MARKET TIMING ABILITY AND PASSIVE INVESTMENT STRATEGIES

ABSTRACT

This paper contributes further to empirical evidence regarding the lack of market timing ability on the part of investment fund managers and focuses on traditional and conditional market timing models, demonstrating that the arguments that are well established in large markets are also applicable to small and relatively unexplored markets, such as the Spanish investment fund market. This study agrees with the financial literature in favor of passive investment or indexing strategies, owing to the lack of timing, general underperformance and the empirical evidence detected regarding the inability of economic variables to predict market returns

KEYWORDS: passive management, prediction inability, market timing ability, conditional models, Spanish investment fund market

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1. INTRODUCTION

On occasions, in addition to publicly available information, investment fund managers use another type of private information that only they possess and which the market cannot access, in order to compile portfolios.

However, fund managers who possess superior information must not trade too much on the basis of this information since it would affect the balance of prices. This would make the evaluation of performance somewhat problematic, as indicated by Dybvig and Ross (1985), Glosten and Jagannathan (1994), Chen and Knez (1994).

Portfolio performance that is attributable to the good decisions and actions taken by the manager can either derive from the manager's ability to choose securities (stock-picking ability) or from the prediction ability and therefore anticipation of global market returns (market timing ability). The literature on the subject finds it difficult to break ability down into these two distinctive categories. Furthermore, if managers trade with options, spurious timing and selectivity abilities could be recorded (Jagannathan and Korajczyk (1986)). The same thing happens when managers implement dynamic strategies (for example insurance portfolios), as long as trading occurs more frequently than the returns measurement interval. The conditional versions of simple market timing models do not resolve these problems.

Empirical evidence also shows that significant market timing ability is rare (Henriksson (1984)). Furthermore, a negative correlation is observed between stock-picking ability and timing ability. Average timing measures are, in general, negative and the performance of funds that exhibit significant timing is more often negative than positive.

This paper analyzes a sample of Spanish domestic equities, applying the market timing models developed by Treynor and Mazuy (1966) and by Merton and Henriksson (1981). In line with the empirical evidence on this subject, we scarcely observe any significant timing ability and the average fund performance is negative. This second assertion leads us to conclude that fund managers do not create added value and that their management is inefficient; we would therefore opt for passive management of financial assets or the use of indexing techniques, as signaled by Malkiel (2003).

In this respect, Malkiel clearly finds in favor of passive investment strategies in a variety of different markets, owing to the efficiency of markets in general (information is immediately reflected in market prices) and the difficult nature of market predictions. Most predictable patterns disappear as soon as they are discovered; furthermore they are not robust and generally reflect a better approach to the measurement of risk and not inefficiency. These predictable patterns, although they exist, do not generate profitable investment strategies. Even though they recognize certain inefficiencies and anomalies in the markets, and a minimal market prediction ability, when similar risk levels are involved, active management does not have the advantage over passive management, mainly owing to transaction costs, among other things. Although, *ex post*, there are market agents who act irrationally, *ex ante* there are no opportunities for arbitrage.

Malkiel demonstrates empirically that, after costs, passive management outperforms active management. In fact, a passive strategy not only minimizes taxes, but also minimizes turnover, thereby reducing brokerage costs and the spread between bid and asked prices.

In this present paper, we agree with the financial literature in favor of passive investment strategies and in relation to the difficulty of anticipating the market, and we demonstrate that that the widespread results that occur in highly scrutinized markets such as US market can also be found in relatively unexplored markets, such as the Spanish investment funds market.

Furthermore, our research also examines the conditional versions of market timing models, since the traditional models, in addition to their strong assumptions about how managers use their abilities, consider that any information relating to future market returns is superior information. Hence, based on the approach adopted by Ferson and Schadt (1996), and chiefly using the same simplifying assumptions as traditional models, but also assuming semi-strong form market efficiency, we apply the conditional versions of market timing models. The idea involves differentiating between market timing based on public information and market timing based on superior information to that offered by lagged information variables

In addition, the conditional versions of market timing models produce very similar results to those provided by the traditional versions of such models, in agreement with other studies carried out on performance and market timing.

The predictive ability of predetermined information variables when applied to conditional versions of market timing models was also analyzed. We examined the variables that are recommended by the financial literature for this area, since they are considered to have the highest market predictive power. In agreement with the majority of conditional performance academics, we conclude that these variables have minimal predictive power. Hence, the inability of predetermined information variables to predict the market further supports the implementation of passive investment strategies. In this respect, we concur with Malkiel (2003) and Ross (2002), who suggest that, despite attempts to find some predictability out of asset return data, there is a serious lack of correlation between these data. Furthermore, Cochrane (2001) suggests that most studies that support the existence of predictable patterns are equivalent to "intelligent magnifying glasses", which make small facts appear to be economically interesting.

2. BIBLIOGRAPHIC REVIEW

As we mentioned in the previous section, many authors have denied the ability of managers to anticipate the market. Knigge et al. (2004), who analyzed private equities cash flows, observed that, for "later-stayed buyout" funds, performance is not determined by market timing although it is significantly related to the experience of the manager.

Along these same lines, the work of Christensen (2005), based on the Danish market, which represents the third largest funds industry in Europe per capita, concludes that Danish funds do not exhibit market timing ability. He also observes that the performance of these funds is neutral and that returns are not persistent. Christensen analyzes stock-picking ability based on a single-index model and a multi-factor model, respectively, and analyzes timing ability based on the quadratic model of Treynor and Mazuy (1966) and the approach to options suggested by Merton and Henriksson (1981). The persistency of returns is analyzed using parametric and non-parametric techniques.

However, there are also studies that assert the existence of market timing ability on the part of the managers, for example the paper presented by Glassman and Riddick (2003), who focus on a sample of US global funds in the late 80s and early 90s. These authors examine portfolio composition and returns to distinguish between world market timing (movements of funds between all equity markets and cash) and national market timing (movements out of one country' s equity market into one or more other countries' equities). They find no evidence of world timing ability but strong evidence of national timing ability. In fact, these authors attribute the scarce evidence of timing ability found by other studies to the fact that they do not distinguish between national and world timing.

Along these same lines, Jiang et al. (2005) attribute the scarce timing ability reflected in the financial literature to returns-based analyses. In fact, by applying tests based on holdings, these authors find significant timing ability.

Boney et al. (2005) find perverse timing ability in their study of high quality corporate bond funds. They observe perverse timing ability between cash and bonds, as well as in bond maturities. They conclude that a great deal of perverse market timing ability is driven by the subset of funds with the highest expense ratios.

Lee (1999) also observes perverse timing ability based on the quadratic model of Treynor and Mazuy. However, this evidence is eliminated when the conditional version of the same model is applied. Similar results are obtained by Sawicki and Ong (2000).

Chen and Liang (2005) analyze market timing ability based on the models developed by Treynor and Mazuy, Merton and Henriksson and Busse (1999). Moreover, they develop a new model that permits them to test jointly returns timing and volatility timing. This new model links fund returns to the squared Sharpe ratio. They find strong evidence for returns and volatility timing for a sample of hedge funds. This ability exists chiefly in bear market states. Their cross-sectional analysis indicates that timing ability is related to certain fund characteristics.

There are also other significant studies on market timing: Fung et al. (2002), who observe stock-picking but not market timing ability in their sample; Lin et al. (2004), who analyze market timing in international stock markets; Hovakimian (2005) concludes that debt transactions exhibit timing patterns; and Jenter (2005) concludes that managers actively attempt to time the market both in their private trades and in company decisions, and that managers' portfolio decisions are closely linked to changes in corporate capital structures.

In the Spanish sphere, of particular note is the study carried out by Miralles and Miralles (2004), who analyze whether frequency of observation alters the detection of timing ability, applying the bootstrap method. They conclude that the use of daily data increases the capacity to detect timing ability.

3. TREYNOR AND MAZUY'S MODEL (1966): TRADITIONAL AND CONDITIONAL VERSIONS

This model is constructed around the notion that managers continually try to outguess the market, oscillating between two lines, high volatility and low volatility. Figure 1 show that when the manager opts for high volatility (line 3-4), the market rises and when s/he opts for low volatility (line 1-2) the market falls. The resulting line (1-2-3-4) of a fund that continually outguesses the market is not straight. Considering that no fund can anticipate the market correctly, a gradual transition is assumed from a flat to a steep slope. Hence, with the slope varying more or less continually between the extreme points of both lines, the resulting lines might be concave, which is specified better with the inclusion of a quadratic regression:

$$r_{p,t+1} = \alpha_p + b_p r_{m,t+1} + \gamma_{tmu} \left[r_{m,t+1} \right]^2 + \upsilon_{p,t+1} \qquad (3.1)$$

Where the coefficient γ_{tmu} measures a manager's market timing skill.

INSERT FIGURE 1

This figure represents a fund that has anticipated the market both correctly (blue line) and incorrectly (red line). Figure 2 shows a fund that has anticipated the market with above average success:

INSERT FIGURE 2

Admati et al. (1986) describe a model in which a manager with constant absolute risk aversion in a normally distributed world, observes at time t a private signal, $r_{m,t+1}+\eta$, equal to the future market return plus noise. The manager's response is to change the portfolio beta as a linear function of the signal, so that the coefficient γ_{tmu} is positive if the manager increases the beta when the market signal is favorable.

Ferson and Schadt (1996), using practically the same analysis as Admati et al. (1986), propose a conditional version of the Treynor and Mazuy model (1966), assuming that the manager observes the vector (z_t, $r_{m,t+1}+\eta$) at time t and the question is then how to assign funds between the market portfolio and the risk-free asset. With exponential utility and normal distributions, the demand for the risky asset is a linear function of information. In a model containing two assets, the portfolio weight on the market index is the beta of the portfolio, which is a linear function of z_t and ($r_{m,t+1}+\eta$). By replacing the function $\beta_{pm}(z_t) = b_{0p} + B'_p z_t$ with this linear function and letting η join the regression error term, the conditional version of the Treynor and Mazuy model suggested by Ferson and Schadt would be:

$$r_{p,t+1} = \alpha_p + b_p r_{m,t+1} + C'_p \left(z_t r_{m,t+1}\right) + \gamma_{tmc}\left[r_{m,t+1}\right]^2 + \upsilon_{p,t+1} \qquad (3.2)$$

where the coefficient vector C'_p reflects the response of the portfolio beta to public information Z_t. The coefficient γ_{tmc} measures the sensitivity of the beta to private signal of market timing. In the original model developed by Treynor and Mazuy the bias caused by publicly available information is controlled by the term $C'_p(z_t r_{m,t+1})$. In this model, the new term captures the part of the quadratic term in Treynor and Mazuy model that is attributed to public information variables. In this model, the correlation of the betas with future market return, which could be attributed to public information, is not considered to reflect market timing ability.

4. THE MERTON AND HENRIKSSON MODEL (1981): TRADITIONAL AND CONDITIONAL VERSIONS

Merton and Henriksson (1981) and Henriksson (1984) propose a different model of market timing. This model assumes that for each period the manager will try to forecast whether or not the market will have positive or negative excess returns ($r_{m,t+1}>0$ or $r_{m,t+1}<0$). A manager who believes that a positive value will be produced for $r_{m,t+1}$ will probably take more systematic risk than if s/he expects a negative value for $r_{m,t+1}$. In other words, the portfolio beta is lower in the case of a bearish market prediction, and the market beta will be higher in the case of a bullish market prediction. For Merton and Henriksson, if the manager is able to anticipate the market, then the coefficient γ_{hmu} in the following regression will be positive:

$$r_{p,t+1} = \alpha_p + b_p r_{m,t+1} + \gamma_{hmu} \left[r_{m,t+1}\right]^+ + \upsilon_{p,t+1} \qquad (4.1)$$

Where $[r_{m,t+1}]^+$ = Max $[0, r_{m,t+1}]$ - Merton and Henriksson interpret this expression as the payoff to an option on the market portfolio with exercise price equal to the risk free asset - y γ_{hmu} measures the manager's market timing skill.

Ferson and Schadt (1996) propose a conditional version of the model in which the manager tries to predict $u_{m,t+1} = r_{m,t+1} - E(r_{m,t+1}|Z_t)$, or rather, the deviation of the market returns from its expected conditional mean. It is also assumed that in the case of a bullish market prediction, the conditional beta of the portfolio will be: $\beta_{up}(Z_t) = b_{up} + B'_{up}z_t$. For bearish market predictions, the conditional beta of the portfolio will be

$\beta_{down}(Z_t) = b_{down} + B'_{down}z_t$. Using these assumptions, the conditional version of the Merton and Henriksson model is as follows:

$$r_{p,t+1} = \alpha_p + b_{down} r_{m,t+1} + B'_{down}\left[z_t r_{m,t+1}\right] + \gamma_{hmc}\left[r_{m,t+1}\right]^+ + \Delta'\left[z_t r_{m,t+1}\right]^+ + \upsilon_{p,t+1} \quad (4.2)$$

Where $$\left[r_{m,t+1}\right]^+ = \left[r_{m,t+1}\right] \times I\left[\left\{r_{m,t+1} - E\left(r_{m,t+1} \middle| Z_t\right)\right\} > 0\right] \quad (4.3)$$

$$\gamma_{hmc} = b_{up} - b_{down} \quad (4.4)$$

$$\Delta = B_{up} - B_{down} \quad (4.5)$$

I is the binary function that indicates the prediction of positive market returns. Positive market timing ability is reflected by a positive value for $\gamma_{hmc} + \Delta' z_t$, which states that the conditional beta is higher when the market is above its conditional mean, given public information, than when it drops below said mean. This implies that $E(\gamma_{hmc} + \Delta' z_t) > 0$, in other words that market timing is, on average, positive. In the case of no market timing ability γ_{hmc} and Δ are zero.

5. EMPIRICAL ANALYSIS

5.1. Information about the funds analyzed

For this study a sample of 225 Spanish domestic equities were analyzed[1].

The database is free of survivorship bias. With his aim, the funds must fulfill two requirements: firstly, for a reasonably long period (almost the entire period analyzed) their investment objective has been the acquisition of equity assets, and secondly, they must have lifetime of over two years within the overall time period analyzed (July 1994 to June 2002)[2].

The return data used in the analysis is monthly; hence we have a total of 96 observations. The majority of these data comply with the hypothesis of normality[3]. The equity benchmark selected for the analysis of conditional performance is the MSCI-Spain. We obtained information about monthly returns from the Spanish Securities Market National Commission (CNMV).

5.2. <u>Information about the predetermined information variables</u>

For our conditional performance analysis we used the predetermined information variables indicated by the financial literature as being the most powerful in the prediction of returns and variable risks over time. However, those studies did not obtain very high levels of prediction for said variables. In this study, we carried out a predictive power analysis on these variables and similarly obtained low levels of prediction. As we mentioned in the introductory section, the inability of the variables selected to predict the market leads us back to a preference for passive investment or indexing strategies.

INSERT TABLE 1

The following predetermined information variables were used:

a) The lagged level of one month Treasury Bill yield, reported in annualized form.

b) The lagged dividend yield of the MSCI-Spain index.

c) A lagged measure of the slope of the term structure of the yield curve.

d) A dummy variable for the month of January.

e) A measure of inverse relative wealth.

f) The real bond yield.

All the data from these variables are monthly.

The first variable refers to 30-day Spanish treasury bill repos. We obtained these data from Statistics Reports compiled by the Bank of Spain.

The dividend yield is calculated as the ratio between the total sum of the previous 12 months of dividend payments by the index during the period t-1 and the price level of the MSCI-Spain during t. These data were taken from Morgan Stanley's price history.

The slope of the term structure is the difference between the 10-year Government bond yield and the 3-month Treasury bill yield. These data were obtained from the Statistics Reports compiled by the Bank of Spain.

Keim and Stambaugh (1986) believe that any study on changing expectations should take into account seasonality. The variables used by these authors to predict returns on bonds and stocks demonstrate the January Effect, which suggests an increase in risk around the turn of the year. To explore this possibility, we included a dummy variable to take account of the January Effect, which will take a value of 1 in January and 0 in the other months.

Inverse relative wealth is calculated as the ratio of past real wealth to current real wealth. As a variable representing wealth we used the stock index since, although stock markets only represent a small portion of world wealth, they are focused on the most volatile part and are positively related to other segments of wealth. Therefore, we used the MSCI-Spain deflated by the CPI. Data about the CPI were obtained from Statistics Reports compiled by the Bank of Spain.

Real bond yield is the difference between the long-term yield of a bond (10 years) and the expected rate of inflation during the bond's remaining lifespan. The year-on-year rate of inflation was used. Bond yield and inflation data were obtained from Statistics Reports compiled by the Bank of Spain.

Before including all these variables in the conditional versions of market timing models we analyzed the possible problems of multicollinearity between the variables, finding the correlations between each pair of variables, as shown in the table below:

INSERT TABLE 2

This table shows that there are three variables that have a high correlation between them, specifically real bond yield, dividend yield and one-month treasury bond yield. In order to solve the problem of linearity between these three variables, we performed a factor analysis [4], which provided us with a "summary" variable of the three and which we have used in our analysis instead of the three aforementioned variables. Therefore, our conditional analysis has four predetermined information variables.

5.3. Traditional versus conditional efficiency results

The first stage in our analysis involved analyzing the statistical significance level of the conditional information. The table below contains the average values of the parameters alpha, gamma, and their respective t-statistics, as well as the R-square coefficients of the Treynor and Mazuy and Merton and Henriksson models, both in their traditional and conditional versions.

INSERT TABLE 3

From this table we can see that the conditional versions of the models present a greater explanatory power than their respective traditional versions, since the R-square coefficient is higher in the conditional versions of these models. Nevertheless, the average alpha is lower in the conditional versions of the models. However, we cannot conclude that the performance of these models is worse, since we have not considered the significance level of said parameter.

In addition, the Treynor and Mazuy model presents a higher average alpha than the Merton and Henriksson model in their traditional versions, whereas just the opposite occurs in the conditional versions.

The table below shows the distributions of the t-ratios for the alpha parameter, considering different levels of statistical significance (1%, 5% and 10%). Focusing on the Treynor and Mazuy model, we observe that the traditional version produces better results, since it shows a higher number of positive significant alphas and a lower number of negative significant alphas. On the other hand, focusing on the Merton and Henriksson model, we could also confirm the superior performance of the traditional version of this model, since the conditional version produces a higher number of positive significant alphas and also a higher number of negative significant alphas, with the increase in the latter being much greater. Nevertheless, in all cases and using any model, the number of negative alphas is much higher than the number of positive alphas.

We also observe that the results are better using the Merton and Henriksson model, both in its traditional and conditional version.

INSERT TABLE 4

From this table, we can see that approximately 90% of the alphas are negative in all models, and that both versions of the Merton and Henriksson model produce better performance results. This model also produces more positive significant alphas.

5.4. Market timing results. Comparative analysis.

Table 3 shows that all the models present positive average gamma coefficients, except the conditional version of the Merton and Henriksson model, which might lead us to believe that, by applying any model except this one, fund managers display positive market timing ability. However, this result lacks validity since we have not considered the statistical significance level of this parameter.

The table below shows the distribution of the t-ratios of the gamma parameter. We can see that all the models have a higher number of positive than negative parameters, although the significance levels are low; hence there is no real evidence to support the existence of market timing ability on the part of the managers. This finding is in line with the financial literature, which finds scarce evidence of significant market timing.

The best results are obtained using the traditional version of the Treynor and Mazuy model and the worst using the conditional version of the Merton and Henriksson model.

INSERT TABLE 5

6. CONCLUSIONS

The Merton and Henriksson and the Treynor and Mazuy models are based on strong hypotheses regarding the use made by fund managers of the superior information they possess. When these hypotheses are not fulfilled, the models are unable to break performance down into its two components: market timing and selectivity. Since it is unlikely that these hypotheses will be fulfilled, the models should be viewed as approximations of a more complex relationship between the portfolio weights and future market return.

The Treynor and Mazuy model approximates this relationship using a linear function, whereas the model devised by Merton and Henriksson applies an indicator function in which weights take the value of zero or one depending on the forecast for market return.

In the conditional versions of the models, assumptions are simple extensions of the hypotheses formulated in the original models. In these conditional versions, the betas of the underlying assets are no longer constant.

This study assesses the performance and market timing ability of a set of 225 Spanish domestic equities based on the traditional and conditional versions of the Treynor and Mazuy and Merton and Henriksson models. The conditional versions of the models have been built based on various economic information variables that we have demonstrated to be both economic and statistically significant. Furthermore, we have performed a factor analysis on these variables in order to resolve the problems of multicollinearity.

From our empirical analyses we can deduce that the conditional models are better specified than their respective traditional versions, since they obtained a higher R-square coefficient together with a considerable increase in the number of significant alpha coefficients.

With regard to performance assessment, we observed that both models obtained better results using the traditional version, although, in general, negative results dominate.

We have reached the following overall conclusion about performance: not only do fund managers *not* manage investment funds adequately (negative performance measures) with the public information available for the whole market, they also bring no added value to their management by the possession and appropriate use of private information (negative conditional performance measures).

This conclusion, in addition to the minimal prediction power of the economic information variables, leads us to agree with the literature in general, and specifically with Malkiel (2003), in favor of passive investment strategies, since, for the market as a whole, the empirical evidence clearly demonstrates that it is very difficult to systematically outperform the market using an active strategy.

As for timing coefficients, we observed that, in general, positive non-significant coefficients are obtained; hence there is not evidence to support the existence of positive market timing ability on the part of the fund managers. This finding is also in line with the results obtained by the literature, which finds scarcely any empirical evidence of significant timing.

Therefore, fund performance is not determined by the fund managers' market timing ability, but rather by their ability to choose securities which, in this case, is similarly inadequate, since the average performance is negative.

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FOOTNOTES

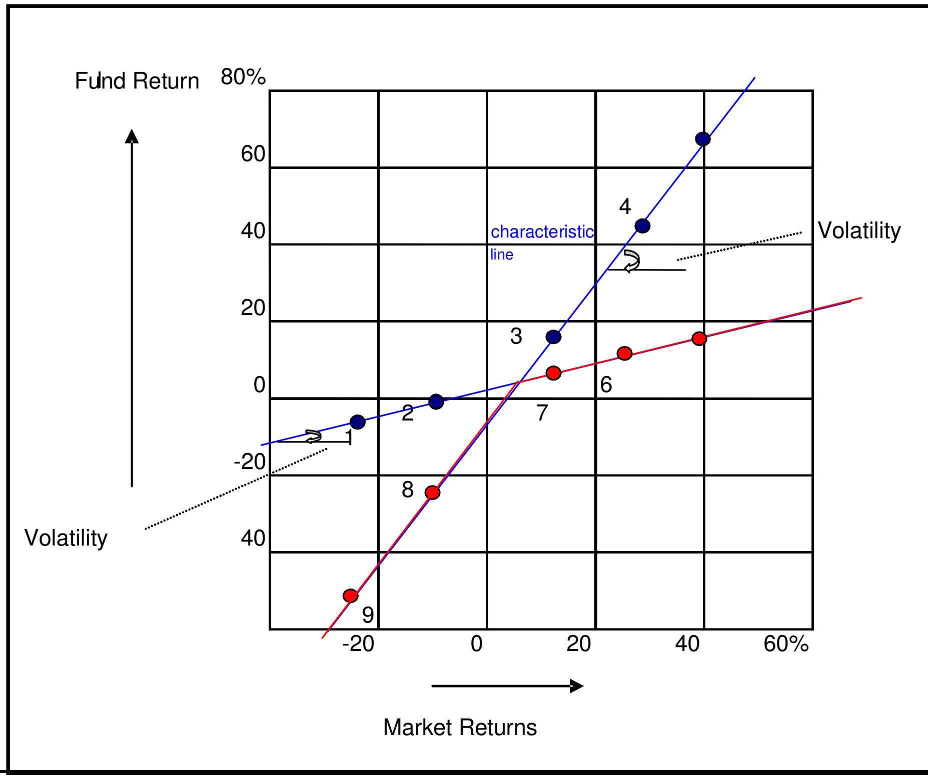
1. See Appendix 1 about the composition of the portfolios analyzed.

2. Around 16% of funds not were considered in the period analyzed. They have not been included because the minimum time period required in the analysis had not passed since they were created.

3. See Appendix 2 about the analysis of normality on yield series.

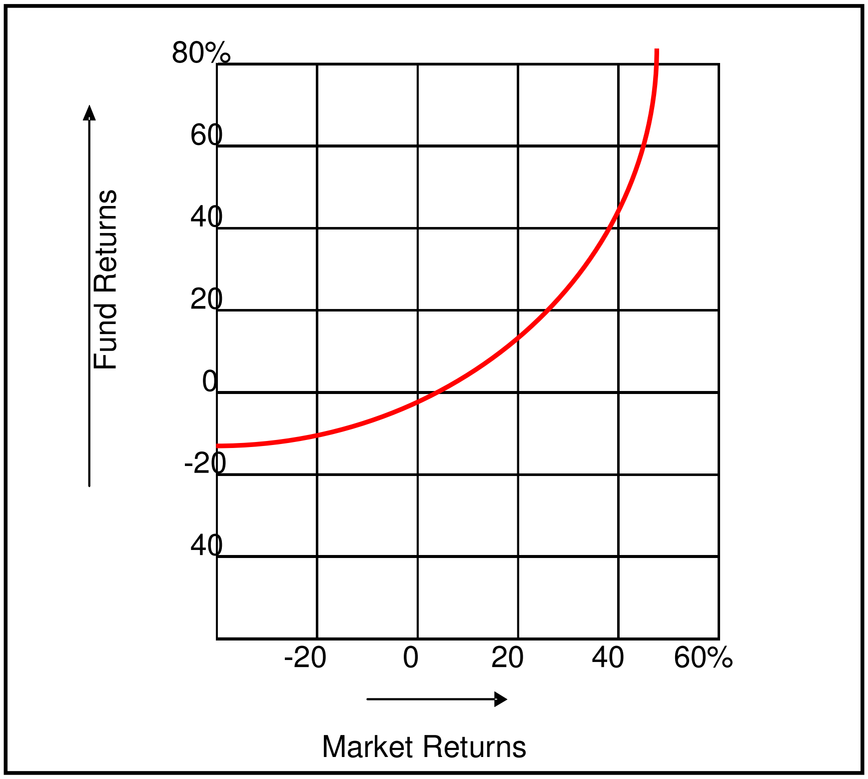
4. See Appendix 3 about the factor analysis of the predetermined information variables that present problems of multicollinearity.

FIGURE 1



SOURCE: TREYNOR AND MAZUY (1966)

FIGURE 2



SOURCE: TREYNOR AND MAZUY (1966)

TABLE 1: Predictive power of the predetermined information variables

Variable	R-Square
repos	0.492%
Term spread	0.735%
Dividend yield	1.873%
real bond yield	1.969%
inverse relative wealth	1.066%
dummy January	0.866%

TABLE 2: Correlation between predetermined information variables

	repos	Term spread	dividend y.	Real bond y.	Inv.rel.wealth	January d.	December d.
repos	1	,302(**)	,940(**)	,872(**)	-0,055	-0,02	-0,017
Term spread	,302(**)	1	,411(**)	,563(**)	0,048	-0,043	-0,053
dividend yield	,940(**)	,411(**)	1	,950(**)	-0,135	0,001	-0,014
Real bond y.	,872(**)	,563(**)	,950(**)	1	-0,123	-0,004	-0,027
Inv.rel.wealth	-0,055	0,048	-0,135	-0,123	1	-0,058	-0,052
January d.	-0,02	-0,043	0,001	-0,004	-0,058	1	-0,091
December d.	-0,017	-0,053	-0,014	-0,027	-0,052	-0,091	1

(**) Statistical significance level of 1%

TABLE 3: Average values of the parameters of the market timing models

Traditional Treynor-Mazuy model					Conditional Treynor-Mazuy model				
α_p	$t(\alpha_p)$	γ_{tmu}	$t(\gamma_{tmu})$	R^2	α_p	$t(\alpha_p)$	γ_{tmc}	$t(\gamma_{tmc})$	R^2
-0,0036	-1,9027	0,0955	0,4694	0,8197	-0,0046	-2,0186	0,0457	0,5911	0,8510
Traditional Merton-Henriksson model					**Conditional Merton-Henriksson model**				
α_p	$t(\alpha_p)$	γ_{mhu}	$t(\gamma_{mhu})$	R^2	α_p	$t(\alpha_p)$	γ_{mhc}	$t(\gamma_{mhc})$	R^2
-0.0040	-1,6487	0,0322	0,4683	0,8194	-0,0042	-1,7112	-0,0566	0,1039	0,8695

TABLE 4: Distribution of the t-statistics for the alpha parameter

	Traditional T-M model	Conditional T-M model	Traditional M-H model	Conditional M-H model
α>0	**19**	**24**	**23**	**33**
α>0 & significant (1%)	0	0	0	0
α>0 & significant (5%)	1	0	0	3
α>0 & significant (10%)	2	2	0	3
α<0	**206**	**201**	**202**	**192**
α<0 & significant (1%)	64	86	49	58
α<0 & significant (5%)	115	130	95	97
α<0 & significant (10%)	143	144	113	123

TABLE 5: Distribution of the t-statistics of the market-timing coefficient

	Traditional T-M model	Conditional T-M model	Traditional M-H model	Conditional M-H model
$\gamma>0$	**145**	**142**	**141**	**119**
$\gamma>0$ & significant (5%)	23	16	21	18
$\gamma<0$	**80**	**83**	**84**	**106**
$\gamma<0$ & significant(5%)	6	5	7	14

APPENDIX 1: Composition of the portfolios analyzed

NOTE: For each agency an "average" portfolio is shown as the result of all the funds managed by each management company. Updated at the end of 2002. Note how in all cases the percentage of the equity portfolio is over 70%.

MANAGEMENT COMPANY	internal portfolio		external portfolio		total
	%equities	%fixed income	%equities	%fixed income	%equities
UNIGEST	95.13	0.00	4.87	0.00	100.00
CAIXA TARRAGONA GESTIO	100.00	0.00	0.00	0.00	100.00
BANKPYME	73.26	0.00	26.74	0.00	100.00
SANTANDER GESTIÓN DE ACTIVOS	14.76	2.05	83.18	0.00	97.94
LLOYDS INVESTMENT ESPAÑA	92.76	2.35	4.89	0.00	97.65
BARCLAYS FONDOS	88.75	3.08	8.17	0.00	96.92
BBK GESTIÓN	38.65	3.08	58.27	0.00	96.92
BANSABADELL INVERSIÓN	96.24	3.76	0.00	0.00	96.24
MARCH GESTIÓN DE FONDOS	91.50	4.07	4.43	0.00	95.93
ESPIRITO SANTO GESTIÓN	55.34	5.30	39.36	0.00	94.70
GAESCO GESTIÓN	93.13	6.87	0.00	0.00	93.13
INVERSAFEI	83.77	7.14	9.09	0.00	92.86
CREDIT AGRICOLE ASSET MANAGEMENT F.	45.86	7.44	46.70	0.00	92.56
EDM GESTIÓN	92.51	7.49	0.00	0.00	92.51
ALLIANZ GESTIÓN	92.39	7.61	0.00	0.00	92.39
SEGUROS BILBAO FONDOS	91.99	8.01	0.00	0.00	91.99
CEP GESTORA	84.59	9.45	5.03	0.93	89.62
BESTINVER GESTIÓN	41.58	11.36	47.07	0.00	88.65
URQUIJO GESTIÓN	86.33	12.60	1.07	0.00	87.40
RENTA 4 GESTORA	39.68	12.86	47.47	0.00	87.15
ADEPA	57.76	13.97	28.27	0.00	86.03
GESCOOPERATIVO	84.32	15.10	0.58	0.00	84.90
BANKOA GESTIÓN	82.06	17.94	0.00	0.00	82.06
INVERSEGUROS GESTIÓN	80.13	17.99	1.88	0.00	82.01
PRIVAT BANK PATRIMONIO	65.45	18.33	16.22	0.00	81.67
KUTXAGEST	80.73	19.27	0.00	0.00	80.73
GESBETA MEESPIERSON	79.50	20.50	0.00	0.00	79.50
CREDIT SUISSE GESTIÓN	70.07	20.95	8.98	0.00	79.05
GES.FIBANC	76.39	21.88	1.73	0.00	78.12
GESCAFIX	46.25	23.17	30.58	0.00	76.83
SOGEVAL	73.41	23.23	3.36	0.00	76.77
MAPFRE INVERSIÓN DOS	55.93	19.54	20.79	3.74	76.72
GESDINCO GESTIÓN	70.85	26.00	3.15	0.00	74.00
AHORRO CORPORACIÓN GESTIÓN	68.85	26.33	4.82	0.00	73.67
CAJA LABORAL GESTIÓN	73.60	26.40	0.00	0.00	73.60
IBERCAJA GESTIÓN	63.30	26.67	10.03	0.00	73.33
INVERCAIXA GESTIÓN	73.23	26.77	0.00	0.00	73.23
ARCALIA INVERSIONES	39.33	21.78	33.74	5.15	73.07
CREDIGES	13.77	27.33	58.90	0.00	72.67
BBVA GESTIÓN	70.91	28.41	0.69	0.00	71.60
GUIPUZCOANO	38.95	22.07	32.50	6.48	71.45
RIVA Y GARCÍA GESTIÓN	31.92	26.00	38.43	3.65	70.35

SOURCE: CNMV

APPENDIX 2: Normality analysis of the sample analyzed

For each fund and type of return, the Kolmogorov-Smirnov statistic was applied (with the Lilliefors correction) as an indicator for testing normality. In most cases, when using the Kolmogorov-Smirnov statistic, one must estimate the unknown parameters that characterize the theoretical distribution. If the distribution that you wish to adjust is normal, you have to estimate the mean and standard deviation. In this case, the parameters are estimated using the maximum likelihood method and the statistical distribution changes.

Now the test statistic is:

$$D_n = \sup_{x \in R} |F_n(x) - \Phi((x - \overline{x})/s_X)|,$$

where $\Phi(z)$ is the distribution function of a standard normal distribution.

The statistic Dn represents the maximum discrepancy, in the vertical element, between the empirical distribution function and the distribution function of the adjusted normal distribution (in other words, of the normal distribution with an estimated mean and variance). The distribution of this statistic was tabulated by Lilliefors (K-S-L test); therefore the significance of the value obtained for this statistic should be judged in relation to this tabulation (and not in relation to Kolmogorov-Smirnov's table).

RESULTS

16.0% of the 225 domestic equities analyzed reject normality hypothesis

REPORT

For the monthly returns we can accept the hypothesis of normality for almost all of the funds.

APPENDIX 3: Factor analysis of the predetermined information variables "repos", "real bond yield" and "dividend yield"

Correlations Matrix

		Repos	Dividend yield.	Real bond yield
	Repos	1	0,940	0,872
	Dividend yield	0,940	1	0,950
	Real bond yield	0,872	0,950	1
One-side significance	Repos.		0	0
	Dividend yield.	0		0
	Real bond yield	0	0	
Determinant	0,016			

KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0,629
Bartlett's test of Sphericity	Approximate Chi-Squared	384,804
	Freedom degrees	3
	Statistical significance	0

Anti-image matrices

		Repos	Dividend yield	Real bond yield
Anti-image covariance	Repos	0,127	-0,062	0,042
	Dividend yield	-0,062	0,048	-0,060
	Real bond yield	0,042	-0,060	0,110
Anti-image Correlation	Repos	,671[a]	-0,786	0,354
	Dividend yield	-0,786	,573[a]	-0,819
	Real bond yield	0,354	-0,819	,659[a]

a. Measure of Sampling Adequacy

Communalities

	Initial	Extraction
Repos	1	0,899
Dividend yield	1	0,980
Real bond yield	1	0,906

Extraction method: Principal components analysis

Total explained variance

Component	Initial auto-values			Extraction Sums of Squared loadings		
	Total	% of variance	% accumulated	Total	% of variance	% accumulated
1	2,784	92,813	92,813	2,784	92,813	92,813
2	0,184	6,143	98,956			
3	0,031	1,044	100			

Factors Matrix

	Component
	1
Repos	0,948
Dividend yield	0,990
Real bond yield	0,952

Correlations reproduced

		Repos	Dividend yield	Real bond yield
Reproduced correlation	Repos	,899[b]	0,938	0,902
	Dividend yield	0,938	,980[b]	0,942
	Real bond yield	0,902	0,942	,906[b]
Residual[a]	Repos		-0,014	-0,086
	Dividend yield	-0,014		-0,007
	Real bond yield	-0,086	-0,007	

[a] Residuals are computed between the observed and reproduced correlations

There are 1 (33%) non-redundant residuals with absolute values greater than 0,05

[b] Reproduced Communalities

Factor Score Coefficient Matrix

	Component
	1
Repos	0,34
Dividend yield	0,355
Real bond yield	0,342

Rotation method: Varimax with Kaiser Normalization