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Performance in the Management of Spanish and European Investment Funds

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Abstract: This study we analyse the positive effect that international financial diversification has over its domestic counterpart in achieving the efficient management of investment funds. We first consider the standard Sharpe measurement, before proposing and justifying alternative measurements of performance which, as indicators of utility, are applied in a comparative analysis of the management performance of investment funds versus that of the IBEX-35, IGBM, Euro Stoxx 50 and Eurotop 100. We provide evidence of the advantages of international diversification, as well as the difficulties encountered by investment funds in exceeding the performance of their benchmark, particularly those referring to international investment.

Key words: Performance ratios, diversification

INTRODUCTION

This study compares the management performance of portfolios limited to investment in domestic equities against those that diversify their investment in a number of international markets. The comparison is based on empirical evidence from investment funds operating in the Spanish market.

Performance measurement as a subject of the financial literature starts from the risk/return analysis first modelled by Markowitz[1-3] and further developed by a number of scholars, the best known of whom is Sharpe[4-7]. Sharpe's contributions laid the foundations for the development of the Capital Asset Pricing Model, which he first worked out in 1963 and was later described by Fama[8] as the Sharpe-Lintner-Black model.

Applying the basic concepts of the CAPM, scholars such as Sharpe[9], Treynor[10] and Jensen[11] combined returns with the risk inherent in financial investments to create the first portfolio performance measures.

Following these pioneering performance indices, a variety of lines of research has grown up, including the following:

- Certain scholars break performance down into factors such as the ability of portfolio managers to synchronise their activity with the market and their skill in investment security selection. This analysis concentrates on defining the portfolio management style[12-22].
- Other scholars have based their work on the methodology proposed by Sharpe and have focused on the analysis of risk-adjusted returns, obtaining similar findings to those of Sharpe himself. Key work in this area has been done by scholars such as Treynor and Mazuy[23], Graham and Harvey[24,25], Modigliani and Modigliani[26], Muralidhar[27].
- Yet others have sought to establish the persistence of efficient management in an effort to predict the future performance of portfolios on the basis of past results[28-39].

Certain critical positions with regard to the functioning of the CAPM are also to be found in the financial literature. For this reason, scholars such as Carhart[40] use a four-factor rather than the single factor model. This includes the three factors proposed by Fama and French[41] and Jegadeesh and Titman's[42] momentum factor, the application of which can also be observed in the work of Korhana[43].

In this study we have used the Sharpe ratio and the risk-adjusted returns approach to assess portfolio performance, since this remains the paradigm for performance measurement, as is pointed by Stutzer[44] and Muralidhar[27]. It is worth noting that the application of Sharpe's measure does not require either the validity or verification of the CAPM, as is the case with the measures proposed by, for example, Treynor and Jensen.

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This measure is applied, then, with the aim of determining the benefits to be gained from international financial diversification, a phenomenon which represents a paradigm of portfolio risk reduction and, at the same time, is one of the key subjects of Portfolio Theory.

The advantages of risk reduction at the level of international investment was originally discussed by scholars such as Grubel[45], Levy and Sarnat[46], Solnik[47]. Other significant research includes the research of Lessard[48,49], Solnik and Noetzlin[50], Logue[51], Jorion[52], Grauer and Hakansson[53], Haavisto and Hanson[54], Liljeblom *et al.*[55], Gerrits and Yüce ,[56] Chandar and Patro[57] and Pan *et al.*[58].

There is growing interest within the field addressed in this paper in the study of the combined problem of portfolio management performance and international diversification. In addition to the work cited above, papers by Chang *et al.*[59], Patro[60] and Ahmed[61] stand out in this regard.

The current state of research in the field of financial diversification, particularly in the international context, shows on the one hand a necessary and growing sophistication in the matter of data treatment and, on the other, an accretion of empirical evidence supporting international diversification processes. Nevertheless, it seems to be no easy task to beat the market or the relevant indices at the level of investment funds and in general a degree of underperformance compared to the benchmark is observable.

At the same time, the empirical analysis contained in this paper reveals that Sharpe's measure may at times give rise to errors where certain anomalous market situations occur. We are also concerned to establish a link between Sharpe's measure and utility in the presence of risk in order to seek a ratio that would allow measurement of the utility of an investment for a financial decision-maker.

In order to take account of these matters, present study includes certain small variations on the Sharpe ratio with a view to ensuring the consistency of performance rankings and achieve an approximation of the Sharpe ratio to utility index.

The Sharpe ratio and the link to utility in the presence of risk:

The Sharpe ratio is expressed as follows:

$$S_p = \frac{E_p - R_f}{\sigma_p} \quad (1)$$

Where: E_p is the average return on a portfolio, p; R_f is the average return on a risk-free asset; and σ_p is the standard deviation in the return on the portfolio, p

This performance measure describes a linear marginal substitution relationship between the average return on a portfolio and the associated level of risk.

It will be seen that for this measure to operate coherently, portfolios must provide positive premiums, which is to say that $E_p > R_f$. Where this is not the case, the sensitivity of the ratio to the level of risk contained in the portfolio would be illogical, implying that any increase in the risk of an investment would carry with it higher levels of performance.

One proposal to correct this would be to consider the return premium in relative rather than absolute terms: Thus:

$$S_p(1) = \frac{E_p/R_f}{\sigma_p} \quad (2)$$

The link between the performance of portfolio management and Utility Theory appears to be Theory within a minimum conceptual framework appropriate for the purpose of treating performance measures as indicative of the level of utility obtained by a given financial decision-maker from investment in a specific portfolio.

To this end we propose seven postulates of financial logic with the aim of bringing portfolio resting on key aspects of utility theory in the presence of risk. These postulates are as follows:

Utility or satisfaction depend on risk and returns:

$$U = f(E_p, \sigma_p) \quad (3)$$

Where: U is utility. E_p is the expected return on p. σ_p is the portfolio risk measured in terms of standard deviation.

Utility increases in line with returns if risk remains constant:

$$\frac{\delta U}{\delta E_p} > 0 \quad (4)$$

Utility decreases as risk increases if returns remains constant:

$$\frac{\delta U}{\delta \sigma_p} < 0 \quad (5)$$

There is a positive premium on returns at higher levels of risk. As risk increases it must be traded off against rising returns:

$$\frac{dE_p}{d\sigma_p} > 0 \quad (6)$$

This postulate is a consequence of or inference from the preceding two.

Marginal returns rise strictly in line with risk. Where risk increases, the related increment in returns is more than proportional:

$$\frac{d^2E_p}{d(\sigma_p)^2} > 0 \quad (7)$$

The combination of this and the fourth postulate implies a financial risk-return field formed by increasing, convex indifference curves. The degree of risk aversion is represented by the convexity of the indifference curve, which is equivalent to the demand for higher premiums to trade the acceptance of higher risk off against an increase in returns.

Positive marginal utility decreases strictly in line with returns: Declining marginal utility in the presence of wealth is a generally accepted principle of utility theory. In this context, however, it would seem appropriate to modify the principle such that marginal utility declines with returns, expressed analytically as follows:

$$\frac{\delta^2U(E_p,\sigma_p)}{\delta(E_p)^2} < 0 \quad (8)$$

This postulate may be relaxed to allow a more general position in which marginal utility is decreasing or constant with returns. Analytically, it is as:

$$\frac{\delta^2U(E_p,\sigma_p)}{\delta(E_p)^2} \leq 0 \quad (9)$$

Negative marginal utility increases strictly with risk: From the point of view of the rational, risk averse decision maker, this postulate reflects the increasing disutility experienced by the investor in the presence of rising levels of risk. Analytically, it is expressed as follows:

$$\frac{\delta^2U(E_p;\sigma_p)}{\delta(\sigma_p)^2} > 0 \quad (10)$$

This postulate may also be relaxed to admit a more general case, such that:

$$\frac{\delta^2U(E_p;\sigma_p)}{\delta(\sigma_p)^2} \geq 0 \quad (11)$$

Taking these seven postulates into consideration, we may observe the following with regard to the Sharpe ratio:

- In accordance with postulate 3, $E_p > R_f$ must hold for Sharpe's index to function properly with regard to risk. As we have already mentioned, this circumstance is a requirement of long-term financial logic, though it may not necessarily occur in certain transitory scenarios in the financial markets. The alternative measure shown in expression (2) is proposed to resolve this situation.
- Contrary to postulate 5, Sharpe's index does not consider scaled increases in returns in the presence of rising levels of risk. Thus, the indifference curves are straight. This is equally applicable to the alternative ratio Sp(1), in view of which we may conclude that neither the original nor the alternative measures meets this postulate of Utility Theory in the presence of risk.

To resolve this second issue in the analysis, we may consider a further alternative ratio that measures risk through the variance rather than the standard deviation. On the basis of the Sharpe ratio, this may be expressed analytically as follows:

$$S_p(2) = \frac{E_p - R_f}{\sigma^2_p} \quad (12)$$

This index does consider the existence of scaled increases in returns in the presence of rising levels of risk and it therefore represents an approximation to quadratic utility functions.

The $S_p(2)$ ratio will operate correctly within the framework considered provided, as we have already explained, that the return on the portfolio exceeds that of the risk free asset considered.

Where not all of the portfolios analysed show higher average returns than the risk-free asset considered, the Sp(1) ratio should be taken as the reference. Thus, if the variance is considered in order to account for increasing aversion in the face of rising levels of risk, we may propose another alternative performance measure, which is expressed as follows:

$$S_p(3) = \frac{E_p / R_f}{\sigma^2_p} \quad (13)$$

Data bases used in the study: The next step is to obtain empirical evidence of the advantages of international financial diversification on the basis of a study of the quarterly returns obtained by a sample of 30 Spanish investment funds, of which 7 invest in European equities

and 23 exclusively in domestic equities, over the period from January 1995 until December 2000.

Three-month Treasury bills over the time horizon of the study are used as the risk free asset in the calculation of fund performance using the Sharpe ratio.

Finally, the study incorporates the results obtained by the two most representative Spanish stock market indices, the general Madrid Stock Market Index (IGBM) and the selective IBEX 35, as well as two further selective indices that are representative of international stock markets (Euro Stoxx 50 and Eurotop 100).

RESULTS

European equity funds: Figure 1 and 2, respectively reflect the returns and total risk of each of the seven funds forming part of the sample, as well as the four benchmark equity indices and the risk free asset.

On the basis of Fig.1, the Euro Stoxx 50 index shows the highest average return of the four stock market indices considered. At the same time, only two of the seven funds considered achieved average returns that were higher than the four stock market indices, although all of them managed a higher average return than the risk free asset and, as a consequence, the Sharpe ratio can be applied.

In view of this, it is not necessary to apply the alternative $S_p(1)$ ratio. Nevertheless, consideration of both the $S_p(2)$ and $S_p(3)$ is not without interest as they provide alternative performance rankings for the funds based on the postulates of the conceptual framework presented in the preceding section. This takes into account certain basic principles of utility in the presence of risk.

The key feature of Fig. 2 is the high level of risk presented by the Spanish stock market indices compared to the more moderate risk of the European indices, especially the Eurotop 100. This confirms that international financial diversification allows a reasonable reduction of the risk inherent in a portfolio.

Risk and return are considered together in Fig. 3, which illustrates the relative positioning of each portfolio or index in the risk-return environment. The Fig. 3 takes the values for the domestic stock market indices as the benchmark, showing that these indices are surpassed by both the Euro Stoxx 50 and two of the investment funds, which generated higher average returns while involving a lower level of risk. The remaining indices and portfolios reveal a lower level of risk, although the returns obtained are also lower.

Finally, none of the portfolios beats the Euro Stoxx 50 taken as the benchmark, since even the two investment funds with the higher averages also show higher levels of risk.

This confirms that is very difficult for the investment funds analysed to surpass the indices that may be considered as benchmarks in accordance with the nature of investments in the portfolios. This difficulty is given in Fig. 4, which shows portfolio performance resulting from the application of Sharpe's original measure. Furthermore, the superiority of the European over domestic indices is confirmed.

None of the funds surpasses the Euro Stoxx 50 index, although one of them comes close, beating the Eurotop 100. The performance of a second fund is also close to the latter index. Clearly, these are the two portfolios that stand

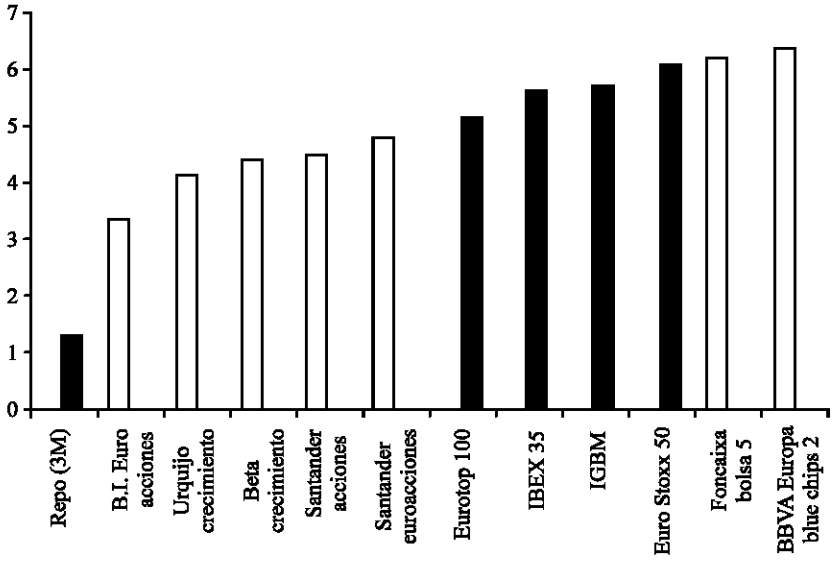

Fig. 1: Average quarterly returns on European stock market indices and equity funds (1995-2000)

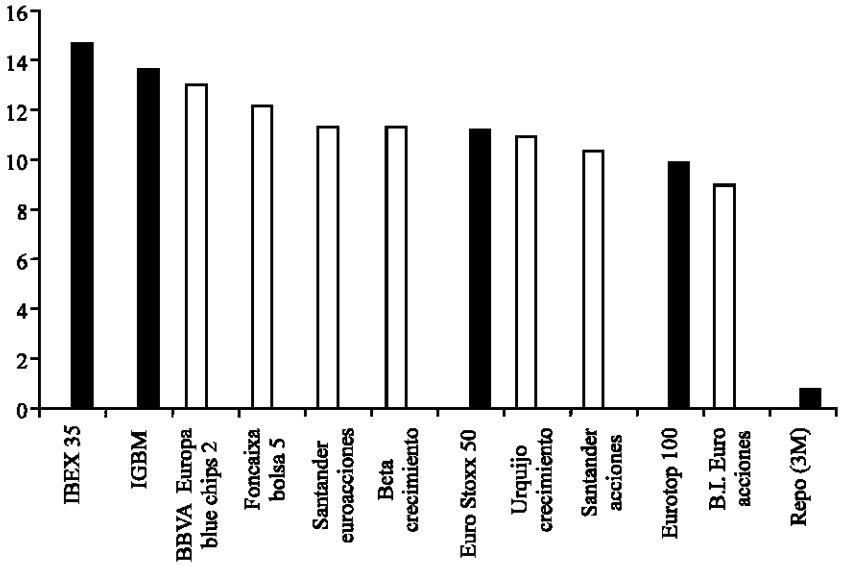

Fig. 2: Total risk of European stock market indices and equity funds (1995-2000)

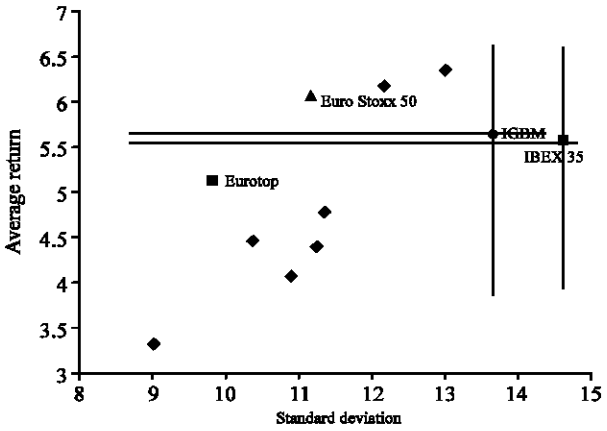

Fig. 3: Combined risk and returns (European equity funds)

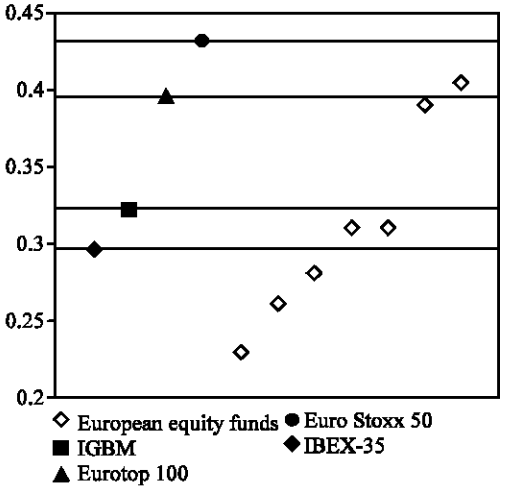

Fig. 4: Performance of European equity funds and benchmark indices using the Sharpe ratio

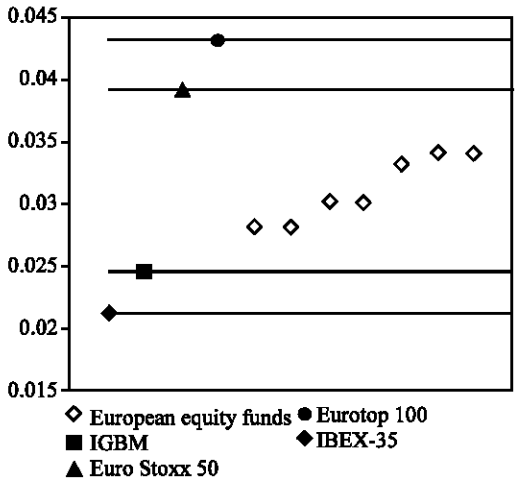

Fig. 5: Performance of European equity funds and benchmark indices using the alternative $S_p(3)$ ratio

out in Fig. 3 and they both outshine the domestic indices. Two of the other five investment funds considered present values that are close to the domestic indices, while the other three are clearly beaten even by the Spanish market indices.

These findings may be confirmed and supported by the application of an alternative measure such as $S_p(3)$, which seeks to provide a performance ranking based on utility in the presence of risk.

The application of this measure is shown in Fig. 5. The two selective European indices stand out here due to their relatively high performance, while the domestic indices are to be found at the bottom of the ranking. The seven investment funds are to be found in the middle with relatively similar levels of performance.

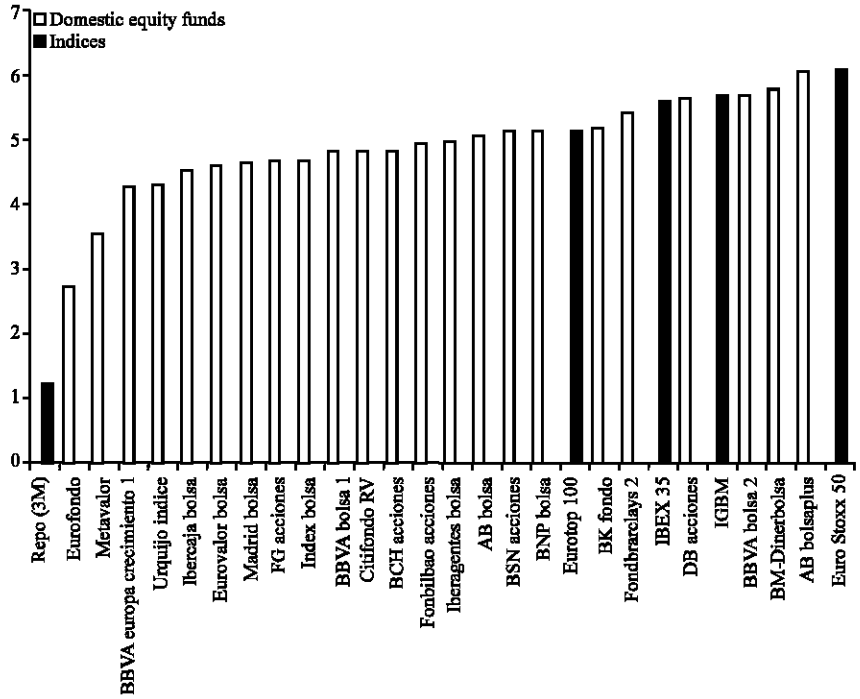

Fig. 6: Average quarterly returns on Spanish stock market indices and equity funds (1995-2000)

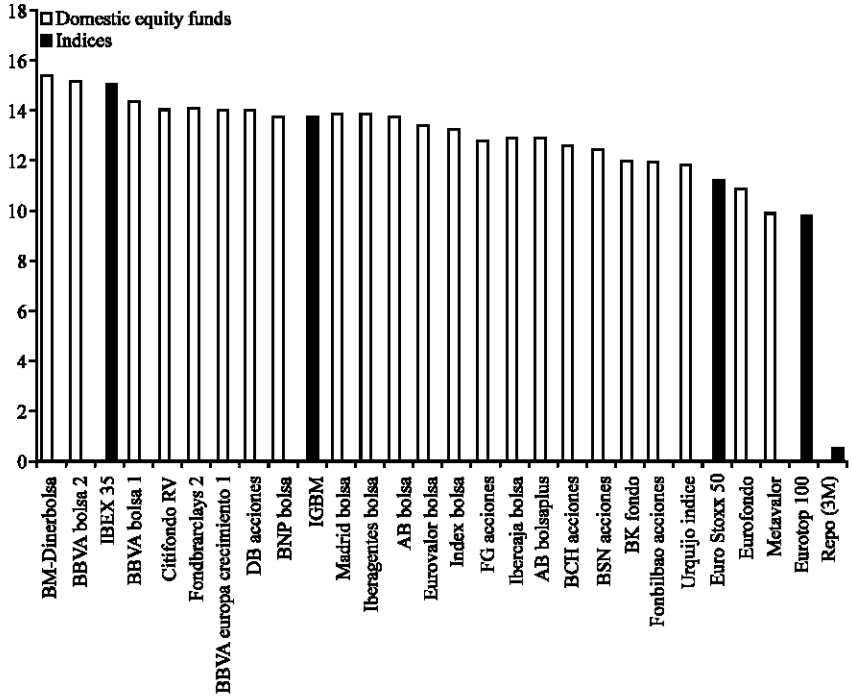

Fig. 7: Total risk of Spanish stock market indices and equity funds (1995-2000)

The immediate conclusion is to confirm that international financial diversification through European investment funds provided the financial investor with a higher level of utility than simply investing in assets that seek to mirror the evolution of the Spanish stock market over the time horizon of the study.

Spanish equity funds: Figure 6 and 7, respectively reflect the average returns and total risk of each of the 23 funds forming part of the data base, as well as the four benchmark equity indices and the risk free asset.

It can be seen in Fig. 6 that the risk free asset once again presents a lower average return than that offered by the indices and portfolios considered and, once again, this allows us to use Sharpe's original measure to obtain coherent performance rankings. In this case, none of the funds surpasses the average return provided by the Euro Stoxx 50 index, while four achieved a higher return than the IBEX and only three beat the Madrid General Index (IGBM).

An analysis of the levels of risk shown in Fig. 7 once again reveals the dominating position of the European stock market indices. Thus, without taking the risk free asset into consideration, the Eurotop 100 index is the least risky portfolio and only two of the funds in the data base show a lower level of risk than the Euro Stoxx 50. Nevertheless, the majority of the funds present lower levels of risk than the domestic indices. Indeed, only eight funds are riskier than the IGBM, while only two are riskier than the IBEX index.

Figure 8 presents an overall picture of the total risk and returns of all of the financial assets analysed. The dominating position of the European stock market indices compared to Spanish indices is clear and this is also true of the investment funds considered.

Comparison of the funds with the domestic indices reveals one fund that beats both in terms of risk and returns. At the same time, a series of funds show similar levels of risk and returns, although the majority of the portfolios generate a lower return but with less total risk. In this light, it is necessary to calculate rankings based on the application of risk-return performance indices in order to establish which funds beat the market and which underperformed.

The application of the Sharpe ratio is given in Fig. 9. Here, we may observe that none of the funds achieved the performance levels of the European indices, although two surpass the IGBM and one of these obtained a performance value that is very close to the Eurotop 100. Of the rest, only four funds outperformed the IBEX while the remaining 17 show lower levels of performance than this benchmark. Once again, the difficulty experienced by fund managers in generating a higher performance than the relevant benchmark indices for their investment aspirations is clear.

As in the previous case, the application of the alternative $S_p(3)$ ratio supports the conclusions drawn from the application of the original measure. In this regard, it can be seen in Fig. 10 that the performance of all of the funds as measured by $S_p(3)$ is significantly behind the

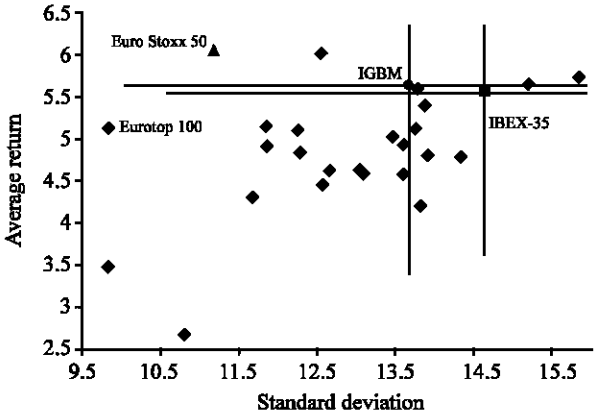

Fig. 8: Combined risk and returns (Spanish equity funds)

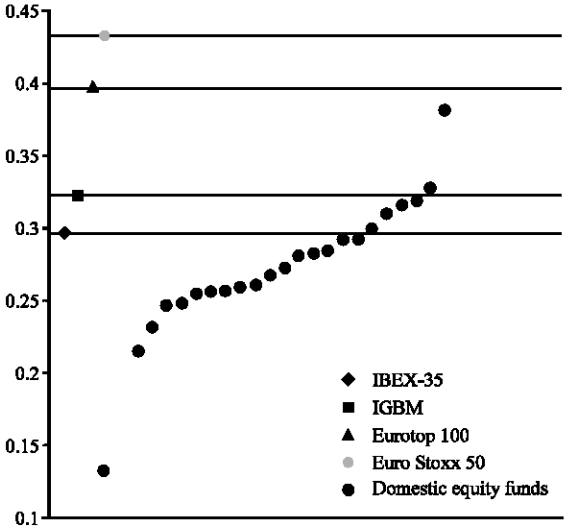

Fig. 9: Performance of domestic equity funds and benchmark indices using the Sharpe ratio

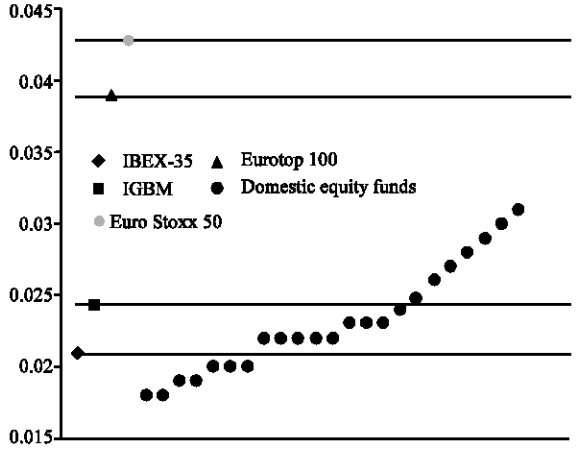

Fig. 10: Performance of Spanish equity funds and benchmark indices using the alternative $S_p(3)$ ratio

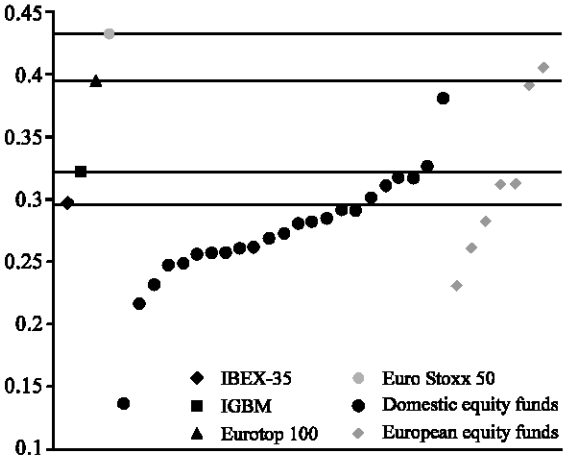

Fig. 11: Application of the Sharpe ratio to all funds

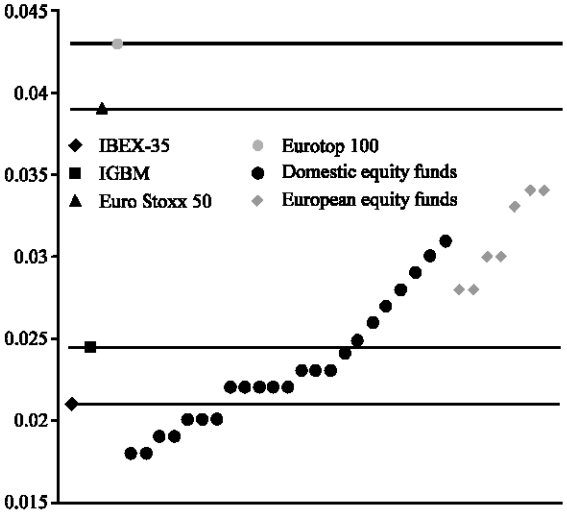

Fig. 12: Application of the $S_p(3)$ ratio to all funds

values obtained by the European indices. Applying $S_p(3)$, however, a greater number of funds beat the IGBM (7) and the IBEX (9), while the other 7 underperform.

Comparison of domestic and european equity funds: This last part of the empirical analysis of the study data base seeks to compare the results obtained by the equity funds that diversify at the European level compared to those of the funds that are limited to investment in the domestic stock market. This comparison is based on the two measures applied in the preceding analyses.

The application of both ratios to the full 30 investment funds is shown in Fig. 11 and 12, which respectively present the Sharpe ratio and the alternative measure.

Figure 11 shows a certain dominance of funds diversifying at the European level over those that do not. In particular, the two funds already mentioned as having achieved notable performance during the period considered stand out.

Nevertheless, in the remaining cases, the superiority of internationally diversified funds, though observable, is less clear cut than in the case of the aforementioned two funds.

This dominance is, however, much more clearly apparent in Fig. 12, where consideration of the postulates related with utility in the presence of risk permits the application of an alternative measure to provide an appropriate basis to evaluate the improved performance achieved though European financial diversification.

In the Fig. 12. it can be seen that the European equity funds conspicuously outperform the domestic equity funds, with all seven of the internationally diversified funds among the top 10.

CONCLUSIONS

Studies of the levels of performance achieved by portfolios of financial assets have become an important field of financial research, as well as a matter of increasing academic, professional and social interest. Work has increasingly been aimed at the analysis of international financial diversification as a means of reducing the risk borne by portfolios compared to straightforward domestic investment.

Among the performance measures that combine the attributes of risk and return on financial investments, the Sharpe ratio remains a basic paradigm for the measurement of management performance.

Nevertheless, the operation of the Sharpe ratio may be erroneous in certain anomalous market situations that may arise from time to time.

Correcting these possible inconsistencies and linking the performance of portfolios to utility in the presence of risk, alternative measures to the Sharpe ratio may be proposed. These nevertheless form a part of the same family and allow measurement of the level of risk obtained by the financial decision-maker from investment in a given portfolio or fund.

In order to verify whether international financial diversification in fact has a positive effect on the performance of a group of Spanish investment funds, we have applied the Sharpe ratio and an alternative, derived index that meets all of the basic postulates related with utility in the presence of risk to 7 European equity funds and 23 domestic equity funds, as well as to four Spanish and European stock market indices.

The risk free assets used present average returns that are clearly lower than either the indices or the portfolios considered. The Euro Stoxx 50 index, meanwhile, presents a clearly higher level of returns than the average.

The levels of risk presented by the European indices are conspicuously lower than the domestic indices and we may therefore affirm that international financial diversification provides a reasonable avenue to reduce the risk inherent in a portfolio.

Only one European investment fund managed to been the Eurotop 100 index. Three European and 2 domestic funds are less risky than the Euro Stoxx 50, while all of the European and the majority of the domestic funds are less risky than either the IBEX 35 or the IGBM indices. Indeed, only eight of the domestic equity funds are more risky than the IGBM and only two more so than the IBEX.

The following conclusions may be drawn from the application of the Sharpe ratio:

- The European indices clearly outperform the Spanish indices, which confirms that international financial diversification provides more efficient results.
- None of the international investment funds achieved a better performance than the Euro Stoxx 50 index, while one of the funds considered is close to the Eurotop 100, which another of the European funds outperforms.
- None of the funds investing only at the domestic level achieved similar performance to the European indices, although two outperformed the IGBM (one of them obtaining a performance value that was very close to the Eurotop 100) and six outperformed the IBEX 35.

All of these conclusions are confirmed and supported by the application of the alternative utility measure $S_p(3)$.

- When this performance measure, which meets certain postulates related with utility in the presence of risk, is applied to the stock market indices, the ranking obtained differs from that resulting from the application of the Sharpe ratio and distances between levels of performance become more marked.
- Analysis of the European investment funds reveals that all of achieve relatively similar levels of performance and fall short of the European indices while significantly outperforming the Spanish indices.
- The performance levels of all of the domestic investment funds measured using $S_p(3)$ are significantly lower than those of the European indices. Nevertheless, on the basis of this ratio the number of domestic funds that surpass the IGBM and IBEX 35 indices in terms of both performance and utility is significantly higher than when the Sharpe ratio is applied.

The application of Sharpe's performance measure to both groups of funds reveals a certain dominance of the portfolios that diversify at the European level compared to those that do not. Two funds achieve particularly notable performance levels.

This dominance is much more marked when the measure applied is $S_p(3)$. In this case, the European equity funds clearly outperform the average for the domestic equity funds and all seven internationally diversified funds are among the top 10.

The results of this analysis show that international financial diversification through European investment funds provides a higher level of utility for the financial investor than merely investing in assets that seek to mirror the evolution of the Spanish stock market.

By way of a final synthesis, we might say that, in spite of the empirical evidence in favour of international financial diversification processes, the results obtained clearly reveal the difficulties experienced by the managers of the funds considered in obtaining higher levels of performance than the relevant benchmark indices resulting from the nature of their investments. These difficulties are especially apparent when portfolios are diversified at the cross-border level.

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APPENDIX

Study of partial derivatives permitting analysis of the Sharpe ratio and the alternatives proposed as approximations to utility indicators in the presence of risk.

	S_p	$S_p(1)$	$S_p(2)$	$S_p(3)$
$\delta I_p / \delta E_p$	+	+	+	+
$\delta^2 I_p / \delta (E_p)^2$	= 0	= 0	= 0	= 0
$\delta I_p / \delta \sigma_p$	- (*)	-	- (*)	-
$\delta^2 I_p / \delta (\sigma_p)^2$	+ (*)	+	+ (*)	+
$\delta E_p / \delta \sigma_p$	+	+	+	+
$\delta^2 E_p / \delta (\sigma_p)^2$	= 0	= 0	+	+

(*) If $E_p > R_f$

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