Size and experience effects on global funds performance

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Abstract

This work analyzes the conditional performance estimates of Spanish global funds and the impact of the linearity problem between the conditioning variables on these performance results. The elimination of one of these variables seems to be an appropriate solution for this problem.

Size and experience effects on the performance estimates are also analysed. Finally, it is assessed the effect of survivorship bias on the conditional performance evaluation

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1. Introduction

The unconditional performance measures have been proved to have important limitations for the appropriate assessment of fund management results.[1]

Conditional performance evaluation, meanwhile, considers public information available to investors in the estimation of expected returns and risk, assuming that these expectations are time-varying because the information changes as a consequence of time-varying economic conditions. By including such time-varying public information, conditional models evaluate the valued added by fund managers as a result of the possession and appropriate use of private information, thereby obtaining a better assessment of performance.

This public information is configured by a set of predetermined information variables that predicts future market returns, allowing investors to establish their return and risk expectations.

Ferson and Schadt (1996), Ferson and Warther (1996), Chen and Knez (1996), Christopherson et al. (1998), Christopherson et al. (1999), Silva et al. (2003) and Ferson and Qian (2004) are some studies that provide evidence of the statistical significance of conditional models. Otten and Bams (2004), meanwhile, state that conditional models are economically significant to detect dynamic patterns in the management of mutual funds.

Most of the conditional performance models have been applied empirically to the US and UK mutual fund industries.[2] As stated by Hallahan and Faff (2001) and Ayadi and Kryzanowski (2004), it is necessary to minimise possible data snooping biases that

[1] The dynamic strategies followed by fund managers lead to biased unconditional performance assessments (e.g., Jensen, 1972; Grant, 1977; Dybvig and Ross, 1985; Grinblatt and Titman, 1989).

[2] Some exceptions are Sawicki and Ong (2000) for the Australian market, Ayadi and Kryzanowski (2004) for the Canadian market, Cortez and Silva (2002) and Silva et al. (2003) for the Portuguese market, Ferruz et al. (2006) and Moreno and Rodríguez (2006) for the Spanish market. Finally, Otten and Bams (2002) and Blake et al. (2002) analyse the European market.

arise from analysing repeatedly the same markets. Furthermore, studies in unexplored fund industries would allow academics and practitioners to analyse findings from markets outside the US with different institutional features, thereby making an original contribution to the financial literature.

Our research analyses the impact of public information in the evaluation of the performance of Spanish mutual fund industry, which, though far behind US market figures, is one of the most important in Europe, ranking 3rd by number of funds and 6th in terms of total assets.[3]

Our research analyses a special category of Spanish mutual funds: global funds. Spanish Securities Exchange Commission (CNMV) imposes strict investment restrictions on mutual funds in order to protect investors and inform about each fund's investment vocation. In this framework, global funds are the unique mutual fund category allowed to invest in any world market and assets without limit and to change portfolio allocations on a discretionary basis in view of the information they have.

Consequently, time variations of global fund returns and risk are not affected by the investment restrictions imposed by the official mutual fund classification. However, global funds are not financially comparable to the recently created Spanish hedge funds.

Our analysis is focused on a survivorship-free sample of global funds what allows us to measure the survivorship bias in both conditional and unconditional performance models, comparing the results found previously in other empirical research described in the literature.[4] As far as we know, Ayadi and Kryzanowski (2004) and Leite and Cortez

[3] Approximately €254,000 million are managed by more than 2,800 Spanish mutual funds, ranking 6th in the world by number of funds and 11th by total assets (Source: European Fund and Asset Management Association, and Investment Company Institute).

[4] The magnitude and significance of this bias on performance evaluation is a controversial topic in literature. Grinblatt and Titman (1989), Brown et al. (1992) and Brown and Goetzmann (1995) are examples of studies providing support for a weak impact of survivorship bias on performance results. In contrast, Malkiel (1995) and Blake and Timmermann (1998) find evidence for an important impact on performance estimates. Other relevant examples of these controversial findings are Wermers (1997), Hallahan and Faff (2001) and Carhart et al. (2002).

(2006) are the only studies that analyse the effects of survivorship bias on conditional models.

A second institutional feature that makes the analysis of the Spanish fund industry particularly interesting is market concentration.[5] As a result of the universal banking model existing in Spain, credit institutions dominate the fund industry with more than 90% of mutual fund assets managed by banks and saving banks.

In such a concentrated industry, where possible competitive distortions may arise from this market map, it is necessary to explore the fund-size and the fund management company-size effects on both conditional and unconditional performance evaluation.

Engstrom (2004) asserts that the previous evidence for a negative fund-size effect on fund performance is partly explained by a negative management company-size effect. Chan et al. (2005) provides a direct test between fund performance and economies of scale, finding that fund performance is negatively affected by fund manager size. Chen et al. (2004) also find diseconomies of scale in fund management. On the other hand, Gallagher and Martin (2005) conclude that the incidence of fund size and fund company size on performance evaluation is not statistically significant; rejecting the hypothesis that performance declines with fund size. Finally, Bauer et al. (2006) provide recent evidence for a positive relationship between performance and fund size, but no tests of fund company size are reported in their work.

In addition to the highly concentrated Spanish fund market, this industry is relatively young and growing compared with other relevant world markets, presenting a competition map in which experienced fund management companies compete against recently established fund management companies.[6] In order to address this relevant

[5] There are 116 fund management companies registered in the Spanish fund market, but the 10 largest manage more than 75% of the industry's total fund assets.

[6] The average age of the less experienced fund company quartile is 3.39 years. More than 80% of these recently established management companies are not owned by Spanish banks and saving banks.

feature of the Spanish fund industry, our study explores the experience effect on performance evaluation.

Christoffersen and Sarkissian (2007), Ferreira et al. (2007) and Nowak et al. (2004) find that fund managers with high levels of experience obtain better performance results than the rest of the market. Ding and Wermers (2006) find that experienced managers outperform their less experienced counterparts when large funds are considered. However, experience is negatively correlated with performance in small funds.

Finally, the paper also deals with the largely ignored problem of the linearity of the predetermined information variables to predict future stock excess returns.

In order to address this phenomenon, all the insights of this paper on conditional performance evaluation have been tested by considering a well-specified performance model that controls the linearity problem.

The paper is organised as follows: Section 2 explains the performance models applied in the empirical analysis. Section 3 describes the sample of funds and predetermined information variables considered in the empirical study. Section 4 presents the performance estimates resulting from the application of unconditional and conditional models to our sample. Survivorship bias, size and experience effects are also discussed in this section. Finally, section 5 summarises the findings of the study.

2. Performance methodology

2.1 Unconditional model

In this study we use the well-known Jensen's alpha (1968) as the unconditional measure for performance evaluation. In this unconditional model, alpha and beta parameters are assumed to be invariant over time:

$$r_{p,t+1} = \alpha_p + \beta_p r_{m,t+1} + \varepsilon_{p,t+1} \qquad (1)$$

In contrast, the average age of the more experienced fund company quartile is 20.75 years. Nearly 60% of these experienced firms are owned by traditional Spanish banks and saving banks.

Where $r_{p,t+1} = R_{p,t+1} - R_{f,t+1}$ is the portfolio excess return, being $R_{p,t+1}$ the rate of return on the portfolio *p* between time *t* and *t+1*, and $R_{f,t+1}$ the return of the risk free asset; $r_{m,t+1}$ is the excess return of the market factor during the same period; β_p is the systematic risk of the portfolio *p* and $\varepsilon_{p,t+1}$ is the error term in period *t+1*.

2.2 Partial conditional model: The Ferson and Schadt (1996) approach

In this model the portfolio weights are a linear function of the information (however, the alpha parameter remains invariant). Hence, if the betas of the underlying assets are fixed over time, the portfolio beta will be also a linear function of this information. This idea is not entirely true for a managed portfolio but it prevails in the interests of obtaining a simple regression.

The model uses a vector of instruments representative of the information available and used by the manager in period *t*, which is denoted by Z_t. The portfolio beta $\beta_p(Z_t)$ is a function of the information vector Z_t.

$$\beta_p(Z_t) = \beta_{0p} + B'_p z_t \qquad (2)$$

Where $z_t = Z_t - E(Z_t)$ is a vector of the deviations of Z_t from its unconditional mean, and B'_p is a vector with the same dimension that Z_t. The B'_p elements are the response coefficients of the conditional beta with respect to the information variables Z_t. Furthermore, β_{0p} can be interpreted as the unconditional mean of the conditional beta: $E(\beta_p(Z_t))$.

Incorporating this portfolio beta into the conditional CAPM framework we obtain the following regression of the portfolio excess returns:

$$r_{p,t+1} = \alpha_p + \beta_{0p} r_{m,t+1} + B'_p \left[z_t r_{m,t+1} \right] + \varepsilon_{p,t+1} \qquad (3)$$

Where $E\left(\varepsilon_{p,t+1} \middle| Z_t\right) = 0$ and $E\left(\varepsilon_{p,t+1}, r_{m,t+1} \middle| Z_t\right) = 0$; Z_t represents the lagged information and $\varepsilon_{p,t+1}$ is the random disturbance.

The first expression of the previous paragraph arises from the assumption of market efficiency and the second one indicates that $r_{m,t+1}$ is orthogonal to the random disturbance of the model

The alpha coefficient in equation (3) represents the average difference between the portfolio *p* excess return and the excess return of the dynamic strategies that replicate the exposure to the time-varying risk. When the average return achieved by the manager of portfolio *p* is higher than that obtained by the dynamic strategies, then portfolio *p* obtains a positive conditional alpha.

In this partial conditional model, the covariance between fund's betas and market expected returns, given Z_t, is captured by the factor $z_t r_{m,t+1}$, so this covariance is somewhat controlled through the use of conditioning information.

2.3 Full conditional model: The Christopherson, Ferson and Glassman (1998) model

Christopherson et al. (1998) criticize the partial conditional model given that it assumes constant alphas thereby failing to provide much power in predicting superior performance.

In the partial conditional model, conditional alpha will be zero if the manager's portfolio weights do not add information about future returns and the unique information about them is contained in public information variables represented by Z_t. Then, Christopherson et al. (1998) consider that if the manager uses more information than that contained in Z_t, the portfolio weights will be conditionally correlated with future returns, given *Zt*, and the conditional alpha will be a function of this conditional covariance.

So, Christopherson et al. (1998) incorporate time-varying alphas to the Ferson and Schadt (1996) model, with alpha being a linear function of Z_t:

$$\alpha_p(z_t) = \alpha_{0p} + A'_p z_t \qquad (4)$$

Where α_p is the average conditional alpha and the vector A'_p represents the response of the conditional alpha to the information variables.

If we introduce equation (4) into the partial conditional model we obtain the full conditional model, which allows us to track the variation in alphas in response to public information changes:

$$r_{p,t+1} = \alpha_{0p} + A'_p z_t + \beta_{0p} r_{m,t+1} + B'_p [z_t r_{m,t+1}] + u_{p,t+1} \quad (5)$$

3. Data

Our database comprises all global funds that existed in Spain from December 1999 to December 2006. The Spanish fund industry is a recent one and a longer time horizon would have reduced the number of funds included in our sample, weakening the significance of the conclusions.

The sample is unaffected by survivorship bias and it was constructed by considering mergers, name changes and changes in funds' investment policy over the study horizon.

Summary statistics for the monthly gross returns[7] of an equally-weighted portfolio composed of the surviving Spanish global funds are shown in panel A of table 1. Similar information is exhibited for an equally-weighted portfolio of all existing global funds over the study horizon.

The attrition rates exhibited in panel B of table 1 are higher than the rates reported in other empirical studies on non European fund markets[8], although they are very similar to those found by Dahlquist et al. (2000) for Swedish bond funds. The mortality rates are also very important although the trend decreases over the study horizon.

[7] Thus, the results obtained in our performance analysis are not biased by fees calculated on a different basis of fund returns.
This is because management and custodial fees are daily subtracted from the gross returns obtained by Spanish funds, but most of the Spanish global funds calculate these management fees on the basis of total fund assets instead fund returns.

[8] For example, Elton et al. (1996) and Carhart et al. (2002) for the US equity fund market, and Ayadi and Kryzanowski (2004) for Canadian fixed-income mutual funds.

In spite of the global investment objective of this category of Spanish mutual funds, their normal portfolios are invested mainly in European markets, requiring the use of a European benchmark to assess their performance results on an appropriate basis.[9] Therefore, we use the MSCI Europe TR index in our analysis (Source: Morgan Stanley Capital International-Barra). The 1-month Euribor interest rate is used as a proxy for the risk-free rate to obtain the excess returns included in the performance models.

Three public information variables are considered in view of their extensive use in previous empirical studies and their relevance for stock returns predictability (e.g., Ferson and Schadt, 1996; Christopherson, Ferson and Glassman, 1998; Cortez and Silva, 2002; Roy and Deb, 2004)

European information variables are used in our work because of the significant tendency of our sample of global funds to invest in Europe and the convergence of European economies as a consequence of the European Monetary Union.[10]

First, the European dividend yield variable (DY) is calculated from the dividends paid by the MSCI Europe benchmark in the prior 12 months divided by the current price of the MSCI Europe index. Second, the slope of the European term structure (TERM) is computed as the annualized yield spread between 10-year European Monetary Union government bonds and the 3-month Euribor interest rate, both obtained from the Spanish Central Bank. Finally, the 3-month Euribor interest rate is used as a proxy for the European short-term interest rate (SR).

These three public information variables are one month-lagged to be included in the conditional models. Moreover, following Ferson and Schadt (1996), these variables are

[9] The average geographical distribution of the Spanish global fund portfolios from December 1999 to December 2006 is 83.86% in European markets, 10.34% in US market and 5.80% in other international markets.

[10] Hardouvelis, Malliaropulos and Pristley (2006) find that the expected returns of European stock markets are explained more by European Union market risk and less by local risks since the creation of the European Monetary Union. León, Nave and Rubio (2007) also find that European equity markets have become strongly integrated since the creation of the European Monetary Union in 1999.

demeaned and multiplied by the excess return of the market to allow an appropriate interpretation in the conditional performance models (3) and (5).

Table 2 report low autocorrelation coefficients of order 1 for these three predetermined variables, which are not significant values to induce spurious regressions in prediction models as suggested by Ferson et al. (2003b).[11] The null hypothesis of a unit root is rejected in every case by using the augmented Dickey-Fuller (1979) test for a 1% MacKinnon critical value and using lags from 1 up to 12 months.

However, panel C of table 2 shows high and significant correlation coefficients for the three transformed information variables, $[z_t r_{m,t+1}]$, thus confirming a possible linearity bias in conditional models. This linearity bias must be taken into account in the next empirical analysis because it affects the interpretation of the conditional model variables as a consequence of the unstable OLS estimators, even though the theoretical properties of these estimators are good.

4. Empirical analysis

An equally-weighted portfolio that includes all surviving and terminated Spanish global funds during the period December 1999-December 2006 has been formed to evaluate the performance of these funds on an appropriate basis.

The performance estimates of a size-weighted portfolio including all surviving and terminated global funds instead an equally-weighted one would present a significant size bias because this size-weighted portfolio would be dominated by the effect of a small number of large global funds.[12]

[11] Ferson et al. (2003b) show that the "stochastic detrending" method of Campbell (1991) and Hodrick (1992) by subtracting a moving average from the own past values of the information variables is a simple and useful form to reduce spurious predictive relations.

[12] The ten largest surviving global funds share approximately 31% of total net assets managed by all global funds that existed at the end of December 2006, clearly highlighting the level of concentration in the Spanish global fund market.

4.1. Unconditional performance evaluation

The Jensen's alpha estimate reported in panel A of table 3 shows that the European stock market is not outperformed by global fund managers, obtaining a negative value of -0.0894% per month, which is not statistically different from zero.

This negative and non-significant result is very similar to the evidence provided by most of the previous empirical studies.

However, the adjusted determination coefficient obtained in the unconditional model is relatively high, supporting the significance of the regression.

4.2. Conditional performance evaluation

Before applying the conditional performance models described in section 2 of this study, the statistical significance of the transformed information variables is tested in order to predict stock excess returns.

First, simple linear regressions of excess returns of both MSCI Europe benchmark and the equally-weighted portfolio on each transformed information variable, $[z_t r_{m,t+1}]$, are applied. Panel A of table 4 provides evidence that European dividend yield and European short term interest rate are individually significant to predict European stock excess returns. The slope of the European term structure does not report statistically significant values.[13]

In addition to these regressions, a multiple linear regression that jointly includes the three variables is also applied, not finding individual significance for the prediction of excess returns. But the Wald test rejects the hypothesis that the transformed information variables are jointly equal to zero, providing evidence that expected excess returns are time-varying with public information.

[13] European dividend yield is the information variable with the highest significance level for the estimation of expected excess returns of the European stock market and the equally-weighted portfolio

These results should motivate the application of conditional performance models, but the linearity phenomenon found previously in the information variables suggest an analysis of this problem in order to avoid any linearity bias in the estimators reported in the conditional performance models.

In this work, we propose the elimination of one of the three conditional variables instead the use of factor analysis techniques, in order to preserve the interpretation of these information variables.[14]

As shown in panel B of table 4, there is not an easy solution for the linearity problem and their consequences in the conditional performance models. Schwarz Bayesian Criterion (SBIC), Wald test and the adjusted R^2 lead us to choose the European Dividend yield and the European short term interest rate to be included in the conditional models. In addition, the significance of both variables in their individual regressions to predict European stock excess returns confirms this two-variable model.[15]

Partial conditional model

The results of the partial conditional model shown in panel B of table 3 provide evidence that the incorporation of the predetermined information variables improves significantly the unconditional performance estimate and its explanatory power, which may indicate that fund managers use private information. These results are in line with most empirical studies, which support the hypothesis of a negative correlation between conditional betas and expected returns of the market.[16]

[14] We have verified that there are not significant differences in results between our approach and the use of factor analysis techniques.

[15] According to the determinant of the correlation matrix, we should consider the European term structure instead the short term interest rate to have a linearity-free model. However, panel A of table 4 reports that the European term structure is not individually significant to predict excess returns, making this linearity-free model to have an important specification bias.

[16] Ferson and Schadt (1996) and Ferson and Warther (1996) suggest that this negative relationship may be caused by the opposite change of the fund portfolio betas with respect the market, and the important cash flows into funds, which may not be invested immediately, when the expected market returns are high.

Our results confirm that the consideration of the two-variable performance model has not a relevant impact in the performance estimates. However, none of the alpha estimates is statistically significant. This lack of impact is also evident in the sign and the individual significance of the conditional betas of the model.

Full conditional model

Panel C of table 3 shows that the explanatory power of full conditional models is higher than that obtained using the unconditional methodology, but it is slightly lower than the adjusted R^2 coefficients obtained in the partial conditional framework.

Full conditional betas are very similar to those obtained in partial models, providing evidence of the individual statistical significance of the information variables. Wald probability values (W2 and W3) also jointly confirm the statistical significance of the conditional beta parameters.

The full conditional alpha estimates are also very similar to those obtained by partial conditional models. In line with Otten and Bams (2004), Wald p-value (W1) suggests that conditional alphas are not jointly time-varying.[17]

4.3. Size and experience effect

In the Spanish highly concentrated fund industry, where the average fund size is one of the lowest in Europe, a few large global funds coexist with much smaller counterparts.

An obvious question arises from this market map: Do the largest global funds obtain better performance results than the rest of global funds?

In addition to this question, the concentration of Spanish fund management companies makes it necessary to test the economies of scale phenomenon in those funds that are managed by large companies.

[17] Although it is not reported in table 3, we also find that conditional alphas lack individual significance.

Large companies should have more and better management resources than their small counterparts. The question arising from this market map is whether fund management companies with large market shares perform better than their counterparts with a modest market share.

Finally, given that older fund management companies may be expected to display greater experience in non-local markets than their more recent peers in the Spanish fund industry, we have examined the effect of experience on performance estimates.

As a result of their superior abilities, the performance estimates of the funds managed by the experienced companies should be higher than those obtained by the less experienced companies.

This effect should be especially identifiable in global funds, because they are allowed to invest in international markets with fewer restrictions than the rest of Spanish mutual funds.

In order to address the aforementioned questions on an appropriate basis, total net assets of the funds (TNA) at the end of each month is taken as a proxy for the fund-size variable; company-size variable is computed as the total net assets managed by each fund company at the end of each month and, finally, the registration date of the fund company provided by CNMV is used as a proxy for the age, and therefore the experience, of the fund company.

We then proceed to test the null hypotheses of size and experience effect in two complementary ways:

- Comparing the performance estimate of an equally-weighted portfolio with that obtained by a size-weighted portfolio and an experience-weighted portfolio.

  H_0: $\alpha_{S\text{-}W} > \alpha_{E\text{-}W}$ (Fund-size effect exists) (6)

  H_0: $\alpha_{CS\text{-}W} > \alpha_{E\text{-}W}$ (Fund company-size effect exists) (7)

H_0: $\alpha_{CE\text{-}W} > \alpha_{E\text{-}W}$ (Experience effect exists) (8)

Where $\alpha_{E\text{-}W}$ represents the performance estimate of the equally-weighted portfolio, $\alpha_{S\text{-}W}$ ($\alpha_{CS\text{-}W}$) represents the performance estimate of the fund size-weighted (company size-weighted) portfolio and $\alpha_{CE\text{-}W}$ represents the performance estimate of the company experience-weighted portfolio. These four portfolios include all surviving and terminated global funds during the whole study horizon.

- Comparing the performance estimate of an equally-weighted portfolio composed of those funds ranked in the monthly top size (top experience) quartiles with that obtained by an equally-weighted portfolio composed of those funds ranked in the monthly bottom size (bottom experience) quartiles.

  H_0: $\alpha_{TSQ} > \alpha_{BSQ}$ (Fund-size effect exists) (9)

  H_0: $\alpha_{TCSQ} > \alpha_{BCSQ}$ (Fund company-size effect exists) (10)

  H_0: $\alpha_{TEQ} > \alpha_{BEQ}$ (Experience effect exists) (11)

  Where α_{TSQ} (α_{BSQ}) represents the performance estimate of the equally-weighted portfolio composed of funds that ranked in monthly 1^{st} fund-size (4^{th} fund-size) quartiles, and α_{TCSQ} (α_{BCSQ}) represents the performance estimate of the equally-weighted portfolio composed of funds that ranked in monthly 1^{st} company-size (4^{th} company-size) quartiles. α_{TEQ} (α_{BEQ}) represents the performance estimate of the equally-weighted portfolio composed of funds managed by companies that ranked in monthly 1^{st} experience (4^{th} experience) quartiles.

The first approach has been widely used in international research to analyse size and experience effect on performance evaluation. However, the second procedure may be

more appropriate for the Spanish market because of the striking differences in the size[18] and experience[19] of Spanish funds and fund companies, allowing us to examine this effect in more detail.

The results shown in table 5 do not reject the aforementioned null hypotheses (6) and (9), finding a positive fund-size effect on performance results.

In view of the results shown in panel B of table 5, we reject null hypothesis (10) for a positive company-size effect on the performance results of global funds. But we can not reject this positive effect when we consider those funds managed by the two largest fund companies. [20]

The performance estimates obtained by the company size-weighted portfolio and the quartile portfolios allow us to conclude that Spanish global funds managed by large companies are slightly better performers than the rest of the companies.

Additionally, in order to detect the common impact of the fund size and the fund company size on the performance results, all global funds existing in each month of the study horizon are classified in quartiles according to these size variables.

The combination of the 1st and the 4th size quartiles allows us to form four different clusters of funds for each month. We then apply the performance models on the equally-weighted portfolios obtained from the four different combinations of funds to detect common size effects on the performance estimates.

The results found in table 6 identify important differences in the performance estimates when joint size effects are considered.

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[18] In order to analyse the fund company-size effect in more detail, we also test the null hypothesis (10) by considering those global funds managed by the two largest fund companies at the end of each month instead those global funds managed by the top company-size quartiles.
Notice the high concentration of the Spanish global fund market where the two largest fund companies - *Santander Gestión* and *BBVA Gestión* - manage 41.93% of the total assets of global funds in 2006

[19] At December 2006, the average age of the ten fund companies with the earliest registration dates is 21.14 years, which means that these companies have actually existed since the beginning of the Spanish fund industry. At the same time, the average age of the ten most recent fund companies is 1.22 years.

[20] A positive company-size effect is also found when we use a size weighted portfolio, see hypothesis (7)

Thus, 1st size-quartile funds managed by 1st size-quartile fund companies obtain the best performance results. Although these alpha estimates are not significant, their positive signs are representative of a good performance result.

However, the Wald p-values obtained by these funds in both the partial and full conditional models reveals that the joint statistical significance of the predetermined information parameters is lower than in the rest of clusters. Moreover, the low adjusted R^2 coefficients also lead us to confirm that large funds managed by large companies are not explained by this performance model.

In contrast, those 4th size-quartile funds managed by 1st size-quartile fund companies obtain the worst performance results.

The aforementioned results prove that the management abilities and the use of predetermined information by 1st size-quartile fund companies are largely affected by the fund size.

A similar conclusion is also found for those funds managed by the 4th size-quartile companies, although the performance differences are not so relevant.

Only the largest funds managed by the smallest companies have been proved to show time-varying alphas, as can be seen from table 6, panel C.

Finally, panel C of table 5 reports that the performance of the funds managed by experienced companies is slightly higher than that obtained by funds managed by other less experienced companies, not rejecting hypothesis (8). However, this positive company-experience effect is rejected when 1st and 4th experience quartile portfolios are compared, rejecting hypothesis (11).

However, the performance estimates obtained by the experience-weighted portfolios and the top experience quartile portfolios are not significant.

4.4. Survivorship bias

The performance findings presented so far in this paper are not affected by survivorship bias, since the portfolios formed in the preceding sections include all funds that existed in each month for the whole study period, allowing us to consider the performance results of terminated global funds from December 1999 to December 2006.

In this light, the question addressed in this section is: Are surviving funds better performers than terminated funds? An affirmative answer would confirm the hypothesis that the worst performers are expelled from the market.

As suggested in the introduction of our work, the analysis of survivorship bias is motivated by the largely unexplored impact of this bias on conditional evaluation.

The impact of survivorship bias on both unconditional and conditional performance models[21] is computed by measuring the difference between the performance estimates of an equally-weighted portfolio made up of those surviving funds at December 2006 and the results obtained by an equally-weighted portfolio that includes all the funds of the study sample (surviving and non-surviving funds).

The results displayed in table 7 provide evidence of a positive survivorship bias estimate. These monthly estimates are not significant in magnitude and range from 0.0315% to 0.0323%, which are very similar to the recent findings of Leite and Cortez (2006) for the Portuguese market.

The positive sign and the small magnitude of survivorship bias lead us to conclude that non-surviving global funds are slightly worse performers than surviving funds. However, the poor performance of these non-surviving funds might not be the only reason they were expelled from the market. Thus, a relevant number of non-surviving funds disappeared from database because they switched their global investment

[21] As far as we know, the only studies to analyse the impact of survivorship bias on conditional performance results are Ayadi and Kryzanowski (2004) and Leite and Cortez (2006).

vocation to other markets, with the result that the CNMV changed their official category.

5. Conclusions

Our study proves that European stock excess returns are time-varying with public information, represented by three European information variables, thus motivating the application of conditional performance models.

However a linearity problem between these conditioning variables has been detected, so we have opted for eliminating one of these three variables in order to avoid any linearity bias in the estimators obtained from the conditional performance models.

Several criterions (SBIC, Wald test, adjusted R-squared, and the individual significance of each variable in the prediction of European stock excess returns) have led us to choose the European dividend yield and the European short term interest rate as the two conditioning variables to be included in the performance conditional models. However, the conditional performance results hardly change when eliminating the European term structure variable.

The results obtained in our empirical research provide evidence that the incorporation of two European information variables improves significantly the poor unconditional performance estimates and their explanatory power, thereby suggesting the possible use of private information by global fund managers.

Our study provides evidence of a positive fund-size effect on performance estimates. A positive company-size effect is rejected only when we compare the performance of the funds managed by companies ranked in the two extreme size quartiles. However we can evidence a positive company-size effect when comparing the performance of an equally-weighted portfolio with that of a size-weighted one, as well as when we

compare the performance of funds managed by the two largest companies with that of funds managed by the companies ranked in the bottom size quartile.

In general we observe that information variables, especially European short term interest rate, have a relevant impact on all of the global funds regardless of their size or their company's size.

When both fund and company size effects are jointly considered, we conclude that the management abilities are positively affected by both the fund size and the company size. However largest funds managed by largest companies are the worst in using predetermined information, and are not explained by conditional performance models. Additionally management abilities and the use of public information by largest fund companies are shown to be affected by the fund size.

Moreover, we find a positive effect of the experience of the fund company on the performance estimates of Spanish global funds when we compare the performance of an equally-weighted portfolio with that obtained by an experience-weighted portfolio. This evidence disappears when comparing the performance of the funds managed by companies ranked in the two extreme experience quartiles.

In general, we observe that public information variables, especially European short term interest rate, have a significant impact on all of the global funds regardless of their company's experience.

Finally, our research proves that those funds that disappear from the data base are slightly worse performers than the surviving funds at the end of the study horizon, providing evidence for a positive, though small, impact of survivorship bias on both unconditional and conditional performance results.

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Table 1. Summary statistics of the equally-weighted portfolios of Spanish global funds

Panel A reports statistics of monthly gross returns on both equally-weighted portfolios formed by surviving funds and all existing funds over the period December 1999-December 2006. Panel B exhibits the attrition and mortality rates of the sample during each year. The attrition rate is calculated as the number of exiting funds each year divided by the number of existing funds at the end of the year. The mortality rate for each year is obtained as one minus the number of surviving funds in December 2006 that also existed at the end of each year divided by the number of existing funds at the end of the year.

PANEL A: Summary statistics of monthly gross returns		
	Surviving funds	**All funds**
Mean	0.169%	0.139%
Median	0.441%	0.442%
Maximum	6.908%	5.465%
Minimum	-6.541%	-6.571%
Standard Deviation	0.0260	0.0246
Skewness	-0.219	-0.400
Kurtosis	2.487	2.556
Jarque-Bera test	1.611	2.965
Number of funds	347	438

PANEL B: Attrition and mortality rates		
	Attrition rate	**Mortality rate**
1999	-	52.1%
2000	0.93%	48.6%
2001	23.71%	37.1%
2002	14.41%	29.7%
2003	9.03%	20.6%
2004	1.87%	15.4%
2005	9.77%	4.9%
2006	3.75%	0.0%

Table 2. Summary statistics of the conditional model variables

Panel A of this table reports annual statistics of the three transformed information variables $[z_t r_{m,t+1}]$*, European dividend yield (DY), European short-term interest rate (SR) and slope of the European term structure (TERM) that are incorporated to the conditional performance models. These statistics are computed for the period December 1999-December 2006.*
Panel B shows the autocorrelation coefficients of order 1, 3, 6 and 12 for DY, SR and TERM, and finally, Panel C reports the correlation matrix of these three information variables.

Panel A: Summary statistics			
	DY	**SR**	**TERM**
Mean	0.0069%	-0.0121%	0.0027%
Median	0.0082%	-0.0094%	-0.0011%
Maximum	0.0732%	0.0983%	0.0899%
Minimum	-0.0662%	-0.1389%	-0.0686%
Standard Deviation	0.0002	0.0004	0.0002
Skewness	-0.2199	-0.9526	0.8139
Kurtosis	4.5109	5.6837	5.4598
Panel B: Autocorrelation coefficients			
	DY	**SR**	**TERM**
ρ_1	-0.186	-0.078	0.001
ρ_3	0.129	0.183	0.246
ρ_6	0.076	0.245	0.302
ρ_{12}	-0.150	0.016	0.150
Panel C: Correlation matrix			
	DY	**SR**	**TERM**
DY	1.000	-0.7953**	0.2358*
SR		1.000	-0.6649**
TERM			1.000

**5% statistically significant **1% statistically significant*

Table 3. Performance and risk estimates

Panel A of this table shows the unconditional performance estimates (α_p) and the systematic risk (β_p) obtained by applying the Jensen's measure on the returns obtained by an equally-weighted portfolio that includes all surviving and terminated Spanish global funds from December 1999 to December 2006. The adjusted R^2 coefficient is also presented in the last column of the panel.
Top section of panel B presents the performance and risk estimates of the partial conditional model using the three transformed information variables. Bottom section of panel B shows the performance and risk estimates of the partial conditional model using European dividend yield and European short term interest rate as information variables. Both sections compute the partial conditional model for an equally-weighted portfolio that includes all surviving and terminated funds from December 1999 to December 2006. Each section exhibits the performance estimate α_p, the average conditional beta β_{0p}, and the coefficient estimates for the conditional beta function: European dividend yield (DY), European Short term interest rate (SR) and the slope of the European term structure (TERM). The adjusted determination coefficient is also presented for each model. Wald is the probability value of the χ^2 statistic and it tests for the null hypothesis that all variables included in the partial conditional model have a coefficient equal to zero.
Similar information is reported for the full conditional models shown in panel C. α_{0p} is the full conditional performance estimate and W1, W2 and W3 are the Wald probability values of the χ^2 statistic that test for the null hypothesis that the coefficients of the conditional alphas, the conditional betas and both conditional alphas and betas included in the full conditional model have a coefficient equal to zero, respectively.

PANEL A: Unconditional model

	α_p	β_p	Adj-R^2
Equally-weighted portfolio	-0.000894	0.4640***	73.69%

PANEL B: Partial conditional model

	α_p	β_{0p}	DY	SR	TERM	Adj-R^2	Wald
Equally-weighted portfolio	0.001122	0.4365***	22.9516***	31.498***	7.2020	79.94%	0.000
	α_p	β_{0p}	DY	SR	TERM	Adj-R^2	Wald
Equally-weighted portfolio	0.000977	0.4366***	17.0374**	25.283***	-	80.02%	0.000

PANEL C: Full conditional model

	α_{0p}	β_{0p}	DY	SR	TERM	Adj-R^2	W1	W2	W3
Equally-weighted portfolio	0.001084	0.4303***	22.322***	30.918***	7.5360	79.64%	0.3988	0.0000	0.0000
	α_{0p}	β_{0p}	DY	SR	TERM	Adj-R^2	W1	W2	W3
Equally-weighted portfolio	0.000893	0.4355***	17.228**	24.706***	-	79.90%	0.4049	0.0000	0.0000

Note: None of the dynamic alphas of the full conditional model is individually significant
Standard errors are consistent with heteroskedasticity and autocorrelation problems (Newey and West, 1987)
**10% statistically significant **5% statistically significant ***1% statistically significant*

Table 4. Stock return predictability

This table reports the simple and multiple linear regressions of both European stock market and an equally-weighted portfolio monthly excess returns on each transformed information variable, $[z_t r_{m,t+1}]$, to be included in the conditional models. These transformed variables are: European dividend yield (DY), European Short term interest rate (SR) and the slope of the European term structure (TERM). The slope coefficients and their statistical significance are reported for every simple and multiple regressions. The figures in brackets represent the adjusted R^2 obtained in every linear regression. Wald p-value is the probability value of the χ^2 statistic and it tests for the null hypothesis that all variables included in the multiple linear regressions have a coefficient equal to zero. SBIC is the Schwarz Bayesian Criterion obtained for each regression. Determinant is the determinant of the matrix of the correlation coefficients of the information variables included in each linear regression.

PANEL A: Simple and multiple linear regressions on transformed information variables

	Dependent variable: MSCI Europe TR		Dependent variable: Equally-weighted portfolio	
Slope DY	-103.118***	(27.21%)	-59.2602***	(31.04%)
Slope SR	45.7225**	(12.30%)	36.5304***	(28.42%)
Slope TERM	-9.2476	(-0.96%)	-23.1220	(4.03%)
Slope DY	-125.502		-31.859	
Slope SR	-17.775	(26.31%)	23.704	(31.93%)
Slope TERM	1.632		7.869	
Wald p-value	*0.0097*		*0.0002*	
SBIC	*-3.4643*		*-4.7783*	
Determinant	*0.1192*			

PANEL B: Linearity phenomenon – Two-variable linear regressions

	Dependent variable: MSCI Europe TR		Dependent variable: Equally-weighted portfolios	
Slope DY	-126.848*		-38.347	
Slope SR	-19.185	(27.20%)	16.908	(32.56%)
Wald p-value	*0.0031*		*0.0000*	
SBIC	*-3.5165*		*-4.8276*	
Determinant	*0.3675*			
Slope SR	74.613**		45.157***	
Slope TERM	65.399	(18.12%)	24.057	(30.75%)
Wald p-value	*0.0351*		*0.0006*	
SBIC	*-3.3989*		*-4.8010*	
Determinant	*0.5579*			
Slope DY	-106.810***		-56.7852***	
Slope TERM	15.1470	(26.94%)	-10.1528	(31.17%)
Wald p-value	*0.0032*		*0.0001*	
SBIC	*-3.5130*		*-4.8071*	
Determinant	*0.9443*			

The equally-weighted portfolio includes all surviving and terminated Spanish global funds from December 1999 to December 2006.

Standard errors are consistent with heteroskedasticity and autocorrelation problems (Newey and West, 1987)

**10% statistically significant **5% statistically significant ***1% statistically significant*

Table 5: Performance and risk estimates – Size and experience effects –

This table reports the performance and risk estimates obtained from the application of the full conditional evaluation models on different portfolios. Equally-weighted portfolio (a) and fund size-weighted portfolio (b) are formed by all global funds existing from December 1999 to December 2006. Q1 fund size (c) is the equally-weighted portfolio composed of those funds ranked in monthly top fund size quartiles. Q4 fund size (d) is the equally-weighted portfolio composed of those funds ranked in monthly bottom fund size quartiles. Fund-size effect hypothesis (6) is the result of (b)-(a). Fund-size effect hypothesis (9) is the result of (c)-(d).
Company size-weighted portfolio (e) is formed by all global funds existing from December 1999 to December 2006. Q1 company size (f) is the equally-weighted portfolio composed of those funds managed by companies ranked in monthly top company size quartiles. Top 2 company size (g) is the equally-weighted portfolio composed of those funds managed by the two largest companies at the end of each month. Q4 company size (h) is the equally-weighted portfolio composed of those funds managed by companies ranked in monthly bottom company size quartiles. Company-size effect hypothesis (7) is the result of (e)-(a). Company-size effect hypothesis (10) is the result of (f)-(h). Company-size effect hypothesis (10') is the result of (g)-(h).
Company experience-weighted portfolio (i) is formed by all global funds existing from December 1999 to December 2006. Q1 company-experience (j) is the equally-weighted portfolio composed of those funds managed by companies ranked in monthly top company experience quartiles. Q4 company-experience (k) is the equally-weighted portfolio composed of those funds managed by companies ranked in monthly bottom company experience quartiles. Experience effect hypothesis (8) is the result of (i)-(a). Experience effect hypothesis (11) is the result of (j)-(k).

Full conditional model								
Panel A: Fund-size effect								
	α_{0p}	**β_{0p}**	**DY**	**SR**	**Adj-R^2**	**W1**	**W2**	**W3**
Equally-weighted portfolio	0.000893	0.4355***	17.228**	24.706***	79.90%	0.4049	0.0000	0.0000
Size-weighted portfolio	0.002013	0.3475***	8.5597	34.127***	69.91%	0.3825	0.0000	0.0000
Q1 fund size	0.000824	0.2992***	13.649*	22.659***	65.52%	0.5042	0.0000	0.0001
Q4 fund size	-0.000222	0.4892***	28.632***	31.675***	82.58%	0.6170	0.0000	0.0000
Fund-size effect (H 6)	**0.00112**							
Fund-size effect (H 9)	**0.001046**							
Panel B: Fund company-size effect								
	α_{0p}	**β_{0p}**	**DY**	**SR**	**Adj-R^2**	**W1**	**W2**	**W3**
Company size-weighted port.	0.001041	0.3149***	7.5245	20.7778***	70.00%	0.6440	0.0000	0.0000
Q1 company size	0.001154	0.3896***	26.023***	39.6656***	71.47%	0.5234	0.0000	0.0000
Top 2 company size	0.001569	0.2694***	-4.7198	10.7717*	57.76%	0.6357	0.0000	0.0003
Q4 company size	0.001533	0.5212***	10.3691	18.0497***	79.02%	0.4115	0.0002	0.0001
Company-size effect (H 7)	**0.000148**							
Company-size effect (H 10)	**-0.000379**							
Company-size effect (H 10')	**0.000036**							
Panel C: Company-experience effect								
	α_{0p}	**β_{0p}**	**DY**	**SR**	**Adj-R^2**	**W1**	**W2**	**W3**
Experience-weighted port.	0.000901	0.4280***	16.803**	24.0007***	79.25%	0.3891	0.0000	0.0000
Q1 company-experience	0.000843	0.3567***	10.0523	21.4078***	75.26%	0.5162	0.0000	0.0000
Q4 company-experience	0.000902	0.5257***	32.492***	40.9004***	78.56%	0.5210	0.0000	0.0000
Experience effect (H 8)	**0.000008**							
Experience effect (H 11)	**-0.000059**							

Note: None of the dynamic alphas of the full conditional model is individually significant
The sign and the financial interpretation of the different hypotheses tested for the full conditional model are similar to those reported for the unconditional and partial conditional performance models. These results can be required to the authors.
Standard errors are consistent with heteroskedasticity and autocorrelation problems (Newey and West, 1987)

**10% statistically significant **5% statistically significant ***1% statistically significant*

Table 6: Unconditional and conditional performance estimates – common size effects –

This table reports the performance and risk estimates obtained from the application of the unconditional, partial conditional and full conditional evaluation models on four different equally-weighted portfolios based on the quartile criterion for the following two size characteristics: fund size and fund company size.
Thus, portfolio Q1 Q1 is composed of those 1st size-quartile funds managed by 1st size-quartile fund companies; portfolio Q1 Q4 is composed of those 1st size-quartile funds managed by 4th size-quartile fund companies; portfolio Q4 Q1 is composed of those 4th size-quartile funds managed by 1st size-quartile fund companies and portfolio Q4 Q4 is composed of those 4th size-quartile funds managed by 4th size-quartile fund companies.

Panel A: Unconditional model

Fund Size	Company Size	α_p	β_p	Adj-R^2
Q1	*Q1*	0.000690	0.2437***	23.93%
Q1	*Q4*	-0.000264	0.4509***	74.79%
Q4	*Q4*	-0.001952	0.6014***	75.52%
Q4	*Q1*	-0.003265*	0.5371***	62.12%

Panel B: Partial conditional model

Fund Size	Company Size	α_p	β_{0p}	DY	SR	Adj-R^2	Wald
Q1	*Q1*	0.002645	0.1937***	-2.1748	15.0975	28.26%	0.0291
Q1	*Q4*	0.000463	0.4653***	30.1197***	23.148***	78.92%	0.0000
Q4	*Q4*	-0.000023	0.5650***	9.9279	21.739***	78.68%	0.0001
Q4	*Q1*	-0.000759	0.5262***	46.9255**	47.532***	73.91%	0.0000

Panel C: Full conditional model

Fund Size	Company Size	α_{0p}	β_{0p}	DY	SR	Adj-R^2	W1	W2	W3
Q1	*Q1*	0.002624	0.2039***	0.0027	16.1291	26.75%	0.8517	0.0255	0.1077
Q1	*Q4*	0.000308	0.4676***	31.3514***	22.562***	79.72%	0.0092	0.0000	0.0000
Q4	*Q4*	-0.000081	0.5755***	12.3628	22.607***	78.38%	0.5128	0.0003	0.0002
Q4	*Q1*	-0.000789	0.5203***	45.8715**	46.709***	73.34%	0.8925	0.0001	0.0000

Note: Only the largest funds managed by the smallest companies have been proved to show time-varying alphas, as can be seen from panel C.
Standard errors are consistent with heteroskedasticity and autocorrelation problems (Newey and West, 1987)
**10% statistically significant **5% statistically significant ***1% statistically significant*

Table 7. Performance and risk estimates –Survivorship bias–

This table reports the performance and risk estimates obtained from the application of the unconditional, partial conditional and full conditional evaluation models on both equally-weighted portfolios including surviving funds and all funds (surviving and non-surviving).

Panel A: Unconditional model

	α_p	β_p	Adj-R^2
Surviving funds	-0.00057	0.4935***	74.61%
All funds	-0.00089	0.4640***	73.69%
Survivorship bias	**0.000318**		

Panel B: Partial conditional model

	α_p	β_{0p}	DY	SR	Adj-R^2	Wald
Surviving funds	0.001300	0.4587***	10.1945	21.4522***	79.28%	0.000
All funds	0.000977	0.4366***	17.0374**	25.2838***	80.02%	0.000
Survivorship bias	**0.000323**					

Panel C: Full conditional model

	α_{0p}	β_{0p}	DY	SR	Adj-R^2	W1	W2	W3
Surviving funds	0.001208	0.4574***	10.3921	20.8099***	79.17%	0.4246	0.0000	0.0000
All funds	0.000893	0.4355***	17.228**	24.706***	79.90%	0.4049	0.0000	0.0000
Survivorship bias	**0.000315**							

Standard errors are consistent with heteroskedasticity and autocorrelation problems (Newey and West, 1987)

**10% statistically significant **5% statistically significant ***1% statistically significant*