**	4.0884*	0.6504	2.0025
12M	1.5713	2.5695	1.9911**	4.0732*	0.7426	0.9585
24M	1.3093	1.7470	2.2203**	4.6059**	0.1305	0.7591
36M	1.5723	2.1352	2.2718**	4.3181**	0.4301	0.6220
			Spain			
6M	2.3750**	5.2777**	2.4903**	5.1233**	1.3694	3.7410*
12M	2.1900**	5.0448**	2.4326**	5.4066**	1.1988	3.2347*
24M	2.6271***	4.8827**	2.6050***	5.3525**	0.3235	3.2247*
36M	2.4824**	4.5461**	2.9064***	5.1154**	-0.2196	2.2727
			Portugal			
6M	0.3467	0.0976	0.2446	0.0870	0.3147	0.1558
12M	0.2780	0.1431	0.2179	0.0819	0.3409	0.1264
24M	0.1536	0.0972	0.3538	0.0764	0.1155	0.1389
36M	0.1594	0.0579	0.3129	0.0764	0.0561	0.0949
			Greece			
6M	0.3145	0.1488	0.2218	0.1743	0.1521	0.2526
12M	0.4894	0.1857	0.3790	0.1750	0.3802	0.1857
24M	0.3743	0.1161	0.2866	0.1429	0.2722	0.1339
36M	0.4492	0.1250	0.1568	0.0833	0.2861	0.1190

This table presents average non-parametric testing results for all three methodologies used for fund ranking. Results are separately presented for 6-, 12-, 24-, and 36-month examination periods. Figures quoted are mean values per methodology and separate measurement period. The tests include the Brown and Goetzmann Z statistic and the Kahn and Rudd chi-squared.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 12. Summary ex-post investment strategy results for winners and losers in consecutive periods over all horizons.

	Italy						Spain					
Examination periods	**Conditional CAPM**		**Sharpe ratio**		**Alternative Sharpe ratio**		**Conditional CAPM**		**Sharpe ratio**		**Alternative Sharpe ratio**	
	WW	**LL**	**WW**	**LL**	**WW**	**LL**	**WW**	**LL**	**WW**	**LL**	**WW**	**LL**
6M	0.8151	-0.5463	**0.4378**	**-0.3650**	**0.1024**	**-0.0949**	**0.5564**	**-0.6284**	**0.0176**	**-0.2716**	**-0.1194**	**-0.0376**
12M	0.6242	-0.4605	0.3750	-0.3285	**0.0204**	**-0.0709**	**0.3592**	**-0.6078**	**-0.0140**	**-0.2445**	**-0.1336**	**-0.0624**
24M	0.3346	-0.2792	0.2494	-0.2045	**-0.0897**	**0.0196**	**0.2629**	**-0.3448**	**0.0062**	**-0.2157**	**-0.1471**	**-0.0643**
36M	0.2859	-0.3029	0.1308	-0.1601	**-0.1178**	**0.0037**	0.1669	-0.2946	**-0.0405**	**-0.2275**	**-0.1615**	**-0.0747**

	Portugal						Greece					
Examination periods	**Conditional CAPM**		**Sharpe ratio**		**Alternative Sharpe ratio**		**Conditional CAPM**		**Sharpe ratio**		**Alternative Sharpe ratio**	
	WW	**LL**	**WW**	**LL**	**WW**	**LL**	**WW**	**LL**	**WW**	**LL**	**WW**	**LL**
6M	0.3159	-0.8773	0.1137	-0.4471	0.0087	-0.5192	0.3455	-0.5304	0.2982	-0.1991	0.2157	-0.1497
12M	0.0346	-0.5353	-0.2797	-0.2013	-0.1356	-0.2506	0.2365	-0.3195	0.2194	-0.2029	0.1170	-0.1587
24M	0.0427	-0.4208	-0.0858	-0.1248	-0.1442	-0.1986	0.1662	-0.2654	0.1172	-0.2442	0.0785	-0.1296
36M	0.0096	-0.3594	-0.1118	-0.2000	-0.1593	-0.1634	0.1080	-0.2985	0.0903	-0.2609	0.0406	-0.2511

This table indicates achieved performance, in percentage format, on an ex-post basis, as measured by the average abnormal return of continuous winner funds and continuous loser funds, using conditional alphas for all ranking methodologies and horizons employed throughout. The particular investment strategy followed is described in Section 3.4. Statistically significant alphas are indicated in bold.

Table 13. Summary equality testing results for ex-post investment strategy.

Conditional CAPM								
Subperiods	**Greece**		**Italy**		**Spain**		**Portugal**	
	mean	median	mean	median	mean	median	mean	median
6M	0.0120**	0.0011***	0.0000***	0.0000***	0.0000***	0.0000***	0.0161**	0.0002***
12M	0.0131**	0.0302**	0.0001***	0.0020***	0.0017***	0.0013***	0.1194	0.0302**
24M	0.0006***	0.0010***	0.0000***	0.0002***	0.0000***	0.0002***	0.0559*	0.0173**
36M	0.0014***	0.0020***	0.0000***	0.0004***	0.0000***	0.0004***	0.0053***	0.0004***
Sharpe								
Subperiods	**Greece**		**Italy**		**Spain**		**Portugal**	
	mean	median	mean	median	mean	median	mean	median
6M	0.0409**	0.0133**	0.0000***	0.0010***	0.0040***	0.0020***	0.0344**	0.0047***
12M	0.0695*	0.0488**	0.0050***	0.0058***	0.0004***	0.0016***	0.2087	0.2372
24M	0.0091***	0.0140**	0.0043***	0.0028***	0.0102***	0.0173**	0.7800	0.1041
36M	0.0020***	0.0036***	0.0020***	0.0047***	0.0020***	0.0217**	0.4549	0.0423**
Alternative Sharpe								
Subperiods	**Greece**		**Italy**		**Spain**		**Portugal**	
	mean	median	mean	median	mean	median	mean	median
6M	0.1333	0.2267	0.1930	0.3790	0.3766	0.2359	0.1534	0.2649
12M	0.2182	0.2122	0.4748	0.7928	0.5456	0.4307	0.4799	0.6936
24M	0.1261	0.1041	0.1891	0.1620	0.3062	0.2413	0.7244	0.3447
36M	0.0409**	0.0423**	0.1118	0.2164	0.0595*	0.0774*	0.9716	0.3314

This table shows the equality testing results as derived by the returns achieved from the investment strategy of investing in persistent winner funds relative to the returns achieved when investing in persistent loser funds. The equality tests employed are the two-tailed test for differences in means and the Wilcoxon Mann-Whitney test for differences in medians.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.