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Advantages of International Financial Diversification in Europe Through Investment in Equity Funds

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Abstract: In the context of rapid globalisation of financial markets and consolidation of European Economic and Monetary Union, we have carried out a financial risk-return analysis on a sample of the best-performing diversified equity funds investing internationally in the whole of Europe. The financial risk analysis is based on historic homoscedastic volatilities. The objective was to verify whether fund managers who diversify savings through such investment vehicles achieve performance gains, obtaining similar or higher returns at lower levels of risk than would be possible through direct investment in shares. The risk-return benchmark used in the study is the Euro Stoxx 50 index.

Key words: Investment funds, international financial diversification, volatility, performance risk

INTRODUCTION

The main objective of this study was to provide empirical evidence for the suitability of investment funds as vehicles to achieve efficient international diversification in investment portfolios and to assess the extent to which the management of such funds actually achieves the performance investors hope for when they channel their savings into fund units.

In this way, we contribute to the analysis of the risk and return of European funds during the last decade. This allows us to compare their results with those of a benchmark portfolio such as Euro Stoxx 50.

The study of investment performance involving international financial diversification strategies is a topic of considerable current interest, both in the specialist literature (valuation models proposed by Solnik^[1-4] for the international context) and from a practical and operational point of view.

In particular, the subject has become increasingly important in the European financial area over the last two decades, where it has received significant attention. For example, Sinclair *et al.*^[5], Eijgenhuijsen and Buckley^[6], Booth and Martikainen^[7], Copeland and Wang^[8], Aparicio and Estrada^[9] and Kempa and Nelles^[10].

In the dynamic framework of shifts and growth in the financial markets, the deep-rooted concept of national borders has gradually dissolved to be replaced by the

application of the terms local and domestic to the Euro-area or to Europe as a whole. As a result, the idea of cross-border diversification of financial investments in order to benefit from the advantages of international financial diversification has taken ever firmer hold^[11-14].

As a part of the development of this specialist literature, Solnik^[15], Eun and Resnick^[16], Solnik *et al.*^[17] and Pan *et al.*^[18] among other leading scholars, have also oriented their research efforts to study and identify countries, assets and financial sectors presenting the lowest levels of cross-correlation with each other in order to achieve the financial efficiency defended by Markowitz^[19].

In practice, however, large numbers of investors have found that it is no easy matter to gain any advantage from financial diversification via direct investment. For private investors it is thus practically impossible to mirror European indices such as the Euro Stoxx 50 or Eurotop 100, while they are likely to remain unaware of many stocks that should perhaps form a part of their optimum investment portfolio.

This context has provided a boost for investment funds, vehicles that have become the ideal vector for a process of financial democratisation in which small savings are able to gain access to the same advantages of volume and opportunity as are open to big capital. Investment funds have thus come to represent a paradigm of financial diversification, both at home and

internationally and have enjoyed a huge burst of development in advanced financial systems, mainly for reasons related with their tax profiles, liquidity, regulatory oversight within the financial system, professional management and economies of scale^[20].

The effects of investment diversification as applied to investment funds can be assessed using performance measures to evaluate management efficiency in risk-return terms. Major contributions to the study of investment fund and institutional portfolio performance and efficiency are as follows: Jensen^[21], Elton *et al.*^[22], Carhart^[23], Liljebloom *et al.*^[24], Ribeiro *et al.*^[25], Chamorro and Pérez de Villarreal^[26], Ferruz *et al.*^[27] and Ferruz and Sarto^[28, 29].

Empirical evidence regarding the performance of internationally diversified investment funds is inconclusive. Cumby and Glen^[30] suggest that international funds are more efficient than domestic indices, but do not outperform international indices. On the other hand, Reilly and Akhtar^[31] and Redman *et al.*^[32] provide conflicting results as consequence of their comparisons of international funds with local markets. Gallo and Swanson^[33] found that results were similar to local indices. Yet other research, such as that of Detzler and Wiggins^[34], indicates that international investment funds do not succeed in raising performance.

In view of the above, we shall present a financial analysis of the key parameters required to assess equity funds, concentrating on a rigorous and detailed analysis of the risk-return relationship, since these are highly liquid vehicles. The risk-return indicators and resulting values are related over different time horizons for the investment. Results are then compared to the other funds included in the study, all of which are analysed in parallel with the evolution of the pan-European stock market index used for benchmarking purposes, the Euro Stoxx 50.

The results of the financial analyses we have carried out confirm the lower volatility of many of these funds compared to the benchmark, amply bearing out their attractiveness to small investors, who would be find it extremely difficult to purchase the necessary stocks in international markets to mirror the Euro Stoxx 50 index.

Nevertheless, we conclude that the longer the investment horizon, the more difficult it is to outperform the benchmark at lower levels of risk. It is, however, possible to obtain similar returns at lower levels of risk.

However, we must be aware that the study is limited to a sample of equity funds.

Paper is organised as follows. Firstly, we describe the data base used in our study and the methodology applied. We shall then go on to make a selection of the

best-performing international investment funds commercialised in Spain in order to proceed with a financial analysis of their historic homoscedastic volatility and that of the Euro Stoxx 50 index. The last section contains a risk-return analysis over periods of one, two and five years (the same periods as used in the volatility analysis) in order to establish investment performance in the context of a comparison between the various international investment funds selected and the Euro Stoxx 50 index as the benchmark.

DATA BASE

The analysis has been performed taking a demand-led approach. In the first place, we have considered the investment options open to financial decision-makers selecting equity funds comprising a diversified portfolio of financial assets issued exclusively in European markets, understood in the wider geographical sense. These funds were all officially registered with the Spanish National Securities Market Commission and commercialised in Spain, although the fund management entities may not be domiciled there.

The financial analysis was performed on this extensive group of investment funds following a process of harmonisation of daily closing data for each and considering a time horizon of three years. This procedure enabled us to rank the funds on the basis of performance criteria, classifying and selecting vehicles using Sharpe's performance index. The Sharpe ratio^[35-38] 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.

Having established this performance ranking, we were able to select for this study the fourteen best-performing funds over three years out of all the equity funds investing in the European market. The top-ranked vehicles chosen are shown in Table 1.

The study was performed using the largest number of daily values as possible for each fund, in view of the significant differences in the starting dates of the various

Table 1: International investment funds analysed and data base starting dates

Fund	Management entity	Data base starting date
HSBC Pan European Equity E	HSBC	3/11/94
Fidelity Fds European Growth	Fidelity	05/07/93
Oyster Europe Value B	Oyster	04/11/99
Sudder Gof Grater Euro	Scudder	07/12/98
Share Euro Selection	Bearbull	30/04/93
Amex Epic Euro Equities	Amex	26/08/99
ABN Amro Europe Equity	ABN	28/11/94
HSBC Fondo Bolsa	HSBC	23/12/97
Principal If European Equity	Principal	27/10/99
Schroder Isf Europe Equity Gdp B	Shroder	27/07/93
BBVA Europa Crecimiento 2	BBVA	03/03/95
Templeton European	Templeton	02/01/92
Invesco Gt Pan European a	Invesco	09/03/94
Mercury St European	Mercury	09/03/94

data bases used. The data bases all end in mid-2001. In addition to the daily closing price data for each fund, we have also considered the values generated by the Euro Stoxx 50 pan-European stock market index for the same period, which have been used as the benchmark for the study.

MATERIALS AND METHODS

The objective of this study was to establish whether investment in internationally diversified European equity funds meeting the postulates of the performance criteria initially defended by Markowitz^[19] would provide a financial optimum consisting of similar or higher returns at a lower level of risk than could be obtained by direct investment in an equally diversified portfolio of European shares.

In view of this objective and given that we have focused on European markets and specifically on the best performing European equity funds, we have chosen the Euro Stoxx 50 index as the benchmark measure. The results of the study are in any case similar to those that would have been obtained had we opted for the Eurotop 100 index because of the high correlation between risk measures in the majority of European equity indices.

In the first place, the risk inherent in these specific financial assets is analysed and compared based daily data and using volatility as the measure of risk. Thus, we have examined the historic homoscedastic annual volatility of the investment funds and the benchmark established, calculated on a business days basis. The period selected for the detailed financial analysis of annual volatility thus comprises 250 days.

Since many funds publish daily data, even on Saturdays and Sundays, it would be methodologically possible to perform the volatility calculation either for all the days of the week or only for business days. However,

it seems more appropriate to consider only working days since the variation in the funds at weekends is abnormally small. In fact, only the part of the fund invested in money market assets or fixed-income securities is sensitive to changes over the weekend and this is scarcely relevant in a fund investing in such volatile assets as equities.

Homoscedastic modelling based on standard distribution has been applied to analyse volatility, as opposed to possible alternatives such as heteroscedastic modelling. This choice was made in view of the greater explanatory and predictive power of the homoscedastic model in the context of volatility over the long term. This is because the heteroscedastic model is less structurally stable, although it provides a better short-term prediction. Throughout this study, historical volatility is calculated using the following formula^[39]:

$$\sigma(n)_t = (\sqrt{250})\sigma[\ln r(y_t)] \quad (2)$$

Where:

Sigma reflects the measurement of risk against its standard deviation; n is the calculation period (volatility at n days); ln is the Naperian logarithm; r is the return on the assets over the n-day period for the study of the asset in question and y is the financial asset. The subscript t denotes the moment which the calculation is performed.

From our point of view, the choice of equity funds as the investment alternative must be decisively and clearly linked to a long-term view in order to ensure that the main advantages of international investment diversification over short-term speculation. Accordingly, we have opted for the homoscedastic framework because it is more robust over the long term, which is precisely the horizon we wish to examine in this study, in terms of both supply and demand and from the viewpoint of both the fund manager and the investor.

On the basis of this data, we have carried out the relevant financial analyses and prepared graphs to illustrate the relationships between the annual (250 days) volatilities of each fund and of each of these funds with the volatility of the Euro Stoxx 50 index calculated for the same period.

In order to verify whether relationships between volatilities are maintained in both the short and the long term, we have calculated linear regressions between the series for the different annual volatilities, considering periods of one, two and five years.

The models are represented by the following equation:

$$\sigma(n)_i(I_1) = \alpha + \beta \sigma(n)_i(I_2) + \mu_i \quad (3)$$

Where:

Sigma represents the historical homoscedastic volatility of a given index or mutual fund I. This is the risk inherent in the asset measured by its annualised standard deviation.

Alpha and beta are the parameters calculated using the linear regression model and mu is the error term.

The intention is to analyse the behaviour of the annual volatility of each fund and the benchmark index over different investment horizons in order to establish whether the performance and relationships observed in the short term remain valid over a longer comparative period.

The study of volatility was afterwards complemented with an analysis of returns, a parameter which forms another basic pillar, together with risk, for the selection of financial instruments. These financial analyses are also illustrated with graphs.

In order to verify whether equity funds provided an optimum investment, we calculated the returns obtained over one, two and five years in each of the portfolios considered and combined this data with the annual volatilities estimated for each of the funds and for the Euro Stoxx 50 index. This enables us to establish which out of the various European equity portfolios considered would provide the most efficient investment from a risk-return standpoint.

FINANCIAL ANALYSIS OF ANNUAL VOLATILITY

The results of this financial analysis of the relationships existing between the annual volatilities

of the various investment funds and the Euro Stoxx 50 index over the period are shown in Fig. 1.

The annual volatility of the Euro Stoxx 50 index is at most close to the average of the volatilities calculated for the investment funds and it is clear that in many cases it would be consistently left behind by several of the funds.

Occasionally, the difference in volatility may be very significant. It is probable that these differences are too great to be explained away on the usual grounds that funds invest a portion of resources in assets with little movement (funds practically always lodge a part of the savings obtained in fixed-income or money market assets, which reduces their volatility).

We carried out the following analyses over periods of one, two and five years in order to establish the pattern of annual volatility for the funds and the benchmark index and observe whether the relationships between them were maintained both in the short term and over longer periods.

The results reflected in Fig. 2 were obtained from a comparison of certain simple statistics from the various series.

As can be seen (Fig. 2), the mean annual volatility of the Fidelity, ABN, Schrodgers, BBVA, Templeton and Mercury funds over the last five years is lower than that of the benchmark index.

The most striking cases are the Templeton and Fidelity funds, which have annual volatilities that are respectively 9.16 and 4% lower than the Euro Stoxx 50 index, while the volatility of the ABN and Mercury funds is over 2% lower than the mean annual volatility of the benchmark over the five-year period.

There is also one investment fund, Invesco, which shows a mean annual volatility that is significantly higher

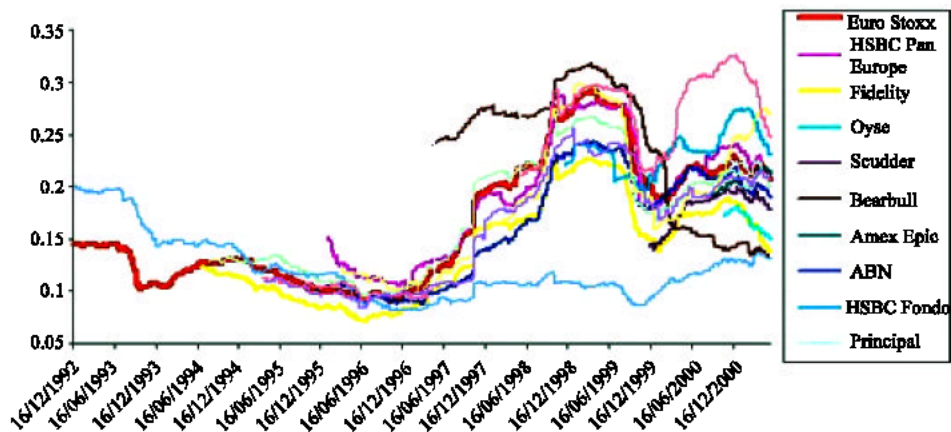


Fig. 1: Comparison of annual volatilities for each fund and the Euro Stoxx 50 index

Table 2: Regression analysis of annual volatilities over 5 years

	Euro Stoxx (%)	HSBC Pan Europe (%)	Fidelity (%)	ABN (%)	Schroders (%)	BBVA (%)	Templeton (%)	Invesco (%)	Mercury (%)
Euro Stoxx	100.00	95.48	97.80	89.80	96.91	87.70	37.91	4.78	94.68
HSBC Pan Europe		100.00	94.40	92.13	90.60	90.13	40.37	2.29	94.19
Fidelity			100.00	87.18	96.67	82.26	37.90	6.50	91.02
ABN				100.00	80.17	85.05	45.94	0.18	92.76
Schroders					100.00	82.11	41.02	9.51	88.86
BBVA						100.00	42.85	0.34	88.55
Templeton							100.00	5.43	42.58
Invesco								100.00	1.09
Mercury									100.00

Table 3: Mean annual volatility over 2 and 1 years

	Over 2 years		Over 1 year	
	Mean annual volatility over 2 years	Difference between annual volatilities of funds and Euro Stoxx 50	Mean annual volatility over 1 year	Difference between annual volatilities of funds and Euro Stoxx 50
Euro Stoxx 50	22.13	-	21.77	-
HSBC Pan	22.52	0.38	22.66	0.89
Fidelity	17.33	-4.81	17.17	-4.60
Bearbull	19.41	-2.72	14.48	-7.29
ABN	20.55	-1.59	20.64	-1.13
HSBC Fondo	23.43	1.30	24.99	3.22
Schroders	20.57	-1.56	20.69	-1.08
BBVA	21.82	-0.32	22.76	0.99
Templeton	11.31	-10.83	12.59	-9.18
Invesco	28.03	5.89	30.36	8.59
Mercury	20.40	-1.73	20.25	-1.52

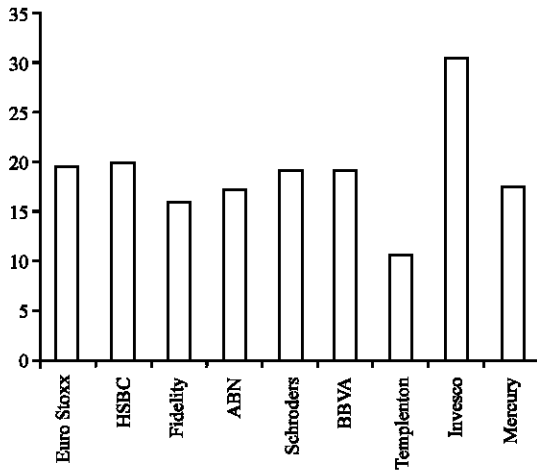


Fig. 2: Mean annual volatility over 5 years

than the Euro Stoxx 50, exceeding the benchmark by 10.72%.

This would appear to indicate two different approaches to winning a place at the top end of the performance rankings. On the one hand, the low volatility of funds such as Fidelity and Templeton means they achieve highly favourable return/volatility ratios, while on the other funds that show very high volatilities, such as Invesco, probably follow a very different investment strategy to the benchmark index, resulting in comparatively high returns.

The next step in our analysis is to identify the relationships existing between the annual volatilities of the funds and the Euro Stoxx 50. To do this, we have estimated a linear regression between both functions, the results of which are presented in Table 2.

The table should be read as follows. In row three, column four, for example, we find the R^2 of the linear regression relating the Fidelity fund as the independent variable with the ABN fund as the dependent variable.

The values reflected in row one show that the annual volatility of many of the funds is closely related to that of the Euro Stoxx 50 with an R^2 of over 85%. This confirms that there is a close relationship between these variables over the five-year period.

The results obtained from the regression confirm that different models exist with regard to long-term risk. Thus, it is clearly observable that both the Invesco and the Templeton funds have a much looser relationship with the Euro Stoxx 50 index than the other investment funds analysed. This means, then, that the funds do not necessarily follow the same investment patterns as one of the indices that they theoretically use as a benchmark.

The linear regressions between the volatilities of the various funds also show close relationships. In fact, the only patterns that are out of step are to be found in the relationships of the other funds with the Templeton and

Table 4: Regression analysis of annual volatilities over 2 years

	Euro Stoxx (%)	HSBC Pan Europe (%)	Fidelity (%)	Bearbull (%)	ABN (%)	HBSC Fondo (%)	Schroders (%)	BBVA (%)	Templeton (%)	Invesco (%)	Mercury (%)
Euro Stoxx	100.00	83.74	82.97	30.99	32.65	2.03	92.82	56.49	0.85	19.86	81.87
HSBC Pan Europe		100.00	80.02	12.71	71.47	0.55	87.17	53.60	1.13	41.46	79.74
Fidelity			100.00	17.07	82.99	0.01	81.16	31.88	0.01	38.45	57.53
Bearbull				100.00	5.01	57.87	30.06	2.26	69.71	15.05	26.77
ABN					100.00	0.76	79.56	28.51	2.59	45.37	41.08
HBSC Fondo						100.00	0.18	6.87	73.09	39.54	1.18
Principal							41.52	33.13	0.22	62.58	2.88
Schroders							100.00	66.51	2.13	33.28	75.07
BBVA								100.00	12.83	20.24	66.27
Templeton									100.00	42.23	0.40
Invesco										100.00	15.68
Mercury											100.00

Table 5: Regression analysis of annual volatilities over 1 years

	Euro Stoxx (%)	HSBC Pan Europe (%)	Fidelity (%)	Bearbull (%)	ABN (%)	HBSC Fondo (%)	Schroders (%)	BBVA (%)	Templeton (%)	Invesco (%)	Mercury (%)
Euro Stoxx	100.00	23.64	21.59	1.27	31.49	18.04	50.48	0.91	2.65	24.29	8.41
HSBC Pan Europe		100.00	45.50	3.45	3.98	36.63	34.01	0.60	16.41	48.27	18.71
Fidelity			100.00	17.15	48.62	5.52	5.78	33.52	9.61	93.20	5.79
Bearbull				100.00	50.08	21.45	11.11	63.44	66.69	11.90	58.36
ABN					100.00	8.54	4.87	52.81	32.66	34.59	25.10
HBSC Fondo						100.00	11.58	36.64	28.91	16.16	43.51
Schroders							100.00	12.01	38.30	4.85	34.25
BBVA								100.00	72.08	20.91	73.54
Templeton									100.00	6.06	84.87
Invesco										100.00	2.90
Mercury											100.00

Invesco funds and between these two, with an R^2 of just over 5%.

The next question addressed in the study was to establish whether these parameters were maintained for shorter periods, basically of two years or one, providing scenarios in which it would be possible to consider a larger number of funds. The results of the two-year analysis are shown in Table 3 and 4, while the values obtained for the one-year period are presented in Table 3 and 5.

Table 4 and 5, respectively present the results of the linear regressions for periods of two years and one year, relating the independent variables represented by the investment portfolios in each row with the dependent variables reflected in the columns.

On the basis of this financial analysis, the shorter the calculation period the lower the R^2 of the linear regressions obtained.

The results of these financial analyses reflect a wide range of relationships between the various funds, although in some cases R^2 is over 80%, as occurs with the Templeton and Mercury funds where the period analysed is one year. These differences may be explained by the presence of divergences in the short-term beliefs about the market held by the management entities in the short term.

The conclusions obtained from the various periods provide a pointer to the time horizon of the investment,

which is the important thing, since the levels of risk in the funds frequently differ substantially from the benchmark indices in shorter periods. In the majority of cases, it is only in the long term that these relationships can be clearly observed.

A knowledge of the funds thus appears to be a key factor for making investment decisions, since differences between funds investing in the same kinds of financial assets may be very great. It may often be the case, then, that knowing which fund provides the best fit with the investor's capacity to accept market risk is as important as deciding on the geographical region or sector in which the investment is to be made.

OPTIMISATION THROUGH INVESTMENT FUNDS

The next objective of the analysis was to verify whether optimisation is possible through internationally diversified investment funds.

To this end we have performed a study of the return that would be obtained from the various equity portfolios over the same periods as were considered in the analysis of volatilities (i.e. one, two and five years) in order to establish which portfolio would provide the most efficient investment in view of the returns obtained and the risk accepted.

We shall, then, analyse the most efficient investment from an overall risk-return standpoint considering the

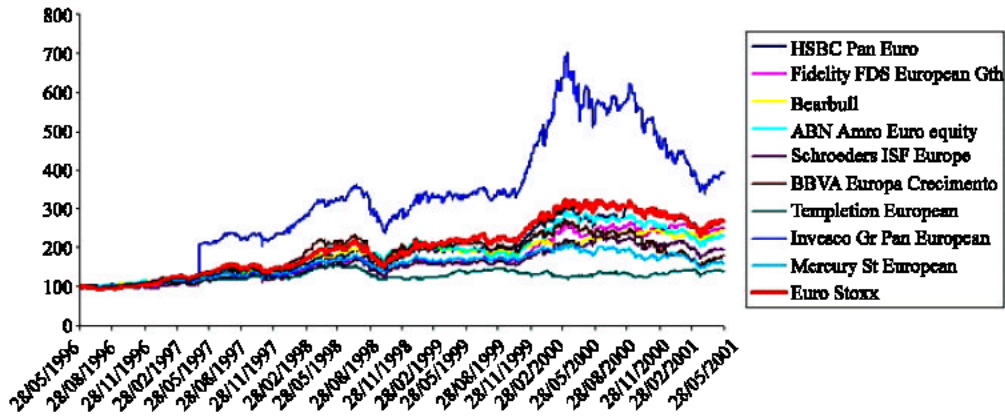


Fig. 3: Comparison of returns on each fund and the Euro Stoxx 50 index over five years

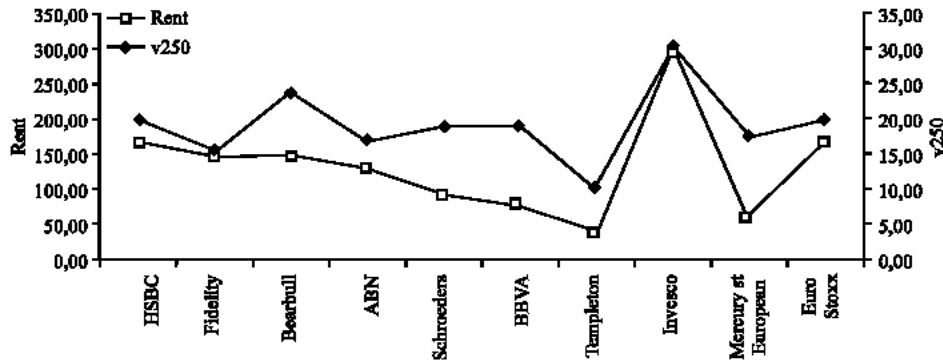


Fig. 4: Comparison of returns and average volatility of the funds and the Euro Stoxx 50 index over five years

returns obtained over periods of one, two and five years and the average annual volatility of each fund and the Euro Stoxx 50 index.

An examination of returns from the funds and the benchmark index over the five-year investment horizon provides some interesting results.

The financial analyses performed are shown in Fig. 3, which is expressed at base 100 and charts the performance of the investment funds and the Euro Stoxx 50 index.

It seems clear that the referenced investment funds are unlikely to significantly outperform the Euro Stoxx 50 index over the long term. One explanation for the empirical facts observed may be that the part of the fund invested in liquid assets represents a drag on returns compared to those obtained by the Euro Stoxx 50 index.

In any event, the financial analysis of returns over five years leads to some interesting conclusions:

- It is difficult to outperform benchmark returns long-term.

- Only one investment fund clearly exceeds Euro Stoxx 50 returns. This is the fund managed by Invesco, which also stood out as one of the more risky vehicles in the volatility analysis, regardless of the period analysed. This finding verifies, once again, that systematically higher returns are only to be achieved through greater exposure to movements in the market, which is to say by accepting higher levels of risk in the investment portfolio.
- It is, however, possible to obtain a similar level of returns to the Euro Stoxx 50 benchmark at somewhat lower levels of risk. As far as risk is concerned, this can clearly be seen in Fig. 1 and is unambiguously confirmed by Fig. 4, which tracks both returns and risk for the investment funds and the Euro Stoxx 50 index over a five-year period.
- Certain funds perform differently to the Euro Stoxx 50 index in terms of returns, even though their policy also involves investing in European equities.

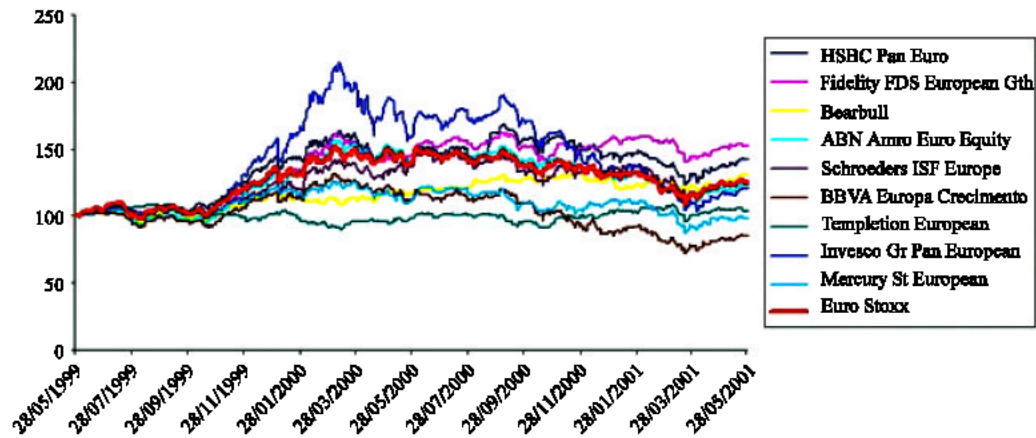


Fig. 5: Comparison of returns on each fund and the Euro Stoxx 50 index over two years

This is most clearly apparent in the case of the Templeton investment fund, the returns on which were significantly lower than those of the benchmark. The reader is reminded that the volatility of this fund over one, two and five years was considerably lower than that of the Euro Stoxx 50 index and it was in fact the least volatile of all the funds considered.

Figure 4 points to the conclusion that the Templeton and Invesco investment funds are located at the two extremes of efficiency for the investor. The Templeton fund not only provides smaller returns and lower volatility than the benchmark index, but is in fact the lowest on both counts out of all of the portfolios analysed. The Invesco fund is at the other extreme, providing the highest returns out of all of the funds and also significantly outperforming the Euro Stoxx 50 index over five years. At the same time, however, it fluctuates most sharply, with a much higher volatility than the benchmark.

The results obtained demonstrate that it is possible to obtain a similar level of returns to the Euro Stoxx 50 benchmark at somewhat lower levels of risk. Thus, Fig. 4 reveals that investment funds such as Fidelity and HSBC would provide very similar returns to the Euro Stoxx 50 index over five years but at somewhat lower levels of annual volatility. However, we would stress that both funds would be clearly preferable to the Euro Stoxx 50 index in terms of the boundary of efficiency for a private investor for three reasons:

- In the first place, funds such as the Fidelity and HSBC vehicles would without doubt be preferred to direct investment on the financial decision-maker's efficiency boundary in view of the manifest difficulty for the private investor of replicating the performance of an internationally diversified stock market index, which would entail purchasing a very large number of stocks.

In this case, it would be necessary to acquire and manage some fifty Euro Stoxx 50 stocks or futures - no easy task for the majority of private investors and financial decision-makers.

- Secondly, the existence of tax benefits and their impact on the financial-tax returns generated are highly relevant to financial investment decisions. Such benefits are obtained precisely by channelling investments through vehicles such as investment funds. In particular, it is worth noting that the investor is not required to perform any additional operations or declare taxes in the event of changes in the make-up of the investment fund portfolio in he/she has invested. In this light, the absence of any tax charge connected with changes in the make-up of the fund's portfolio is a differentiating factor in favour of holding investment fund units. This advantageous tax treatment is unavailable, at least as Spanish tax regulations currently stand, if direct investments are made in the stocks comprising an index.
- The third major advantage is that investment funds provide access to professional management, releasing the investor from the need to know or monitor in detail the features, circumstances and evolution of the various stocks in the portfolio. Thus, the activities of investment fund management entities save investors the trouble of keeping a close watch on their stocks.

The following pages repeat the above analysis for shorter periods of two years and one year.

Figure 5 illustrates the results of the comparative analysis of returns generated by the investment funds and the Euro Stoxx 50 benchmark over two years.

In the two-year comparative analysis of returns, a number of funds outperform the benchmark.

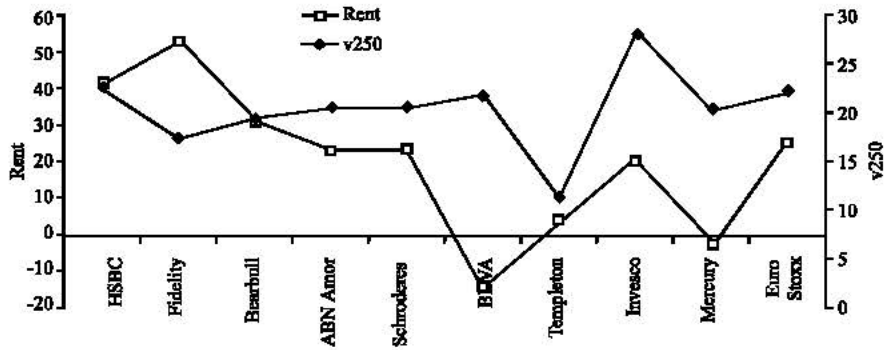


Fig. 6: Comparison of returns and average volatility of the funds and the Euro Stoxx 50 index over two years

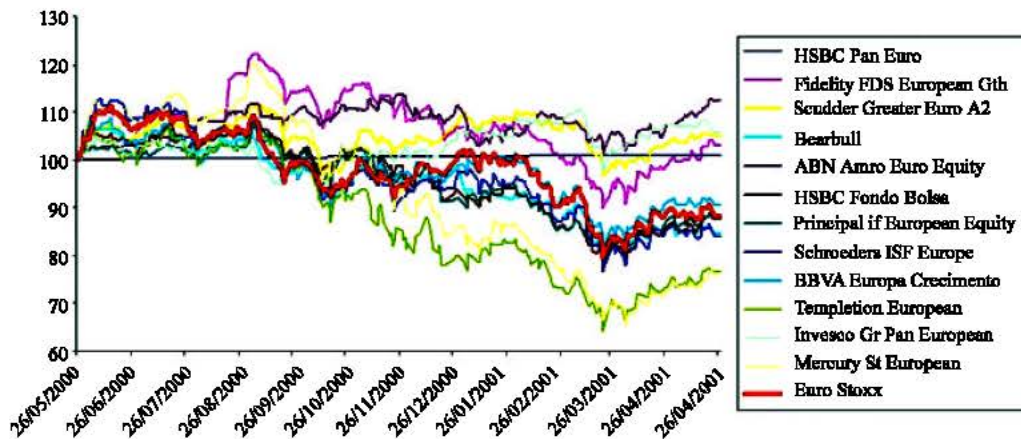


Fig. 7: Comparison of returns on each fund and the Euro Stoxx 50 index over one year

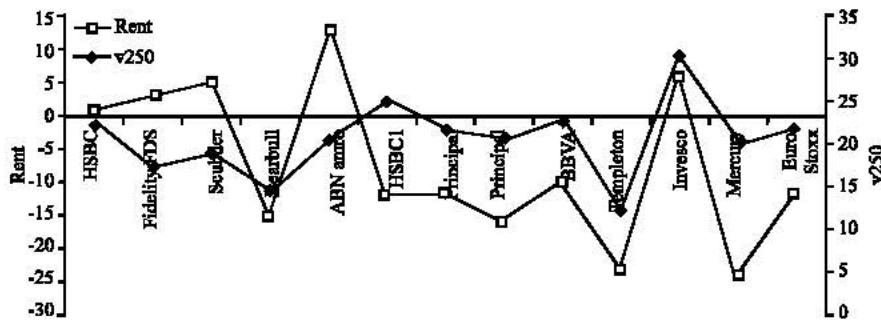


Fig. 8: Comparison of returns and average volatility of the funds and the Euro Stoxx 50 index over one year

The next step is to compare the two-year returns and two-year volatility for each portfolio with that corresponding to the other portfolios (Fig. 6).

This joint analysis of returns and risk over a two-year horizon shows that only two investment funds simultaneously outperform the Euro Stoxx 50 index for both indicators. These are the funds managed by Fidelity and Bearbull, which present higher returns over two years than the benchmark accompanied by lower average volatility for the period in question.

The results of the analyses carried out over the one-year period are shown in Fig. 7 and 8.

Over a time horizon of one year, significantly more investment funds outperform returns on the Euro Stoxx 50 index. The same can be said of the volatility of the pan-European stock market index over this period. Thus, a greater number of funds show lower volatility than the Euro Stoxx 50 benchmark than in the case of analysis over a two-year horizon.

Three conclusions can be reached from the joint consideration of the three periods:

- As the calculation period decreases, particularly in a period of falling share prices as seen in the last year of the analysis, a greater number of funds are likely to outperform the Euro Stoxx 50 benchmark in terms of returns.
- It can also be seen how funds such as Fidelity are located just on the efficiency boundary that is most appropriate to the investor, since their volatilities are lower at higher levels of returns as the investment period considered is shortened.
- Over these shorter periods of two and one years, it is also apparent how funds such as Invesco that generate higher returns long-term become so volatile high that they can no longer be considered appropriate investment vehicles for decision-makers who are willing only to accept a benchmark level of risk.

CONCLUSIONS

This study provides empirical evidence that investment funds may indeed be considered ideal financial vehicles to reap the benefits of financial diversification and especially international diversification in European markets. This is because funds achieve efficient results that may even outperform those of a benchmark portfolio such as the Euro Stoxx 50.

It is, of course, extremely difficult for a private investor to put together an investment portfolio that dynamically replicates the performance of the Euro Stoxx 50. Investment funds using this index as a benchmark, however, allow investment generating similar returns and at times subject to lower levels of risk.

On the basis of our research, it appears that a significant part of the best European market funds not only systematically achieve better annual volatility than their benchmark index, but also that annual volatility over the short, medium and long term remains relatively low compared to the benchmark.

The financial analysis of annual volatility for periods of one, two and five years and the regressions calculated for the same periods show that as the calculation period becomes shorter, so the relationship between the annual volatilities of funds and the Euro Stoxx 50 index grows looser. This explains why it is so important to know the time-horizon for the investment and treat it as a fundamental factor in decision-making, since the risk

inherent in the funds differs substantially from that of the benchmark in the short term. In the majority of cases, it is only in the long term that these relationships can be clearly observed. Accordingly, the time-horizon for the investment is tightly bound up with the choice of fund.

A further significant finding from the study is that the relationships between funds vary considerably. In this light, a knowledge of the available funds themselves appears essential, given the wide differences between the performance and risk-return evolution of each, even though they all invest in similar types of asset.

It is frequently the case that an investment decision as important as the choice of geographical market or sector involves knowing how to select a fund that provides the right fit with the investor's tolerance of market risk. As mentioned above, this is because not all funds referenced to the same index actually perform in a similar manner to the benchmark.

Thus, the investment optimisation study reveals that a knowledge of investor profiles is essential. It may be the case that different funds investing in the same market do not provide the same investor-profile fit.

Some tentative technical and operational investment recommendations could be made on the basis of our research and findings:

- In view of the wide differences in risk and returns shown by funds that claim to be reference to the same index, it would be advisable to follow a similar process for the selection of funds as would be applied in choosing an individual stock. In this regard, it should be remembered that a fund investing in a market with an acceptable level of risk for a given investor need not provide a good fit with that investor's risk adversity profile.
- The longer the investment horizon, the more difficult it is to outperform the benchmark at lower levels of risk. It is, however, possible to obtain similar returns at lower levels of risk, placing some funds on the boundary of efficiency for the investor, especially since subscribing to an investment fund is considerably more straightforward than direct portfolio investment.
- In shorter periods it is possible clearly to outperform the Euro Stoxx 50 index in risk/return terms.
- When only the risk factor inherent in the investment is considered, it becomes apparent that the shorter the period for the calculation of volatility, the greater the impact of the part of the fund invested in liquid assets.

- In the same way, many the risk profiles of many investment funds differ sharply from those of their benchmark indices and from other investment funds, both in the long and in the short term. Once again, this points to the importance of choosing the fund with the best fit to the investment profile of the financial decision-maker.

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