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THINGS INVESTORS SHOULD KNOW ABOUT ALTERNATIVE INVESTMENTS

AN ASSESSMENT OF THE RISK-RETURN AND DIVERSIFICATION PROPERTIES OF PRIVATE EQUITY AND HEDGE FUNDS

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Abstract

Alternative investments are generally offered with the argument that they have particularly advantageous risk-return structures and moreover that they correlate only minimally with traditional investments. In recent years, institutional investors such as insurance providers and pension funds in particular have invested considerable capital, initially in private equity funds and later in hedge funds. However, the expectations they raised have yet to be fulfilled. With regard to the private equity business, this must have come as an unpleasant surprise to investors when the stock market bubble burst, to the point that since then they have for the most part abandoned this market and turned towards hedge fund products in particular. Once again, however, investors seem to be overestimating the advantages - which really do exist at times - of hedge funds, while underestimating their risks.

1. Introduction

While today it is hedge funds that are offered on the strength of the argument that they not only provide advantageous diversification options, but also show superior risk-return structures as individual investments, several years ago it was private equity investments. If investors are then advised even to invest 10 to 20 percent of their assets in alternative products, this gives rise to expectations that can hardly ever be fulfilled and are sooner or later corrected by the market. In the following we intend to provide a sober assessment of private equity and hedge fund investments with an eye to their risk-return and diversification properties, thereby bringing some transparency to the discussion. The fact that we are considering private equity and hedge funds as one, although the former is hardly an issue today, has to do primarily with the sometimes-similar methodological peculiarities in the analysis of these two forms of investment. Findings from the private equity business can thus be applied, at least partially, to the hedge fund sector.

2. Private equity as investment in corporate value

Until a few years ago, private equity capital represented one of the most widespread alternative forms of investment. But due to methodological problems it has under-gone little empirical study. In particular, a liquid market is lacking. For this reason, historical prices/constants or valuations by fund managers generally substitute for missing market data. This, however, results in systematic underestimation of the risks and correlations. If historical data are used to determine expected values, the estimated values turn out to be heavily smoothed. Therefore it does not allow a realistic determination of risks and correlations. As far as the use of constants or of valuations by fund managers is concerned, the former may not reflect any risk at all, while valuations by fund managers fluctuate far less than actual market prices and moreover tend to be too optimistic as well.

These considerations are confirmed empirically by TERHAAR et al. (2002). The authors are able to show that the risks of private equity investments are as a rule heavily underestimated when conventional methods of analysis are used. To prove their point, TERHAAR et al. must first create a suitable database. To do this, they enter the new investments in venture capital for each calendar year. They then calculate the annualized income for the first five years. The authors thus record a horizon that is realistic for the long-term investor that leaves out short-term market fluctuations. TERHAAR et al. subsequently put the traditional investments to be considered on a comparable statistical basis by calculating the annualized income of the traditional investments over the same intervals as those previously calculated for private equity. TERHAAR et al. can now demonstrate that at +0.91, the correlations between private equity investments and the equity market deviate considerably from the correlations calculated according to conventional methods of –0.46. In addition, TERHAAR et al. demonstrate that the risk of private equity proves to be at least twice as high as that of a liquid equity market.

Both the assessments of risks and correlations and those of future returns have serious shortcomings. The forecasts of future returns are regularly oriented towards the returns achieved from "surviving" projects. The fact that many projects end in total losses thus goes unacknowledged, which leads to what is known as a survivorship bias. This was confirmed in a study by SHACHMUROVE (2000). In it the author concludes that the returns previously projected must undergo a significant downward correction even if they refer only to projects that have survived all the way up to the IPO.

The fact that in the case of private equity investments, forecasts of future development are rife with error, makes it likely that investment decisions that are less than ideal will result. This is because portfolio optimizations are weighting investments with high (low) expected returns, negative (positive) correlation properties and low (high) volatility rates higher (lower). Distortions thus end by being more exagge-

rated, the greater the errors of estimation. By far the biggest effect on the optimum portfolio structure have errors in expected returns.[1]

The actual performance of an optimized portfolio depends decisively on the forecast accuracy of the input parameters. Even slight changes in the expectations of returns can effect relatively large changes in the portfolio mix. Analyses also show that the advantages of diversification strategies are often lost because there are errors of estimation. It can be assumed that this applies not only to international diversification strategies such as ERRUNZA et al. (1999) have described, but to private equity and - as we will see - to hedge fund investments as well, owing to the much larger errors of estimation.

Private equity investments usually prove to be very illiquid. This not only makes it difficult to compute expected figures for returns, volatility and correlations, but also compromises the ability of investors to react flexibly to any changes by withdrawing from an investment project. This occasions opportunity costs for the investor that must be covered in the form of a liquidity premium.

The liquidity premium of private equity is difficult to determine. However, the possibility does exist of investigating transactions in securities of private companies that have taken place several months before they go public. BADER (1996), who has analyzed the available empirical studies on this subject, finds a liquidity discount of 40–75 percent for the period from 1975–1987[2]. However, the fact must be taken into account that transactions in private companies for which no IPO has been planned may show a considerably higher discount.

TERHAAR et al. (2002) choose another option for determining the amount of the liquidity premium. The authors correctly assume that the single-period Sharpe ratio is

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[1] Kallberg/Ziemba (1984) dealt early on with the question of what effect errors of estimation can have on the optimum portfolio structure to be determined. The two authors point out that errors in estimating returns have ten times the effect of errors in determining the covariance matrix. This finding was confirmed by Chopra/Ziemba (1993). In addition, Chopra/Ziemba show that errors of estimation in determining variances have twice the effect of errors in determining covariances.

[2] Cf. Bader, 1996, 94.

not suitable for determining the sum recoverable for the risk of investments that cannot be liquidated after one period. TERHAAR et al. thus estimate the liquidity premium within the context of an investments time horizon and within that of the corresponding multi-period Sharpe ratio. In this ratio the liquidity premium represents the amount by which the annual returns must increase so that, other things being equal, the holder of illiquid investments is on equal terms with that of liquid ones. According to Terhaar et al., calculated in this manner, a liquidity premium of about 2 percent exists for private equity.

Also worth mentioning in connection with the question of the expected return on private equity investments is a study by GOMPERS and LERNER (2000). The authors observe that as the availability of capital increases, the price of private equity investments rises significantly although this price increase cannot be attributed to better investment opportunities. This can be explained on the basis of the observation by FENN et al. (1995) that as the capital-seeking investment increases, so does competition for good investment projects and thus also the price for these projects as well as the amount of capital allocated to projects that are considered less likely to succeed and/or are made by less experienced managers[3]. Not only the selection of individual investment projects but also the time of the investment can thus represent a significant success factor in the private equity business.

3. Hedge funds as an investment in asymmetrical bets

Another alternative form of investment that has attracted considerable attention, primarily in recent years, is hedge funds. Rather than investing in individual companies as in the case of private equity, investors invest in investment strategies that attempt to take advantage of market inefficiencies and thus achieve positive income both during lows and highs. Often one refers in this connection to hedge funds as being market-neutral, i.e. those that pursue arbitrage strategies directed towards absolute

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[3] Fenn et al., 1995, 61ff.

gains[4]. However, this does not mean, as has been repeatedly suggested, that hedge funds are risk-free or only contain minimal risks. According to hedge fund representatives, a strategy that makes heavy use of temporary errors in valuing strongly correlated securities would be more or less risk-free. On the other hand, the example of Royal Dutch Shell shows that valuation errors, even in very liquid, predominantly homogeneous titles, can persist for a very long period, contradicting the theory of efficient markets.

Royal Dutch Shell is organized into the two subsidiaries of Royal Dutch Petroleum (RDP) and Shell Transportation and Trading (STT). The profit of Royal Dutch Shell is split 60-40 between the two subsidiaries. The valuation of the two companies should therefore correspond to a 60-40 ratio. However, reality does not bear this out. For example, after the share of RDP showed a discount of up to 5 percent compared to the STT share in the early '90s, starting in 1992, RDP was traded with an average premium of about 8 percent for several years. In 1997, the managers of the LTCM hedge fund also noticed this. Assuming that this valuation error would not persist, they wagered USD 2.3 billion on implementing a so-called long-short equity strategy. Counter to their expectations, however, the valuation error continued to increase. Finally, when the LTCM hedge fund collapsed, RDP was traded with a premium of just under 20 percent.

The example of Royal Dutch Shell illustrates that contrary to economic logic, market prices can behave irrationally for a long time and thus even the exploitation of market inefficiencies is not a priori risk-free. Rather, economic realities show that so-called theoretical arbitrage is only rarely possible[5]. The attempt to exploit market inefficien-

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[4] The term "market-neutral" is sometimes more narrowly defined and equated with a certain hedge fund strategy, but in reality is very often interpreted more broadly. Alexander et al. (2001, 2) describe this as follows: "Certain high profile market-neutral managers were very neutral ... until they weren't. And in some cases, they were shown to be not-so-market-neutral in spectacular fashion."

[5] As we will see below, this is the main tenet of the theory of inefficient markets. Shleifer (2000, 13) formulates it in the following manner: "The central argument (...) states that, in contrast to the efficient markets theory, real-world arbitrage is risky and therefore limited." Mitchell et al. (2002, 551), argue a similar point when they write: "Of course, pure arbitrage exists only in perfect capital markets. In the real world, imperfect information and market frictions make what is referred to as 'arbitrage' both capital intensive and risky."

cies that are attributable to irrational market behavior by means of an arbitrage strat-
egy almost always carries with it the risk that the valuation error will not correct itself
as expected. Ignoring this risk can have consequences that threaten the existence of
an investor.

The exploitation of price differences between two or more strongly correlated invest-
ment opportunities must, however, not be based a priori on the attempt to exploit
market inefficiencies. Often, price differences between similar securities only repre-
sent a payment for taking specific risks. These can be, for example, lending, interest,
currency or raw material price risks. In principle, the risk-return structure of a portfolio
can always be improved by the addition of hedge funds, if 1) the portfolio lacks the
corresponding risks and 2) incurring these risks can be offset by a certain minimum
return. A study by AMIN/KAT (2001) can be mentioned in this context. In it the
authors point out that hedge funds improve the risk-return structure of a portfolio,
although hedge funds as individual investments usually do not show a superior risk-
return structure. AMIN/KAT conclude from this that hedge funds incur specific risks
that are due more to the underlying type of strategy and less to the particular skills of
their managers.[6]

To demonstrate the advantages of hedge fund investments, usually the portfolio
efficiency curves are compared. However, this ignores the fact that hedge funds can
only be analyzed with the tools of so-called modern portfolio theory under certain
conditions.

Modern portfolio theory is based on the assumption that the returns on individual
investments have a normal distribution and can be described using averages and
variances[7]. Hedge funds, however, because of the way they are structured, generally

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[6] Amin/Kat (2001, 29) summarize this as follows: "Our results make it clear that the main attraction of
hedge funds lies in the weak relationship between hedge fund returns and the returns of other asset
classes. (...) this is primarily the result of the general type of strategy followed by many hedge funds
and not special manager skills. Any fund manager following a typical long/short type strategy can be
expected to show low systematic exposure, whether he has special skills or not."

[7] More precisely, modern portfolio theory is based on the assumption of an elliptical price trend (asset
growth). This assumption of distribution, however, is fulfilled neither from a theoretical nor a practical
point of view, which is why the assumption of distribution relating to logarithmic prices (continuous

show a negatively skewed distribution of returns and usually demonstrate a flatter curve compared to a normal distribution (leptokurtosis). These distribution properties remain unacknowledged by modern portfolio theory.

If investments with a negatively skewed return structure and/or high kurtosis are described in terms of average and standard deviation, the risk will be systematically underestimated. Therefore the danger does exist that disproportionately advantageous diversification or correlation properties will be attributed to these investments within the framework of modern portfolio theory. For this reason it is not surprising that the high Sharpe ratios of hedge funds correlate positively with the negatively skewed distribution of returns and the height of the kurtosis. Thus, BROOKS/KAT (2001) conclude that analysis based on modern portfolio theory is not suited to portfolios that contain hedge funds.

Critics object to this conclusion by saying that the assumption of a normal distribution is also impaired for traditional investments such as stocks or bonds, and that consequently here too modern portfolio theory must be rejected as the premise for any argument. This criticism is justified in principle. However, it ignores a major difference between traditional investments and hedge funds: the latter bear, to a much greater degree, a so-called extreme or worst-case risk.

The worst-case risk of hedge funds can often be simulated with a short position in put options[8] and is demonstrated, for example, when a hedge fund achieves good earnings with presumably low risk for a long time, but then suddenly loses a large portion of its assets in a short time. This risk is usually ignored - even to a fatal degree, as it was by the managers of the LTCM hedge fund mentioned above.

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compounded returns) has gained acceptance as a reasonable compromise between precision in the modeling of price trends and practical feasibility. For practical reasons, moreover, researchers as well as practitioner mostly restrict themselves to the assumption of normally distributed returns.

[8] Cf. on this subject Agarwal/Naik (2002), Mitchell/Pulvino (2001), Fung/Hsieh (2001), Favre/Galéano (2001) or Jorion (2000).

The LTCM managers assumed that the assumptions of modern portfolio theory could also be applied to hedge funds. Specifically, they assumed more or less normally distributed returns and relatively stable volatility rates. During the Russian crisis in 1998, however, the LTCM managers had to conclude that volatility rates can easily double in turbulent times and that the assumption of normally distributed returns for the most part ignores the possible consequences of extreme risks.

In a normal distribution, the disaster the LTCM hedge fund managers run in would actually not even have been possible, as far as anyone can judge. However, if we place the analysis on a more realistic theoretical basis, for example on the so-called extreme value theory, which deals with the analysis of sub-distributions of a distribution and thus also with worst-case risks[9], a considerably higher likelihood of occurrence is borne out, one that correlates more closely with the empirical data, and this even when mutual dependencies are ignored. Therefore, with regard to hedge funds, both the assumption of stable volatility rates as a measure of the risk of an investment, and the use of the conventional (based on a normal distribution) correlation coefficient as a measure of mutual dependencies, are unsuitable and must be supplemented with alternative measurements[10].

With regard to worst-case risks a study by SHLEIFER/VISHNY (1997) can be mentioned. In it the two authors demonstrate how situations can develop in which investments are not made at the exact point at which they are valued as extremely low; - even though market participants know that it is a temporary valuation error that is later corrected. Therefore investors who are heavily subsidized by creditors and find themselves in such a capital market situation are threatened with insolvency.

A whole series of examples in recent years show that the paper by SHLEIFER and VISHNY is more than pure theory. The *Economist* in its issue dated December 3, 1998, also credits SHLEIFER and VISHNY with having explained the collapse of the LTCM hedge fund in theory even before it happened. KYLE/XIONG (2001), who take

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[9] For more on extreme value theory cf. Embrechts et al. (1997).

[10] See Fung/Hsieh (1999), Jorion (2000) and Embrechts et al. (2002).

up the ideas of SHLEIFER and VISHNY, go on to demonstrate how mutual dependencies can occur between different investment markets and then transfer losses from one market to the other. KYLE/XIONG thus provide an explanation of why specific worst-case risks cannot be minimized through diversification.

Owing to their asymmetrical remuneration structure and the associated incentive effects, hedge funds show another, often neglected risk component. The compensation of hedge fund managers usually consists of a proportional salary of 1–2 percent of the assets and a performance-related salary of 10–25 percent of the absolute return. According to the argument of hedge fund managers or their representatives, the intent of salaries structured this way is to provide positive performance incentives. However, the consideration that such compensations simultaneously change a manager's motives and tend to encourage the incurrence of risks that are too high is ruled out. The performance-dependent portion of the salary increases the interest of a manager in incurring the highest risks possible: in the event of success, the manager participates in the profit earned on a pro-rata basis. In the event of failure where the strategy pursued by the fund manager proves to incur losses, however, he is only affected to a limited degree, for example if he had invested his own capital in the fund. The performance-dependent salary of a fund manager can thus be described as a call option on a portion of the returns earned. As can be shown by means of option price theory, this incentive leads to disproportionately risky behavior, which can be expressed as very high leverage, for example.

The incentive problem just described naturally exists elsewhere besides hedge funds, but will always be present when a manager participates in profits but not in losses. With hedge funds, however, the incentive problem is particularly serious because their managers regularly receive high profit shares of about 20 percent directed towards absolute profits. It is thus advantageous for a manager to incur disproportionate risks. The extent to which equity capital investments by managers or the threat of possible loss of reputation can lead to a harmonization of interests with the investors depends, among other things, on the risk tolerance of a manager and probably can only be assessed concretely on a case-by-case basis.

Hedge funds often take positions for which market prices are not available, or only irregularly. In practice, therefore, obsolete prices are used in place of current market values. As already mentioned with regard to private equity investments, this leads to statistical distortions. Both the volatility rates of hedge funds and their correlations with traditional investments are thus seriously underestimated. This is also confirmed by ASNESS et al. (2001). They observe that the risks and correlations rise drastically when estimations for hedge fund returns based on historical data are seen in relation to the historical data for returns on traditional investments over the same period and thus placed on a comparable basis. BROOKS/KAT (2001) reach the same conclusion.

The often-cited low correlation is actually only advantageous during lows and crises. A study by AGARWAL/NAIK (2002) is worth mentioning in this regard. The authors show that for the period from January 1990 until June 2000, hedge fund indexes correlated positively with equity markets in falling market conditions, but not during rises. This is also confirmed by MITCHELL/PULVINO (2001) in an "out-of-sample comparison" for the period from 1990 to 1998 for hedge funds that pursue so-called risk arbitrage strategies.

In their paper, however, MITCHELL/PULVINO deal mainly with the analysis of a sample of 4750 mergers and tender offers in order to characterize the risk, return and diversification properties of risk arbitrage strategies. In our context, therefore, this study is interesting primarily because the sample covers a relatively long period (1963 to 1998), which no hedge fund database even comes close to covering. The results of MITCHELL/PULVINO confirm the suspicion that risk arbitrage strategies correlate positively with equity markets in declining markets, but not in rising ones.

AUCKENTHALER et al. (2002), who restrict themselves in their study to the situation of institutional investors in Switzerland, also show that on average, in negative market phases, only short-selling funds in particular succeed in achieving a positive return. However, the authors go on to say, given the investment style, this is not

surprising.[11] AUCKENTHALER et al. conclude that with regard to hedge funds, institutional investors in Switzerland have been lulled into a false sense of security. FAVRE/GALÉANO (2001) as well assert with regard to Swiss pension funds that in negative market phases, only limited diversification effects can be achieved with hedge funds on the BVG index.

Not only are the risks of hedge funds regularly underestimated, but their return is overestimated on an equally regular basis. Performance measurement often refers only to those funds that have survived. This leads to an overly optimistic valuation (survivorship bias). What implications this can have for the returns shown is demonstrated by BANZ/DE PLANTA (2002) in a simple example. To do this, the two authors assume that an index consisting initially of 1000 hedge funds is calculated with an annual average return of 8 percent and a volatility rate of 20 percent. At the end of the year, all funds with negative cumulative performance are eliminated. With a volatility rate of 20 percent, this corresponds to an annual failure rate of about 10.5 percent. Under these assumptions, after 10 years 330 of the original 1000 hedge funds will have survived. They will show an average return of about 12 percent, while the effective return will be about 7.5 percent.[12]

Since 1994, the major index providers have been trying to take survivorship bias into account. Whether they have actually succeeded in doing so remains an open question. In any case, scientifically measured distortions still lie between 2 and 3 percent. BROWN et al. (1999) have observed for the period from 1989–1995 and FUNG/HSIEH (2000) for 1994–1998 that between 15 and 20 percent of hedge funds are eliminated every year, and that effective performance is overestimated by about 3 percent annually. A similar conclusion is reached by AMIN/KAT (2002a), who measure a survivorship bias of around 2 percent for the period from 1994 to 2001. For individual subgroups (e.g. for smaller hedge funds or those that work with

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[11] According to Auckenthaler et al. (2002, 9f.), a return of 3.47 percent can be realized with short-selling funds for the observation period from January 1990 to August 2002. The average volatility rate of these funds was 23.46 percent. The correlation coefficients stood at –0.31 for a global equity portfolio and at –0.24 for a Swiss equity portfolio. For global bond portfolios the correlation coefficient was 0.14 and for Swiss bond portfolios it was –0.03.

[12] See Banz/de Planta, 2002, 325f.

leverage), however, the survivorship bias is considerably higher at 4 to 6 percent. LIANG (2001) also confirms that returns posted even after 1994 were represented too optimistically. For the period from 1994 to 1999 he measures a survivorship bias of just under 2.5 percent and for the period from 1990–1999 one of about 1.7 percent. BROWN et al. (1999) further observe that excess returns from hedge funds revised to remove survivorship bias are for the most part absorbed by management fees. This is also illustrated by the example of BANZ/DE PLANTA (2002) cited above. If one assumes an additional proportional management fee of 1 percent of the assets and a performance fee of 20 percent of absolute return, the recorded return of 12 percent drops to 7.5 percent and the effective return from 7.5 percent to 4.2 percent.[13]

Unlike hedge fund managers with good performance records, those with poor performance only have a negligible interest in furnishing data on performance assessment to rating agencies or index providers. The result of this is that in practice, the funds that are available for performance measurement are those that in retro-spect have shown relatively good development (selection bias). However, it is very difficult to quantify this effect. FUNG/HSIEH (2000) therefore limit themselves to an estimation of the so-called instant history or backfill bias. This occurs because when disclosing his performance, the fund manager is free to decide from what date in the past his performance on the index should be assessed.

Because we can assume that a fund manager will choose the date that is best for him, his performance record or the track record of his fund will be represented as being better than it actually is. To quantify this effect, FUNG/HSIEH determine the difference between the returns of two portfolios. In one portfolio they consider the entire data series provided by one hedge fund for measurement of performance, while in the other they leave out the returns of the first twelve months for each fund. On average, on being integrated into a database, hedge fund managers indicate that their employment dates back 12 months. For the two portfolios, FUNG/HSIEH measure an annualized difference in returns of about 1.4 percent, demonstrating that

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[13] See Banz/de Planta, 2002, 326.

the annual recorded returns of hedge funds might also appear excessive due to the instant history bias.

BAQUERO et al. (2002) further note that the performance of hedge funds is also represented as too positive because of the so-called look-ahead bias. This form of statistical distortion refers to funds that are already included in an index, and occurs when hedge funds with good performance have a higher probability of remaining in the relevant index than those with poor performance. For the period from 1994 to 2000, the authors come to the conclusion that the look-ahead bias for hedge funds is considerable and that because it is ignored, the recorded index performance is significantly overestimated (by up to 5 percent) every year.

The minimal transparency of hedge funds poses another problem. The investment goals are often not disclosed. In addition, hedge funds are for the most part free to form their own investment strategies. Therefore we can assume that the expected values being used for the optimization contain huge errors of estimation and thus, under this aspect, that the risk-return structure of a portfolio that has been expanded to include hedge fund investments cannot improve to the extent anticipated.

Hedge funds pursue a strategy directed towards absolute profits. In comparison with an individual investment, therefore, a portfolio consisting of hedge funds with the widest possible range of styles must possess very advantageous risk, return and diversification properties. Empirical studies, however, cannot confirm this suspicion. Instead, it seems that as diversification increases across different hedge fund styles, correlations with traditional investments also increase significantly.

AMIN/KAT (2002b) observes for the period from June 1994 to May 2001 that one portfolio, consisting of 10 different hedge fund styles, already shows a correlation of almost 0.6 with the S&P 500. Van Hedge Fund Advisors, an enterprise that special-izes in hedge fund advisory services, arrives at a similar finding. For the period from the 1st quarter of 1988 to the 3rd quarter of 2003, the VGHFI (Van Global Hedge

Fund Index) has a correlation factor of 0.7 with both the S&P 500 and the MSCI.[14] AUCKENTHALER et al. (2002) and LHABITANT/LEARNED (2002) also confirm this result. To avoid the risk of *diversification overkill*, LHABITANT/LEARNED recommend diversifying a hedge fund portfolio with only 5 to 10 different styles.

With regard to the diversification properties of hedge fund portfolios, reference is made to a study by AMIN/KAT (2001) cited above. In it the two authors show that the sometimes actually existing diversification potential of individual hedge funds is due more to the type of strategy used and less to the particular skills of the manager. Amin/Kat thus provide a possible explanation of why the diversification potential is almost "diversified away" as the number of available hedge fund styles increases.

The liquidity of hedge fund investments is usually heavily restricted. After a certain blocking period, an investor usually has the option of withdrawing his money with certain redemption dates in mind. Notification must also be provided within a certain period prior to withdrawal of funds. This tying-up of capital represents a risk for the investor that is offset by a liquidity premium. As already mentioned with respect to private equity investments, this can be calculated within the context of the invest- ments time horizon and the corresponding multi-period Sharpe ratio. According to TERHAAR et al. (2002) a liquidity premium for hedge funds calculated in this way amounts about 0.75 percent.

We made reference earlier to a study by GOMPERS and LERNER (2002). In it, the authors point out that as the availability of capital increases, the price for private equity investments rises, although this price increase cannot be attributed to better prospects. Whether the hedge fund business will follow a similar logic in this respect remains to be seen. However, certain parallels can be drawn to the development of the private equity business. In recent years, the hedge fund business has attracted a good deal of capital. In addition, many hedge funds are closed to new clients. To an increasing degree, this is allowing capital to be directed toward less experienced managers. Moreover, additional competition usually causes market inefficiencies to

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[14] See Van Hedge Fund Advisors (2004).

be corrected more quickly and accordingly reduces hedge funds' potential returns. It's to fear that for this reason as well the anticipated returns on hedge fund investments will not materialize.

4. Summary

Hedge fund investments - and in part also private equity investments - have, because of their particular payment structure, developed into an asset class. These investments, however, cannot be analyzed - or not exclusively - within the framework of modern portfolio theory. The fact that hedge funds usually are open to asymmetrical wagers and thus are particularly exposed to worst-case risks is, for the most part, ignored.

The advantages of private equity and hedge fund investments are often overestimated. If private equity investments do not show the characteristics of hedge fund investments, they serve the purpose of optimum diversification within the investment category of stocks and products similar to stocks. Private equity investments differ from liquid share investments mainly in that their minimal tradability over a longer period of time is offset additionally by a liquidity premium. Investors with a very long investment horizon will thus also hold private equity investments for optimization reasons.

The sometimes actually existing diversification potential of individual hedge funds is due more to the underlying strategy type and less to any extraordinary skills of the manager. As individual investments, hedge funds usually do not possess superior risk-return structures. Owing to sometimes-advantageous diversification properties, however, they can still contribute to an improvement in the risk-return structure of a portfolio. However, depending on the style and the structure of the general portfolio to be diversified, diversification effects can vary widely. Moreover, diversified hedge fund investments appear to lose the sometimes-available positive statistical properties of individual investments.

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