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Mutual Funds Performance: Empirical Tests on the Swiss Market

1. Introduction

The investment performance of mutual fund portfolios has been extensively examined in the financial literature. A growing industry, evidenced by newsletters, financial press, and specialised firms, devoted to measuring mutual fund performance, is driven by the general unspoken rationale that embedded somewhere in historical data is a forecast of future performance.

The purpose of this study is to analyse the investment performance of Swiss mutual funds, with three goals:

- to compare the results of the "traditional" performance ratios (such as SHARPE and TREYNOR) with those from other moment-based performance measures and from the stochastic dominance approach to check for significant differences, consistency, or improvements.
- to compare funds' with unmanaged portfolios' (i.e. indices) performance, to check if the former generally beat the market.
- to decompose the fund managers' performance into a market timing and a stock picking ability using various theoretical models.

This paper extends the work by ZIMMERMANN and ZOGG-WETTER (1992), with the consideration of various alternative performance measures (including stochastic dominance) and a larger sample of funds. It is divided as follows: we will first present the theoretical models for overall performance evaluation (Section 2), followed by the models for performance decomposition (Section 3). In a second part, we will apply our models to a set of mutual funds publicly available in Switzerland (Section 4) over different holding periods, and for various asset classes (Sections 5, 6, and 7). Then, we will check if stochastic dominance provides similar results (Section 8). Finally, we will try to decompose the performance between market-timing and stock-picking (Section 9). Conclusions will follow in Section 10. Large empirical tables will be given in an Appendix.

2. Models for overall performance evaluation

2.1 Risk-adjusted performance ratios

The most familiar risk-adjusted performance tools used to rank mutual funds according to their overall performance are probably the SHARPE (1966) and

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TREYNOR (1965) ratios. They are both defined as an excess return standardised by risk, but SHARPE's ratio uses the total variance of returns (σ) as a measure of risk:

$$S_p = \frac{R_p - R_f}{\sigma_p} \tag{1}$$

whereas the TREYNOR's ratio is based on the CAPM and on the systematic risk coefficient (β):

$$T_p = \frac{R_p - R_f}{\beta_p} \tag{2}$$

where R_p is the return on the portfolio, R_f is the risk-free rate, σ_p is the total variance of returns, and β_p is the beta of the portfolio's returns over the considered period.

Both of these ratios suffer from major critiques[1]. Thus, alternative performance measures have been proposed. For instance, BAUMOL (1963) suggested ranking portfolios according to the following index:

$$B_P = R_P - k \cdot \sigma_P \tag{3}$$

where k is a parameter that depends of the investor's risk aversion. The higher the value of k, the more risk averse the investor; the higher the B_p, the better the performance of the portfolio.

BAUMOL's measure is derived from Kataoka's "safety first" portfolio selection model (1963). It is interesting, since it allows the incorporation of the investor's risk-aversion through a very simple concept. However, the problem is to determine the value of k for a given investor. It is clear that k<0 for a risk lover, k=0 for a risk neutral, and k>0 for a risk-averse investor. But the absolute value of k is unknown and is still difficult to estimate...

AFTALION and PONCET (1971) have proposed an alternative measure to rank portfolios. In their model, each portfolio should be attributed a benchmark portfolio compatible with its risk-exposure strategy. Then, for each portfolio, we can calculate an index defined as

$$AP_p = \left(R_p - R_b\right) - RP \cdot \left(\sigma_p - \sigma_b\right) \tag{4}$$

where (R_b, σ_b) are the return and variability characteristics of the benchmark portfolio, and RP is a "risk premium", that must be empirically determined by estimating what the benchmark pays on average per risk basis-point.

We should note that if we use the same benchmark (for example, a market index) for a set of funds, the ranking using the AFTALION-PONCET measure is the same as the ranking using the BAUMOL measure, since

$$\begin{aligned} AP_p &= \left(R_p - R_b\right) - RP \cdot \left(\sigma_p - \sigma_b\right) \\ &= R_p - RP \cdot \sigma_p + \left(RP \cdot \sigma_b - R_b\right) \end{aligned} \tag{5}$$

which is the BAUMOL measure with k=RP and the addition of a (generally negative) constant. But using the volatility as a risk measure penalises a trader's upside volatility (desirable) along with the downside one (dreaded). Hence, in order to penalise only downside variability, chartists have suggested using the drawdown concept to measure risk. The drawdown can be defined as the (negative) return computed with respect to the highest price that prevailed during the observation period.

$$\text{Drawdown}_t = \frac{\text{Max}\left[0, \text{Max}(P_1, P_2, P_3, \ldots, P_t) - P_t\right]}{\text{Max}(P_1, P_2, P_3, \ldots, P_t)} \tag{6}$$

where P_t denotes the price at time t. In fact, the drawdown may be seen as the negative return realised if the investor would have purchased the fund at the highest (passed) price.

Based on this definition of risk, for example, BURKE (1994) suggested to modify the denominator of the SHARPE's ratio and to replace it by the square root of the sum of the square of each period drawdown:

$$BU_p = \frac{R_p - R_f}{\sqrt{\sum_{t=0}^{T}\left(\text{drawdown}_t^2\right)}} \tag{7}$$

Squaring penalises deep extended drawdowns versus lot of very small ones.

2.2 Stochastic dominance

Most of the preceding measures require the normality of return assumption or the quadratic utility function for complete consistency with the VON NEUMANN/MORGENSTERN expected utility maximisation principle.
An alternate performance measure that does not require the normality assumption nor a specific utility function is the stochastic dominance rule. It makes no assumptions about the form of the probability distribution of returns; rather, it specifies progressively stronger assumptions about the general characteristics of the investor's utility function, consistent with whole families of utility functions. Associated with each level of stochastic dominance is a theorem that allows the investor to eliminate many portfolios from consideration, and to create an efficient set, considering the entire distribution of returns rather than some of its moments[2]. Hereafter, the stochastic dominance with risk-free lending and borrowing was tested until its third degree, as the corresponding assumptions were considered not too restrictive: first-order stochastic dominance assumes that an investor prefers more wealth to less; second-order assumes that, in addition, investors are risk-averse; third-order adds an additional restriction of decreasing absolute risk aversion, that is, the investor's risk aversion decreases as he becomes wealthier.

3. Models of Selectivity and Timing for stock funds

Hereafter, three models of selectivity and timing will be empirically examined: the JENSEN, TREYNOR-MAZUY, and the MERTON-HENRIKSSON models. JENSEN (1969) formulated the following return generating model to measure the performance of a managed portfolio:

$$R_{pt} - R_{ft} = \alpha_{pt} + \beta_p \cdot (R_{mt} - R_{ft}) + \varepsilon_{pt} \tag{8}$$

where R_m is the return on the market portfolio, and ε_p is an error term with mean zero, and t denotes time. A statistically significant positive value of α_p would imply a superior manager. Superior performance could arise from security selection skills, and/or from a good market timing. But the above specification assumes that the systematic risk exposition is constant over time (as β_p is fixed), and it exclusively concentrates on the security selection skills or lack thereof. Thus, TREYNOR and MAZUY (1966) added a quadratic term to equation (8) to test for market timing skill. In their model, the portfolio return should be a curvilinear function of the market return:

$$R_{pt} - R_{ft} = \alpha_{pt} + \beta_p \cdot (R_{mt} - R_{ft}) + \gamma \cdot (R_{mt} - R_{ft})^2 + \xi_{pt} \tag{9}$$

Their argument is that a market forecaster will hold a greater (respectively smaller) proportion of the market portfolio when the return on the market is high (respectively low). Thus, a statistically significant positive value of γ would imply positive market timing skills, as it would mean that portfolio returns are more sensitive to large positive market returns than to large negative ones.
Another approach was proposed by HENRIKSSON and MERTON (1981), who assumed that an investment manager chooses among two different systematic risk levels (a high up market beta, and a low down market beta), depending on his forecast. Their

model can be tested by estimating the parameters of the following regression:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p} \cdot (R_{mt} - R_{ft}) + \beta_{2p} \cdot \mathrm{Max}(0, R_{ft} - R_{mt}) + \vartheta_{pt} \quad (10)$$

The market timing ability of the forecaster is measured by β_{2p}, which will equal zero if either the forecaster has no ability, or does not act on his forecast.

4. The sample and the data

The sample of professionally managed portfolios examined consists of 58 mutual funds publicly available on the Swiss Market. They encompass a wide range of stated investment objectives, as well as broad classes of investment vehicles, namely, stocks (21 Swiss-stocks funds), short term money market (9 Swiss-franc money market funds), and bond funds (28 bond funds, holding Swiss-franc notes or foreign currency bonds hedged against currency risk).

For stock and bond funds, the sampling periods starts in July 83 and ends in June 94; the selection of test subperiods was driven by data availability, the necessity of testing performance across subperiods, and to test for long term performance. Hereafter, we will only present the results for the following subperiods: July 89 to June 94, July 91 to June 94, and July 1988 to June 1991[3]. As money market funds only appeared recently, the empirical tests on this subsample were made during a single period, from November 91 to June 94. Mutual funds data was collected on a monthly basis. Returns were calculated using net asset values at the end of each month, dividends being considered as reinvested. Load charges and or redemption fees were ignored.

Most funds' distribution of returns tend to be negatively skewed (i.e. the return distribution has an extended lower tail) and display positive kurtosis (i.e. the distribution is fat tailed). Exceptions are the 1991-1994 period, where the reverse comes true for general stock funds, and the small-caps stock funds, which show generally positive skewness. Despite these deviations, funds returns are not significantly different from a normal distribution[4], according to the Bera-Jarqué test for small samples, and to the Kolmogorov test for larger ones, at the 5% level. Hence, we can use the first two moments (mean and variance) to approximate the entire distribution.

The SBC Total Market index was used as a market proxy (for the beta estimations), as it is the oldest available market weighted performance index encompassing all stocks listed on the Swiss stock exchanges. The rates for the one month Swiss-franc Euro-deposit furnished the risk-free rate series.

Each fund category was assigned a benchmark compatible with its risk-exposure strategy. For the general stock funds, we have selected the SBC Total Market index. For the money market funds, we used the one month Swiss-franc Euro-deposit maturing at the end of each month, and for the bond funds, several alternative indices[5], given that most bond funds do not clearly and completely define their general strategy and style. These benchmarks should be considered as a general indication of an average market sector performance rather than as "pure" investable benchmark portfolios, given that they were not subject to transaction costs.

Exhibit 1: Mutual funds characteristics

	Stock funds	Small-caps funds	Money-market funds	Bond funds
Number of funds	17	4	9	28
Average size (M.Fr)	199.8	211.8	2'693.2	437.7
Std.Dev.	351.1	155.8	2'903.2	494.7
Smallest (M.Fr.)	11	33.6	23.7	15.5
Largest (M.Fr.)	1'438.3	444.04	6'499.2	2'391.7
Creation date Oldest	1949	1989	1990	1971
Most Recent	1992	1992	1991	1992

Source: Bopp (1994)

5. Empirical results: stock funds

We will hereby apply the performance measures previously defined in section 2 to our set of stock funds. Empirical results are provided in the Appendix.

5.1 SHARPE and TREYNOR

Let us start by examining the two traditional ratios: SHARPE, and TREYNOR. The funds' betas were computed using a simple market model regression[6]. All betas were concentrated in a very narrow range around 1. Whatever the period, the riskier funds seems to be the BSS SwissFund (but 26% of its assets were invested in futures and options in December 1993), the SBC-100 Index Fund Switzerland, which is indexed[7], and the Fonsa fund (because of its large size, is well diversified and has a beta very close to 1); most other stock funds appear to be also relatively well diversified and have a beta just below 1, with a small standard deviation; small caps funds have smaller betas, usually between 0.7 and 0.8, which shows that an important part of their total risk is firm specific. We should also note that the beta ranking differs significantly from the one obtained with the total volatility, and that it is dependent of the period considered.

Because of the strong diversification, the results using SHARPE and TREYNOR ratios are very close. Both ratios values are very unstable over time: they have a strong dependency on the period on which they are calculated, and on the length of this period. Negative ratios are observed for some funds on some periods, and for most funds in the July 88-June 91 period. Specialised stock funds and small-cap indices have lower SHARPE ratios than the general ones, but this does not apply to the TREYNOR ratio.

The influence of a misspecification of the risk-free rate was tested using various proxies for the risk-free rate, as well as arbitrary fixed rates between 4% and 7% (all the tested rates were between the 4% to 7% bounds, whatever the period). The general result seems to be that the risk-free rate choice has important effects on the absolute value of the SHARPE and TREYNOR ratios, but has a very little influence on the ranking of the funds. For the periods observed, on average and on a risk-adjusted basis, funds do not beat the market index. To check further, we have made the following test: over all of the possible three years investment periods from January 1980 to July 1994, we have compared the funds and the market SHARPE and TREYNOR ratios to determine if some funds had outperformed the market. The results are summarised in Exhibit 2.

On average, most of the funds did not show above market SHARPE or TREYNOR ratios. In the top-five, the BSS Swiss Fund can be considered as non significant, as the test was only made for three investment periods. Hence, only the Pictet ValSuisse, Fonsa, and SBC 100 Index Fund Switzerland funds tend to show systematically above market SHARPE ratios, while Swiss Valor and Schweizeraktien just miss the 50% level. On average, the same three funds (Pictet Valsuisse, Fonsa, and SBC 100 Index Fund Switzerland) show above the market TREYNOR ratios, but the SwissValor fund has exited the top-five.

Advocates of large funds argue that large size can lower per unit costs, bring more stability by cushio-

Exhibit 2: Funds vs. market SHARPE and TREYNOR ratios

Fund name	Nb. Observed periods	Outperformance periods (Sharpe)	Outperformance periods (Treynor)
FL Trust Switzerland	12	0.00 %	0.00%
Gesti CH	46	0.00 %	0.00%
Rothschild Swiss Equity	27	0.00 %	0.00%
Skandia SICAV Swiss Equity	7	0.00 %	0.00%
Swissca Switzerland	44	0.00 %	0.00%
ParSuisse	63	14.29 %	12.70%
Vontobel Swiss Equities	15	20.00 %	33.33%
MultiHelvetia	59	22.03 %	22.03%
Swissac	103	30.10 %	32.04%
Swissbar	102	39.22 %	39.22%
Schweizeraktien	139	48.92 %	46.04%
SwissValor	139	48.92 %	35.97%
BSS Swiss Fund	3	66.67 %	66.67%
Pictet ValSuisse	139	69.06 %	71.22%
Fonsa	126	79.37 %	80.16%
SBC 100 Index Fund CH	30	96.67 %	100.00%
Average		33.45 %	31.73%

ning errors in stock selection, and more competitiveness (by hiring better analysts), while proponents of small funds maintain that it allows more flexibility and lesser sluggishness in portfolio revisions. In the case of Switzerland, at least, the latter seem to be wrong, as the largest funds (in terms of assets under management) and the oldest are the "best" performers.

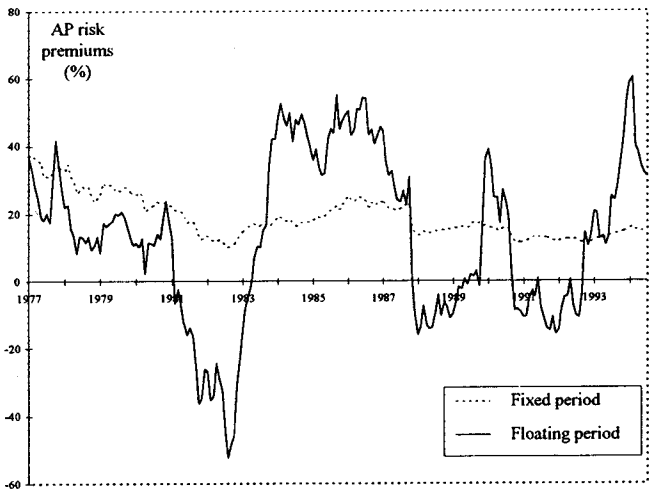
5.2 Alternative performance measures

We will now examine if the other performance measures previously exposed (AFTALION-PONCET, BAUMOL, and BURKE) can provide additional or different information than these captured by SHARPE and TREYNOR ratios for stock funds. In the AFTALION-PONCET index, the crucial parameter is the risk-premium, which must be empirically evaluated. Should we consider the effective risk premium over a period, or use a risk-premium averaged over a long time interval, as recommended by AFTALION and PONCET ? As an illustration, using the Euro-Swiss franc one month deposit rate and the SBC General Index, we have calculated the risk premium for general stock funds using monthly data from January 1975 until June 1994, by two methodologies: the first one ("fixed") follows AFTALION and PONCET recommendations and estimates the risk premium over a long period (from the fixed start date of January 1975 to the current date), while the second, ("floating") uses a floating period of two years before current date. Results differed dramatically depending on the selected methodology (see Exhibit 3).

The floating results are very unstable, and they even yield negative risk premiums. This was predictable, since the impact of new data is lowered in the fixed methodology, while it is not in the floating one. For the same reason, the fixed risk premium becomes more and more stable, as the observation period lengthens.

Nevertheless, the test was made on general stock funds, which were assigned the SBC General Index

Exhibit 3: "Fixed" versus "floating" risk premium



as a benchmark, and using the AFTALION PONCET methodology (i.e. a fixed risk-premium of 14.33 %).

On average, mutual funds have negative performance according to AFTALION and PONCET, but with a very large standard deviation. There are little differences with the ranking obtained with SHARPE ratio, the most noticeable being the promotion of the BSS Swiss Fund from the eighth to the first rank for the period 92-94, which is due to the fact that the excess return achieved over the market (highest of the sample) was considerably more weighted than the excess volatility (also the highest of the sample). We should also note that the SBC 100 Index Fund Switzerland and the Fonsa fund remain at the top positions, whatever the period. But many problems remain:

- on which period should we estimate the risk premium? Does it make sense to apply a ten years averaged risk premium to a two years old fund ?
- the specification of the benchmark dramatically modifies the risk premium value. As an example, over the period 1982-1994, the risk premium according to the SBC General Index is 11.50%, while it is 14.14% according to the Morgan Stanley Capital International Switzerland, and 5.52% according to the Crédit Suisse

Index. What is the appropriate value? Furthermore, as the benchmark should be selected by the fund manager, different managers holding the same portfolio can be rated using different risk premiums !

- negative risk premiums tend to promote funds with a higher volatility than their index.
- the risk premium can differ among investors, and therefore, the value that can be measured is only an average risk premium.

For these reasons, we would not recommend using the AFTALION PONCET measure for the purpose of measuring stock funds performance.

The BAUMOL measure was computed for each period using risk-aversion coefficients of value 0, 0.5, 1, and 2. Increasing the risk-aversion coefficient slowly moves us from a "return only" view (k=0) to a "volatility only" perception (k being large). Whatever the k value and the period, on average, the funds do not beat the market. The SBC-100 Switzerland and Fonsa perform well for low values of k, whatever the period, while the Pictet Valsuisse seems better for high values of k, i.e. for conservative investors. We should also note that high values of k tend to promote the risk-free investment as being better than stock funds, since it is much less volatile!

On average, when using BURKE measure, diversified stock funds still do not beat the market, but small caps funds do. SwissValor, Fonsa, BSS SwissFund, and SBC 100 Index Fund Switzerland keep showing regular good performance. Other funds are more irregular. We can observe the pertinence of the drawdown concept with the BSS SwissFund. This fund has the highest total risk within the sample and is heavily penalised in the SHARPE ratio ranking, but it achieves a good ranking if we consider only drawdowns rather than variability; this is due to the fact that its volatility is mainly an upward volatility, which is highly desirable.

5.3 Conclusions on stock funds' performance

Swiss general stock funds seem rather conservative, with betas very close to 1. This comes directly from strategic decisions. Because of this good diversification, most performance measures will give similar rankings. However, the rankings are dependent of the period considered, but performance appears to be positively correlated with the size and the longevity of the funds.

An important result is that most stock funds do not systematically beat their reference index from a risk adjusted point of view. This is not due to the fact that the reference index does not consider transaction costs, since stock funds do not generally beat either the SBC-100 Index Fund Switzerland (which is an indexed fund supporting fees). It is neither a conclusion linked to a bias of a given performance measure, since it persists in all tests that were performed, whatever the period and the measure considered. All these results tend to confirm a semi-strong form of efficiency of the Swiss stock market. This is in accordance with the results from the ZIMMERMANN and ZOGG-WETTER (1992) study.

6. Empirical results: Money market funds

We will now examine the performance of money market funds.

6.1 The performance of money-market funds

As we could expect, compared to stock funds, money market funds have a low volatility. Hence, they are close to the risk free rate in a (R, σ) plane. Thus, any misspecification of the risk free rate has dramatic consequences on the absolute value of the SHARPE ratio, and can influence the ranking of the funds according to these ratios. Using the one month Euro-deposit rate as our risk-free proxy, all of the money market funds exhibit negative SHARPE ratios. This is not surprising, since over the test period, all funds had a lower return and a higher

Exhibit 4 : SHARPE ratios of money market funds

Period: 11.91 - 06.9	UK Euro 7 days		UK Euro 1 mont		UK Euro 1 year		Yield on Conf. Bonds		Swiss call money rate		5% Micropal rate	
Canto MM Fund Sfr	-0.911	(5)	-0.704	(5)	-0.262	(6)	0.457	(7)	-0.383	(6)	1.089	(7)
CS MM Fund Sfr	-0.632	(3)	-0.383	(2)	0.147	(2)	1.010	(1)	0.001	(2)	1.768	(1)
SBC MM Fund Sfr	-1.015	(6)	-0.757	(6)	-0.206	(5)	0.692	(4)	-0.357	(5)	1.481	(4)
Baer Multicash Swiss Cash	-0.548	(1)	-0.317	(1)	0.174	(1)	0.974	(2)	0.039	(1)	1.677	(3)
Lloyds Intl Liquidity CHF	-1.452	(9)	-1.198	(9)	-0.655	(9)	0.229	(9)	0.804	(9)	1.006	(8)
SVB MM CHF	-0.718	(4)	-0.466	(3)	0.071	(3)	0.945	(3)	-0.077	(3)	1.713	(2)
UBS MM Invest Sfr A	-1.077	(8)	-0.843	(8)	-0.345	(8)	0.466	(6)	-0.482	(8)	1.178	(6)
UBS MM Invest Sfr T	-1.073	(7)	-0.839	(7)	-0.341	(7)	0.471	(5)	-0.478	(7)	1.184	(5)
UBZ Liquidity Fund Sfr	-0.609	(2)	-0.476	(4)	-0.193	(4)	0.269	(8)	-0.271	(4)	0.674	(9)
Average	-0.893		-0.858		-0.179		0.613		-0.312		1.308	
Std. Dev.	0.294		0.292		0.270		0.303		0.270		0.373	
Min.	-1.452		-1.413		-0.655		0.229		-0.804		0.674	
Max.	-0.548		-0.513		0.174		1.010		0.039		1.768	

volatility than the Euro-deposit. This is due to the fact that a fund charges fees (which lower its return), and invests in various maturity securities (which have a higher volatility than the one month Euro-deposit). But fixing arbitrarily the level of the risk free proxy much below the Euro rate, at 5% for instance[8], gives positive SHARPE ratios (see Exhibit 4). Since the CAPM has a very limited explanatory power with money market funds, the TREYNOR ratio should not be used. In fact, the very small duration of the investments contained in money market funds makes their net asset values rather insensitive to interest rate fluctuations, and monthly returns should always be positive. Thus, the volatility is a pure upside volatility, which is highly desirable, and there should not be any downside risk. In this context, any measure that penalises volatility directly penalises return and should not be used.

6.2 Does performance have a meaning for a money market fund?

This question is far from being theoretical. In Switzerland, checking accounts cannot be linked to a money market deposit, as it is the case in United States. Hence, money market funds serve only as temporary investment, or as a safe investment in the short term rate.

For these reasons (and by definition), money market funds should hold very short term investments. For a fund manager, applying an active strategy on very short term monetary instruments is impossible, as they are almost insensitive to interest rate volatility, since they are very close to maturity, and as the transaction costs would override all benefits of the strategy. So, most funds should hold their securities until maturity, and show the same performance as an average short term investment. In pure theory, we should even observe a risk-free rate return, and no excess volatility.

The trouble comes from the fact that money market funds do not always hold short term investments. Exhibit 5 shows the portfolio structure of Swiss francs money market funds in December 1993. Some funds, like the UBZ Liquidity Fund, hold important parts (30.9 %) of their assets in securities with a maturity higher than one year, which gives them a high duration (288 days). If we compare them to the Canto MM Fund, which is fully invested in less than one year securities and has a 100 days duration, we are in fact comparing different asset classes rather than different pure money market strategies. Superior performance may come from the application of a successful, but incorrect strategy: in fact, superior performance can be generated

by allocating resources acting as a short term bond fund rather than as a money market fund. Such a decision should be taken by the investor in the selection of his fund, rather than by the fund manager, since it can lead to a decrease in the net asset value. This was the case for example with the UBZ Liquidity Fund SFR, which had a decrease of -0.47% of its net asset value in June 1994.

6.3 Conclusion on money-market funds' performance

Money market funds performance should be examined in a three dimensional framework: risk, time-horizon, and return. On a pure money-market fund, interest rate risk should not exist, if the investor's time-horizon is long enough (at least a month); hence, it is important to separate "real" money market funds from "short term bonds funds", which should be moved into a distinct category, and judged as bond funds. Other form of risks, in particular credit risk, should be carefully examined[10]; but safe "real" money market funds can be evaluated using the return-only criterion, net of fees, since using betas, variances, or downside-risk makes no sense.

An other important result seems to be that money market performance will generally be lower than the one from a direct investment in short-term securities (such as Euro-deposits). The loss corresponds to the mutual fund fees charged for both the management activity (renewal of rolling investments, bookkeeping, etc.) and the diversification service. Hence, it is fundamental to consider fees and default risk when engaging in such a fund.

7. Empirical results: Bond funds

Bond funds have very specific characteristics in terms of their return distributions, their low market risk, and their high interest rate risk. Since there exist no adequate specific methodology to measure their overall performance, we will try to apply the same measures that were tested on the stock funds (except, of course, the measures depending of a stock market index). Results are provided in the Appendix. As one could expect, the mean rate of return and the variability of the returns for the bond

Exhibit 5 : Portfolio structure of money market funds (in %)

	Baer Mult. Swiss Cash	Canto MM Fund SFr	CS Money Market Fund SFr	SBC MM Fund SFr	SVB Money Market	UBS MM Invest SFr A/T	UBZ Liquidity Fund SFr
Average liquidity	17		0.2	17.6	3	4.9	15.3
1-30 days	24	20	12.2	16	-	7.9	
1 to 3 months	33	27	28	30.1	35	39.1[9]	9.0
3 to 6 months	34	13.2	23.1	8	44.6	14.8	
6 to 12 months	16	15	17	14.2	4	11.4	22.2
12-18 months	-	11.3	2.7	-			
18 to 24 months	34	-	9.3	-	37	-	30.9
over 2 years	-	-	-	-			
Duration	173 days	100 days	187 days	116 days	84 days	105 days	288 days

Source: Bopp (1994)

portfolios are much lower than the corresponding quantities for stocks, whatever the period. On average, the funds volatility was relatively stable over time.

The two pure domestic funds (HelvetBaer and Sfr Baer) and the UBS Fixed Term Invest SFR 96 have very low volatility; at the opposite, the Bond Valor Sfr fund has a high volatility, but this is due to the risks related to the quality of the debtors (more than 6% of the assets are non rated bonds) and to the type of bonds (the fund holds zero-coupons, convertible bonds with embedded options, and perpetual bonds from KLM, SAS, and Austrian Airlines).

Note that a high average return can arise either with a high volatility (like the Bond Valor Sfr) or with a low volatility (like the HelvetBaer, who invests in high quality bonds). At the reverse, a very high or a very low volatility will not imply high returns (like Ace fund yield CHF or UBS Fixed Term Invest SFR 96). We can also notice high differences in the average return and the volatility of similar indices, like the Pictet Foreign Debtors and the SB Foreign Debtors, for the same period. This clearly shows the problem of an appropriate bond index selection.

7.1 SHARPE ratios

On average, the SHARPE ratios for bond funds are much lower than the ones for stock funds. The SHARPE ratio ranking is very unstable over time, as we can see in comparing the period 91-94 and 88-91, where fund number one and two were ranked ninth and eleventh at the precedent three-year period.

Some funds show superior risk adjusted performance, like the HelvetBaer or BondValor SFR which regularly beat most bond market indices. The first invest in high quality bonds, the second in risky ones. The market index dominates all bond indices, which themselves generally dominate the bond funds on average.

7.2 AFTALION and PONCET

Using the UK Euro Swiss Franc one month deposit rate and various bond indices, we have computed the risk premium over the period January 1984-1994 using the AFTALION and PONCET methodology. The bond indices selected were the Pictet General Bond Index, the Pictet Foreign Debtors Bond Index, the Pictet Domestic Bond Index, the Salomon Brothers Foreign Bond Index-Sfr, and the Salomon Brothers Government Bond Index-Sfr. The results are given in Exhibit 6.

Exhibit 6: AP risk premium and various bond indices

Pictet Gal Bond	Pictet For. Debtors	Pictet Dom. Bonds	S.B. Gov. Bonds	S.B.For. Bonds
-4.16	0.35	-7.81	2.33	-8.94

The figures in this table clearly make no sense. Here again, the choice of the bond index totally modifies the risk premiums for bonds from positive to negative values, as they can go from -8.94% to +2.33% for the same period. Hence, no test was made on bond funds using the AFTALION-PONCET methodology.

7.3 BAUMOL ratios

The BAUMOL measure was computed using risk-aversion coefficients of value 0, 0.5, 1, and 2 (the same values as for stock funds). Increasing the risk-aversion coefficient slowly moves us from a "return only" view (k=0) to a "volatility only" perception (k being large). Risky funds with high returns (like Bond Valor) are progressively retrograded in the ranking, as k increases. But we should also note the performance of HelvetBaer, who remains at the top part of the ranking for all values of k. But as k increases, two side effects arise: stocks are considered as dominated by bonds, and the risk-free rate investment (the Euro deposit for one month) becomes highly desirable (as it has a very low volatility).

7.4 BURKE ratio

Using the BURKE measure, like in the SHARPE ratio case, the HelvetBaer or BondValor SFR funds show superior performance and regularly beat bond market indices. The former invests in high quality bonds, the latter in risky ones, but both display excellent risk adjusted performance. The stock market is still dominating the bond funds on average, but now, the bond indices start dominating the market for some periods. This could be expected, since the stock market has more downside (and upside) volatility than the bond indices.

7.5 Conclusion on bond funds' performance

Whatever the measure and the test period used, two funds are regularly in the top rankings: the HelvetBaer or BondValor SFR. But differences in performance measures of Swiss Francs bond funds are mainly coming from strategic decisions concerning risk exposure and investment selection, such as duration, quality of debtors, type of bonds (callable, convertibles), currency risk hedging (totally or partially), etc. Hence, comparing bond funds does not give an estimate of managers superior abilities, but a ranking of their strategies, as their assets reflect these strategic decisions.

8. Does using stochastic dominance improve the results?

The stochastic dominance with risk-free borrowing and lending was tested on all type of funds using the algorithms suggested by LEVY (1980). Results are given in the Appendix. A fund is said to be N-th degree efficient if there exists no other fund that dominates it by N-th degree stochastic dominance. The first results are the following:

- the first degree of stochastic dominance seems useless, since there was no first degree dominance for any type of funds. Second degree stochastic dominance gives the most important number of elimination from the efficient set.
- the results depend on the period considered; for example, the ParSuisse fund is considered as efficient in the period 1991-1994, while the reverse is true for the period 1987-1994, where it is dominated by most funds

Our previous conclusions using moment-based approaches are verified; in particular,

- stock funds performance is inferior to the market: the SBC General Index was only dominated in one sub-period and by one fund, and the SBC-100 Index Fund Switzerland was never dominated.
- for bond funds relative to a bond index, the results depend ... on the choice of the selected index. It seems that some indices (like Salomon Brothers indices) are more often outperformed than others (like Pictet indices).
- money market funds are totally dominated by the Euro-deposit rate.

We can also see the limits of stochastic dominance: for example, in the period 1991-1994, there is no criteria to select the best fund between the ParSuisse and the SBC-100 Index Fund Switzerland: both are undominated, but there is no known dominance relation between them. To rank them, we would have to perform tests with a higher degrees of stochastic dominance, but that would imply also some stronger assumptions about the investor's utility function. We should also note that the magnitude of the dominance cannot be measured: two distributions can be almost identical, except in one month, and show first degree stochastic dominance, as well as two totally different distributions.
Anyhow, the main thing to remember is that stochastic dominance confirms the results we obtained using other moment-based performance measures[11]: on average, Swiss mutual funds do not beat their reference index on a risk-adjusted basis. Should we then conclude that fund managers have no ability? This would be too hasty, as none of our measures identifies sources of performance, such as market-timing and stock-picking.

9. Selectivity and market timing

Selectivity and market timing were tested on the stock funds using the TREYNOR and MAZUY's, and MERTON and Henriksson's models, plus the JENSEN's alphas (if there was no evidence of market timing strategy). The test was performed on the total life of each fund, which implies that the results should not be compared between funds. The results are given in the Appendix, and can be summarised as follows:

- According to TREYNOR and MAZUY's model, only the FL Trust Switzerland and Multi-Helvetia fund shows statistically significant market timing ability, while the ParSuisse and Swissbar funds are qualified as negative market timers. Other funds do not have significant results. But the FL Trust Switzerland is affected at the same time by a negative stock picking ability, as well as the Gesti CH and the Skandia Swiss Equity funds. Only Pictet Valsuisse exhibits superior stock picking ability.
- MERTON's model gives similar conclusions: the FL Trust Switzerland fund has a statistically significant market timing ability, but is affected by a negative stock picking ability, while the ParSuisse and Swissbar funds are qualified as negative market timers. The Gesti CH, Skandia Swiss Equity, and the Baer MultiStock Swiss Stock funds show inferior stock selectivity, but no fund appears as a superior stock picker.
- The JENSEN's alphas showed that no fund had particular stock picking ability; worse, the Gesti CH and Skandia Swiss Equity were qualified as having a negative stock selection ability.

Hence, the general conclusion seems to be that there are no forecasting abilities in mutual funds managers, or that all forecasting ability is devoted to paying management fees. Here again, this is in accordance with the results from the ZIMMERMANN and ZOGG-WETTER (1992) study.

In both ways, results tend to confirm the efficient market hypothesis: it is not possible for a non informed investor to outperform the Swiss market through mutual funds. Then, we should wonder why investors refuse to admit that funds have no forecasting skills and do not consider a totally passive management strategy, in which mutual funds just provide (and are paid for) a diversification service to the investors...

10. Conclusions

Despite the theoretical limits of the considered performance measures, this study suggests that, in Switzerland, whatever the investment period, the asset class, or the strategy, mutual funds fail to outperform unmanaged portfolios, and seem to have no particular abilities for stock picking or for market timing. Such results confirm the ZIMMERMANN and ZOGG-WETTER (1992) study. These results are not surprising from an economic perspective: if mutual fund managers have superior investment talent, they may be able to capture the rents from their talent in the form of higher fees or perquisites obtained through higher expenses. In that case, we can expect to observe abnormal performance only by examining gross returns, which do not have transaction costs, fees, or other expenses subtracted from them.

How then can we account for the mutual funds popularity? People suggest that investors could invest directly and avoid the charges... An answer would be that mutual funds are a "second best" alternative, but attainable: as markets are not perfect nor investable, mutual funds should rather be compared to two to five stocks combination investments, which is the alternative for small investors constrained to purchase a small number of stocks. But the emergence of indexed funds should then be the rule. A possible and more realistic explanation is the irrational behaviour of small investors, who do not believe in the efficient market theory, and think that they can "beat the market"; in fact, one must admit that during some periods, relative to a given benchmark, using an "appropriate" performance measure, some money managers will effec-

tively be superior performers, and make large advertisements about that[12]. A third point of view is that some investors investing in equities may have a gambling or risk loving motivation. But then, why would they use mutual funds? Maybe the funds shareholders do not give the right incentives to the fund managers. But one should wonder if a more rational attitude would not be to accept the efficient market hypothesis, at least in its semi-strong form, and start to promote indexed portfolios and funds, which have a greater transparency, lower fees, no agency problem, no dependency on a star manager, and ... better long term performance. This will certainly be a future challenge for universal banks, which act as both financial intermediaries and financial advisors on this market.

Appendix

Exhibit 7: Examined funds and indices

Bond funds		General stock funds	
Ace Fund Yield CHF	B1	Baer Mult. Swiss Stock	S1
Baer Multibond Swiss Bonds	B2	BSS Swiss Fund	S2
Bond Valor SFR	B3	FL Trust Switzerland	S3
CS Fixed Int SFr 7% 1/96	B4	Fonsa	S4
CS SFr Bond A	B5	Gesti CH	S5
CS SFr Bond B	B6	MultiHelvetia	S6
Helvet Baer	B7	ParSuisse	S7
Helvetinvest	B8	Pictet ValSuisse	S8
Leu Foreign Bonds	B9	Rotschild Swiss Equity	S9
Lloyds IP CHF Bond	B10	SBC 100 Index Fund Sw.	S10
LO Obliflex J Swiss Fr.	B11	Schweizeraktien	S11
LO Obliflex M Swiss Fr. Multi	B12	Skandia Swiss Equity	S12
LO Obliflex T Swiss Fr. Multi	B13	Swissac	S13
LO Obliflex Z Swiss Fr.	B14	Swissbar	S14
Multibond Sfr	B15	Swissca Switzerland	S15
Obligestion	B16	SwissValor	S16
Pictet Valbond Sfr	B17	Vontobel Swiss Equities	S17
SBC Bond Portfolio SFr A	B18		
SBC Bond Portfolio SFr B	B19	**Small-caps stock funds**	
Scontinvest Multicurr. Bond CHF	B20	Baer Mult. Sp. Sw. Stock	S18
SFr Baer	B21	FAR	S19
Swiss Foreign Bond Selection	B22	Swissca Small Caps	S20
Swiss Franc Bond	B23	Vontobel Sw. Small Cies	S21
Swiss Franc Invest	B24		
Swissca Bond CHF	B25	**Market indices**	
UBS Fixed Term Invest SFR 96	B26	SBC General	MI1
Uebersee Bank B Fund	B27	Vontobel Medium	MI2
Vontobel SFr Bond	B28	Vontobel Small	MI3
Bond indices		**Interest rates**	
Pictet Gal Bonds	BI1	Euro-SFr 1 Month	IR1
Pictet Foreign Debtors	BI2		
Pictet Domestic Debtors	BI3		
S.B. Foreign Debtors	BI4		
S.B. Govern. Bonds	BI5		

Exhibit 8: Stock funds' performance (07.91-06.94)

	σ		β		S_P		T_P		AP_P		B_P (k=o)		B_P (k=1/2)		B_P (k=1)		B_P (k=2)		BU_P	
Stock funds																				
S2	17.01	(1)	1.13	(1)	0.62	(8)	9.38	(6)	-0.88	(6)	16.84	(5)	8.34	(7)	-0.16	(10)	-17.17	(14)	0.3	(2)
S3	14.59	(3)	0.93	(11)	0.44	(13)	6.91	(12)	-4.67	(13)	12.71	(13)	5.42	(13)	-1.87	(13)	-16.46	(12)	0.23	(7)
S4	14.46	(6)	1.06	(3)	0.78	(4)	10.63	(4)	0.12	(3)	17.48	(3)	10.25	(4)	3.02	(4)	-11.44	(5)	0.27	(4)
S5	13.32	(15)	0.86	(16)	-0.04	(15)	-0.64	(15)	-11.47	(15)	5.73	(15)	-0.93	(15)	-7.59	(15)	-20.91	(15)	0.00	(15)
S6	13.43	(14)	0.96	(10)	0.55	(10)	7.71	(11)	-3.53	(11)	13.69	(11)	6.97	(10)	0.26	(9)	-13.17	(8)	0.17	(10)
S7	13.46	(13)	0.93	(13)	0.82	(2)	11.92	(1)	0.07	(4)	17.29	(4)	10.56	(2)	3.84	(1)	-9.62	(1)	0.14	(11)
S8	14.51	(5)	1.05	(4)	0.63	(7)	8.78	(8)	-1.91	(8)	15.46	(7)	8.2	(8)	0.95	(7)	-13.57	(9)	0.25	(6)
S9	13.86	(9)	0.92	(14)	0.31	(14)	4.71	(14)	-6.66	(14)	10.62	(14)	3.69	(14)	-3.24	(14)	-17.10	(13)	0.06	(14)
S10	14.57	(4)	1.06	(2)	0.82	(1)	11.28	(2)	0.85	(1)	18.23	(1)	10.94	(1)	3.66	(2)	-10.92	(4)	0.34	(1)
S11	13.28	(16)	0.99	(12)	0.60	(9)	8.57	(9)	-2.98	(9)	14.22	(10)	7.58	(9)	0.94	(8)	-12.33	(7)	0.19	(9)
S12	13.77	(10)	0.91	(15)	-0.21	(16)	-3.19	(16)	-13.9	(16)	3.36	(16)	-3.52	(16)	-10.40	(16)	-24.17	(16)	-0.05	(16)
S13	13.74	(11)	0.98	(8)	0.75	(5)	10.51	(5)	-0.64	(5)	16.62	(6)	9.75	(5)	2.89	(5)	-10.85	(3)	0.21	(8)
S14	14.35	(7)	1.01	(7)	0.46	(12)	6.6	(13)	-4.4	(12)	12.95	(12)	5.77	(12)	-1.4	(12)	-15.76	(11)	0.08	(13)
S15	14.76	(2)	1.03	(5)	0.54	(11)	7.77	(10)	-3.13	(10)	14.28	(9)	6.9	(11)	-0.48	(11)	-15.24	(10)	0.14	(12)
S16	14.17	(8)	1.02	(6)	0.79	(3)	11.09	(3)	0.2	(2)	17.53	(2)	10.44	(3)	3.35	(3)	-10.82	(2)	0.28	(3)
S17	13.64	(12)	0.98	(8)	0.67	(6)	9.26	(7)	-1.86	(7)	15.39	(8)	8.57	(6)	1.75	(6)	-11.88	(6)	0.27	(5)
Avg.	14.18		0.98		0.53		7.58		-3.42		13.90		6.81		-0.28		-14.46		0.18	
σ	0.90		0.07		0.3		4.2		4.19		4.23		4.10		4.02		4.01		0.11	
Min.	13.28		0.86		-0.21		-3.19		-13.90		3.36		-3.52		-10.40		-24.17		-0.05	
Max.	17.01		1.13		0.82		11.92		0.85		18.23		10.94		3.84		-9.62		0.34	
Small-caps funds																				
S19	11.37	(1)	0.70	(1)	0.09	(1)	1.39	(1)			7.25	(1)	1.56	(1)	-4.12	(1)	-15.5	(1)	0.01	(1)
Indices																				
MI1	13.53		1.00		0.81		10.96				17.23		10.47		3.70		-9.83		0.3	
MI2	14.10		0.92		0.2		3.10				9.11		2.06		-4.99		-19.08		0.02	
MI3	14.24		0.76		0.02		0.36				6.55		-0.57		-7.68		-21.92			
IR1	0.49		-0.01		0		0				6.27		6.03		5.79		5.30			

Exhibit 9: Stock funds' performance (07.88-06.91)

	σ		β		S_P		T_P		AP_P		B_P (k=o)		B_P (k=1/2)		B_P (k=1)		B_P (k=2)		BU_P	
Stock funds																				
S4	17.8	(1)	1.08	(1)	0.2	(3)	3.3	(3)	0.18	(3)	10.69	(2)	1.79	(3)	-7.12	(6)	-24.92	(7)	0.04	(2)
S5	13.7	(12)	0.75	(12)	-0.3	(12)	-5.55	(12)	-6.93	(12)	2.99	(12)	-3.86	(12)	-10.71	(10)	-24.4	(6)	-0.03	(12)
S6	15.26	(11)	0.89	(11)	0.08	(6)	1.42	(6)	-1.76	(6)	8.38	(7)	0.75	(6)	-6.88	(4)	-22.13	(2)	0.02	(6)
S7	17.11	(6)	0.99	(8)	0.04	(8)	0.76	(8)	-2.53	(8)	7.88	(8)	-0.68	(8)	-9.23	(8)	-26.35	(9)	0.01	(8)
S8	15.67	(10)	0.94	(10)	0.14	(5)	2.43	(5)	-0.81	(5)	9.39	(5)	1.56	(4)	-6.28	(2)	-21.95	(1)	0.04	(4)
S9	17.26	(4)	1.00	(7)	-0.13	(11)	-2.24	(11)	-5.54	(11)	4.89	(11)	-3.74	(11)	-12.37	(12)	-29.62	(12)	-0.02	(11)
S10	17.32	(2)	1.05	(2)	0.22	(1)	3.67	(1)	0.52	(1)	10.96	(1)	2.3	(1)	-6.36	(3)	-23.67	(4)	0.05	(1)
S11	17.29	(3)	1.03	(3)	0.07	(7)	1.23	(7)	-2.04	(7)	8.39	(6)	-0.26	(7)	-8.9	(7)	-26.2	(8)	0.02	(7)
S13	16.65	(8)	1.00	(6)	0.21	(2)	3.5	(2)	0.28	(2)	10.62	(3)	2.3	(2)	-6.03	(1)	-22.67	(3)	0.04	(3)
S14	17.19	(5)	1.01	(5)	-0.12	(10)	-1.98	(10)	-5.29	(10)	5.13	(10)	-3.46	(10)	-12.05	(11)	-29.24	(11)	-0.02	(10)
S15	16.64	(9)	0.97	(9)	-0.01	(9)	-0.22	(9)	-3.43	(9)	6.91	(9)	-1.41	(9)	-9.73	(9)	-26.38	(10)	0	(9)
S16	16.85	(7)	1.01	(4)	0.16	(4)	2.75	(4)	-0.49	(4)	9.88	(4)	1.46	(5)	-6.96	(5)	-23.81	(5)	0.03	(5)
Avg.	16.56		0.98		0.05		0.75		-2.32		8.01		-0.27		-8.55		-25.11		0.01	
σ	1.15		0.09		0.16		2.81		2.5		2.57		2.36		2.28		2.54	-	0.03	
Min.	13.7		0.75		-0.3		-5.55		-6.93		2.99		-3.86		-12.37		-29.62		-0.03	
Max.	17.8		1.08		0.22		3.67		0.52		10.96		2.3		-6.03		-21.95		0.05	
Indices																				
MI1	16.34		1.00		0.19		3.18				10.30		2.13		-6.04		-22.38		0.04	
MI2	16.76		0.96		-0.25		-4.3				3.01		-5.37		-13.75		-30.51		-0.02	
MI3	14.07		0.65		-0.7		-15.2				-2.69		-9.72		-16.76		-30.82		-0.03	
IR1	0.48		-0.01		0		0				7.12		6.88		6.64		6.15		-	

Exhibit 10: Stock funds' performance (07.89-06.94)

	σ		β		S_P		T_P		AP_P		B_P (k=o)		B_P (k=1/2)		B_P (k=1)		B_P (k=2)		BU_P	
Stock funds																				
S4	19.21	(2)	1.07	(1)	0.16	(2)	2.89	(2)	1.53	(2)	10.46	(2)	0.85	(2)	-8.75	(3)	-27.96	(5)	0.03	(2)
S5	13.04	(10)	0.68	(10)	-0.44	(10)	-8.45	(10)	-6.44	(8)	1.61	(10)	-4.91	(8)	-11.43	(5)	-24.48	(3)	-0.05	(10)
S6	15.31	(9)	0.82	(9)	0.01	(3)	0.23	(3)	-0.83	(3)	7.54	(3)	-0.12	(3)	-7.77	(1)	-23.09	(1)	0	(3)
S7	18.71	(3)	1.01	(3)	-0.31	(8)	-5.64	(8)	-7.22	(10)	1.63	(9)	-7.72	(10)	-17.07	(10)	-35.78	(10)	-0.04	(7)
S8	15.65	(8)	0.86	(8)	-0.03	(4)	-0.54	(4)	-1.53	(4)	6.88	(4)	-0.94	(4)	-8.76	(4)	-24.41	(2)	-0.01	(4)
S11	19.39	(1)	1.06	(2)	0.21	(1)	3.94	(1)	2.57	(1)	11.52	(1)	1.82	(1)	-7.87	(2)	-27.26	(4)	0.05	(1)
S13	17.32	(6)	0.96	(5)	-0.09	(5)	-1.64	(5)	-2.88	(5)	5.78	(5)	-2.89	(5)	-11.55	(6)	-28.87	(6)	-0.01	(5)
S14	17.89	(5)	0.96	(6)	-0.32	(9)	-5.9	(9)	-7.06	(9)	1.68	(8)	-7.27	(9)	-16.22	(9)	-34.11	(9)	-0.05	(8)
S15	16.65	(7)	0.90	(7)	-0.23	(7)	-4.2	(7)	-4.99	(7)	3.57	(7)	-4.75	(6)	-13.08	(7)	-29.73	(7)	-0.05	(9)
S16	18.41	(4)	1.01	(4)	-0.16	(6)	-2.91	(6)	-4.39	(6)	4.42	(6)	-4.78	(7)	-13.99	(8)	-32.39	(8)	-0.03	(6)
Avg.	17.16		0.93		-0.12		-2.22		-3.12		5.51		-3.07		-11.65		-28.81		-0.02	
σ	2.02		0.12		0.21		3.97		3.5		3.6		3.35		3.4		4.27		0.04	
Min.	13.04		0.68		-0.44		-8.45		-7.22		1.61		-7.72		-17.07		-35.78		-0.05	
Max.	19.39		1.07		0.21		3.94		2.57		11.52		1.82		-7.77		-23.09		0.05	
Indices																				
MI1	17.38		1.00		0.08		1.31				8.66		-0.03		-8.72		-26.1		0.01	
MI2	17.31		0.95		-0.34		-6.24				1.41		-7.24		-15.9		-33.21		-0.05	
MI3	12.18		0.55		-1		-22.10				-4.89		-10.98		-17.07		-29.25		-0.08	
IR1	0.5		-0.01		0		0				7.35		7.01		6.85		6.35		-	

Exhibit 11: Stock funds' performance (07.88-06.91)

	σ		SHARPE ratio		BAUMOL (k=0)		BAUMOL (k=0.5)		BAUMOL (k=1)		BAUMOL (k=2)		BURKE ratio	
Bond funds														
B1	6.961	(1)	-0.634	(24)	1.863	(24)	-1.618	(24)	-5.098	(24)	-12.059	(24)	-0.191	(24)
B3	5.660	(2)	0.699	(1)	10.232	(1)	7.402	(1)	4.572	(3)	-1.088	(15)	0.413	(2)
B4	3.640	(13)	0.083	(16)	6.577	(16)	4.757	(16)	2.937	(16)	-0.703	(13)	0.067	(15)
B7	3.291	(20)	0.609	(2)	8.277	(4)	6.632	(2)	4.986	(1)	1.695	(1)	0.517	(1)
B8	3.712	(11)	0.364	(8)	7.624	(7)	5.768	(8)	3.912	(8)	0.201	(7)	0.262	(5)
B9	3.576	(14)	0.294	(10)	7.325	(10)	5.537	(10)	3.749	(10)	0.173	(8)	0.143	(12)
B10	2.881	(23)	-0.259	(23)	5.526	(22)	4.086	(19)	2.645	(17)	-0.236	(12)	-0.131	(23)
B11	3.431	(18)	-0.069	(19)	6.035	(19)	4.319	(17)	2.604	(18)	-0.828	(14)	-0.012	(17)
B12	5.085	(5)	0.547	(3)	9.056	(3)	6.513	(3)	3.971	(7)	-1.114	(16)	0.196	(7)
B13	5.531	(3)	0.503	(4)	9.056	(2)	6.291	(4)	3.525	(12)	-2.005	(19)	0.155	(11)
B14	4.233	(7)	-0.101	(21)	5.845	(20)	3.728	(20)	1.612	(20)	-2.621	(21)	-0.037	(21)
B15	3.928	(10)	-0.192	(22)	5.518	(23)	3.554	(21)	1.590	(21)	-2.338	(20)	-0.070	(22)
B16	3.129	(21)	0.486	(5)	7.793	(5)	6.229	(5)	4.664	(2)	1.536	(2)	0.316	(3)
B17	5.415	(4)	-0.085	(20)	5.814	(21)	3.106	(23)	0.399	(23)	-5.017	(23)	-0.035	(20)
B18	3.443	(17)	0.127	(15)	6.711	(15)	4.989	(15)	3.268	(14)	-0.175	(11)	0.064	(16)
B19	3.448	(16)	0.133	(14)	6.733	(14)	5.009	(14)	3.286	(13)	-0.162	(10)	0.068	(14)
B20	5.041	(6)	-0.044	(18)	6.050	(18)	3.529	(22)	1.008	(22)	-4.033	(22)	-0.015	(19)
B21	3.063	(22)	0.392	(7)	7.475	(9)	5.944	(7)	4.412	(4)	1.350	(4)	0.202	(6)
B22	3.427	(19)	0.429	(6)	7.743	(6)	6.030	(6)	4.316	(5)	0.888	(5)	0.282	(4)
B23	3.471	(15)	0.268	(11)	7.205	(12)	5.470	(11)	3.734	(11)	0.263	(6)	0.168	(10)
B24	3.679	(12)	0.331	(9)	7.490	(8)	5.651	(9)	3.811	(9)	0.132	(9)	0.190	(8)
B25	4.200	(8)	0.232	(12)	7.248	(11)	5.148	(13)	3.048	(15)	-1.152	(17)	0.125	(13)
B26	2.657	(24)	0.177	(13)	6.744	(13)	5.416	(12)	4.087	(6)	1.431	(3)	0.182	(9)
B27	3.928	(9)	-0.030	(17)	6.154	(17)	4.190	(18)	2.226	(19)	-1.702	(18)	-0.014	(18)
Average	4.152		0.145		6.718		4.643		2.567		-1.585		0.106	
Std.Dev.	1.052		0.315		1.603		1.777		2.073		2.871		0.170	
Min.	2.657		-0.634		1.863		-1.618		-5.098		-12.059		-0.191	
Max.	6.961		0.699		10.232		7.402		4.986		1.695		0.517	
Indices														
MI1	13.532		0.810		17.231		10.465		3.699		-9.832		0.303	
IR1	0.488				6.274		6.029		5.785		5.297			
BI1	3.339		0.482		7.883		6.214		4.544		1.205		0.378	
BI2	3.367		0.508		7.983		6.299		4.616		1.248		0.364	
BI3	3.407		0.446		7.791		6.088		4.385		0.978		0.371	
BI4	4.010		0.575		8.577		6.572		4.567		0.558		0.407	
BI5	5.277		0.244		7.562		4.924		2.285		-2.992		0.132	

Exhibit 12: Bond funds' performance (07.89-06.94)

	σ		SHARPE ratio		BAUMOL (k=0)		BAUMOL (k=0.5)		BAUMOL (k=1)		BAUMOL (k=2)		BURKE ratio	
Bond funds														
B1	5.870	(2)	-0.915	(16)	1.750	(16)	-1.185	(16)	-4.120	(16)	-9.990	(16)	-0.154	(16)
B3	5.369	(5)	-0.052	(2)	6.842	(2)	4.157	(6)	1.473	(8)	-3.897	(11)	-0.010	(2)
B7	2.812	(16)	0.135	(1)	7.501	(1)	6.095	(1)	4.690	(1)	1.878	(1)	0.097	(1)
B8	3.589	(13)	-0.314	(9)	5.997	(6)	4.202	(5)	2.408	(5)	-1.181	(5)	-0.087	(13)
B11	4.303	(7)	-0.837	(15)	3.523	(15)	1.371	(14)	-0.780	(14)	-5.083	(13)	-0.066	(9)
B12	5.797	(3)	-0.276	(7)	5.522	(11)	2.623	(12)	-0.275	(13)	-6.073	(14)	-0.043	(3)
B13	6.935	(1)	-0.352	(11)	4.683	(13)	1.215	(15)	-2.253	(15)	-9.188	(15)	-0.054	(6)
B15	3.833	(9)	-0.568	(13)	4.947	(12)	3.031	(11)	1.114	(9)	-2.719	(8)	-0.118	(14)
B16	3.478	(14)	-0.276	(6)	6.163	(5)	4.424	(4)	2.685	(3)	-0.793	(3)	-0.053	(5)
B17	5.399	(4)	-0.225	(4)	5.907	(7)	3.207	(10)	0.507	(11)	-4.892	(12)	-0.060	(8)
B21	2.927	(15)	-0.177	(3)	6.606	(3)	5.143	(2)	3.680	(2)	0.753	(2)	-0.058	(7)
B22	3.600	(12)	-0.238	(5)	6.266	(4)	4.466	(3)	2.666	(4)	-0.934	(4)	-0.068	(11)
B23	3.658	(11)	-0.411	(12)	5.621	(10)	3.792	(8)	1.963	(7)	-1.695	(6)	-0.077	(12)
B24	3.816	(10)	-0.324	(10)	5.887	(8)	3.979	(7)	2.071	(6)	-1.745	(7)	-0.068	(10)
B25	4.781	(6)	-0.302	(8)	5.677	(9)	3.287	(9)	0.896	(10)	-3.884	(10)	-0.051	(4)
B27	4.111	(8)	-0.610	(14)	4.613	(14)	2.558	(13)	0.502	(12)	-3.609	(9)	-0.133	(15)
Average	4.479		-0.392		5.250		3.011		0.771		-3.708		-0.068	
Std.Dev.	1.177		0.267		1.375		1.739		2.201		3.251		0.056	
Min.	2.812		-0.915		1.750		-1.185		-4.120		-9.990		-0.154	
Max.	6.935		0.135		7.501		6.095		4.690		1.878		0.097	
Indices														
MI1	16.339		0.194		10.298		2.129		-6.040		-22.379		0.044	
IR1	0.485		0.000		7.123		6.881		6.638		6.154			
BI1	3.465		-0.331		5.977		4.245		2.512		-0.952		-0.058	
BI2	3.620		-0.345		5.873		4.063		2.253		-1.368		-0.062	
BI3	3.441		-0.305		6.073		4.352		2.632		-0.809		-0.054	
BI5	5.022		0.297		5.632		3.121		0.610		-4.413		-0.054	

Exhibit 13: Bond funds' performance (07.88-06.91)

	σ		SHARPE ratio		BAUMOL (k=0)		BAUMOL (k=0.5)		BAUMOL (k=1)		BAUMOL (k=2)		BURKE ratio	
Bond funds														
B1	3.700	(11)	-2.017	(15)	-0.112	(14)	-1.962	(14)	-3.812	(13)	-7.512	(10)	-0.259	(7)
B3	4.642	(6)	-1.349	(9)	1.091	(13)	-1.230	(13)	-3.550	(12)	-8.192	(11)	-0.223	(6)
B7	2.141	(15)	-1.368	(11)	4.421	(2)	3.351	(2)	2.280	(2)	0.139	(1)	-0.955	(15)
B8	3.329	(13)	-1.611	(14)	1.987	(10)	0.323	(7)	-1.342	(5)	-4.671	(5)	-0.395	(13)
B11	5.723	(3)	-1.511	(13)	-1.295	(15)	-4.157	(15)	-7.018	(15)	-12.741	(14)	-0.162	(4)
B12	6.041	(2)	-0.573	(3)	3.889	(3)	0.868	(5)	-2.152	(10)	-8.193	(12)	-0.099	(3)
B13	8.409	(1)	-0.491	(2)	3.219	(5)	-0.986	(12)	-5.191	(14)	-13.600	(15)	-0.098	(2)
B15	3.715	(10)	-1.351	(10)	2.330	(7)	0.472	(6)	-1.386	(6)	-5.101	(6)	-0.307	(11)
B16	3.831	(9)	-1.348	(8)	2.185	(8)	0.270	(8)	-1.645	(7)	-5.476	(7)	-0.275	(9)
B17	5.286	(4)	0.043	(1)	7.576	(1)	4.933	(1)	2.290	(1)	-2.996	(3)	0.014	(1)
B21	2.946	(14)	-1.324	(6)	3.450	(4)	1.977	(3)	0.505	(3)	-2.441	(2)	-0.453	(14)
B22	3.630	(12)	-1.249	(5)	2.815	(6)	1.000	(4)	-0.815	(4)	-4.445	(4)	-0.362	(12)
B23	3.940	(8)	-1.380	(12)	1.916	(12)	-0.054	(10)	-2.024	(9)	-5.963	(9)	-0.270	(8)
B24	3.971	(7)	-1.346	(7)	2.005	(9)	0.019	(9)	-1.967	(8)	-5.938	(8)	-0.285	(10)
B25	5.224	(5)	-1.035	(4)	1.943	(11)	-0.669	(11)	-3.281	(11)	-8.505	(13)	-0.190	(5)
Average	4.389		-1.246		2.332		0.137		-2.057		-6.447		-0.286	
Std.dev.	1.527		0.505		2.025		2.147		2.507		3.624		0.221	
Min.	2.141		-2.017		-1.295		-4.157		-7.018		-13.600		-0.955	
Max.	8.409		0.043		7.576		4.933		2.290		0.139		0.014	
Indices														
MI1	17.383		0.076		8.664		-0.028		-8.719		-26.102		0.015	
IR1	0.502		0.000		7.351		7.100		6.849		6.346			
BI1	3.760		-1.482		1.779		-0.101		-1.981		-5.742		-0.270	
BI2	4.002		-1.357		1.921		-0.080		-2.081		-6.083		-0.258	
BI3	3.717		-1.532		1.656		-0.202		-2.060		-5.777		-0.278	
BI5	4.447		-1.415		1.059		-1.165		-3.388		-7.835		-0.230	

Exhibit 14: Stochastic dominance results

FSD efficient		SSD efficient	TSD efficient
Stock funds			
1991-1994	all	**Funds:** SwissValor, FL Trust Switzerland, Fonsa, ParSuisse, SBC-100 Index Fund Switzerland, Rotschild Swiss Equity, Schweizeraktien, Swissac, Gesti CH, FAR Indices: SBC General Index, Euro-SFr 1 Month	**Funds:** SwissValor, FL Trust Switzerland, Fonsa, ParSuisse, SBC-100 Index Fund Switzerland, Schweizeraktien, Gesti CH, FAR **Indices:** Euro-SFr 1 Month
1989-1994	all	**Funds:** Fonsa, MultiHelvetia, Pictet Valsuisse, SBC 100 Index Fund Switzerland, Swissac Indices: SBC General Index, Euro-SFr 1 Month	**Funds:** MultiHelvetia, Pictet Valsuisse, SBC 100 Index Fund Switzerland, Swissac **Indices:** SBC General Index, Euro-SFr 1 Month
1988-1991	all	**Funds:** Fonsa, MultiHelvetia,, Pictet Valsuisse, Schweizeraktien **Indices:** SBC General Index, Euro-SFr 1 Month	**Funds:** Fonsa, MultiHelvetia, Pictet Valsuisse, Schweizeraktien **Indices:** SBC General Index, Euro-SFr 1 Month
Bond funds			
1991-1994	all	**Funds:** Bond Valor Sfr, HelvetInvest, Leu Foreign Bonds, LO Obliflex J. Sfr, Sfr Baer, Swiss Franc Invest, Swiss Foreign Bond Selection, Swiss Franc Bond, CS Fixed Int. Sfr 7% 1/96, UBS Fixed Term Invest Sfr 96 **Indices:** Pictet Foreign Debtors, S.B. Foreign Debtors	**Funds:** Bond Valor Sfr, HelvetInvest, LO Obliflex J. Sfr, Sfr Baer, Swiss Franc Invest, Swiss Foreign Bond Selection, Swiss Franc Bond, CS Fixed Int. Sfr 7% 1/96, UBS Fixed Term Invest Sfr 96 **Indices:** Pictet Foreign Debtors, S.B. Foreign Debtors
1989-1994	all	**Funds:** Bond Valor Sfr, Sfr Baer, Swiss Franc Invest **Indices:** SBS General Index, Euro-SFr 1 Month	**Funds:** Bond Valor Sfr, Sfr Baer, Swiss Franc Invest **Indices:** SBS General Index, Euro-SFr 1 Month
1988-1991	all	**Funds:** Helvet Baer, MultiBond Sfr, Sfr Baer, Swiss Franc Invest **Indices:** none	**Funds:** Helvet Baer, MultiBond Sfr, Sfr Baer, Swiss Franc Invest Indices: none
Money-market funds			
1991-1994	all	**Funds:** none **Indices:** Euro-Sfr 1 Month	**Funds:** none **Indices:** Euro-Sfr 1 Month
1989-1994	all	**Funds:** none **Indices:** Euro-Sfr 1 Month	**Funds:** none **Indices:** Euro-Sfr 1 Month
1988-1991	all	**Funds:** none **Indices:** Euro-Sfr 1 Month	**Funds:** none **Indices:** Euro-Sfr 1 Month

Exhibit 15: Test of the market timing models

	Number of periods	Treynor and Mazuy							Merton and Henriksson							Jensen				
		α	t-stat	β	t-stat	γ	t-stat	R^2	α	t-stat	β_1	t-stat	β_2	t-stat	R^2	α	t-stat	β	t-stat	R^2
Baer Mult. Sp. Sw. Stock	26	-0.05	(-0.06)	0.90	(4.53)	-0.01	(-0.13)	0.51	0.25	(0.19)	0.79	(2.60)	-0.24	(-0.37)	0.51	-0.13	(-0.18)	0.89	(5.02)	0.51
Baer Mult. Swiss Stock	31	-0.43	(-1.63)	1.00	(17.48)	0.02	(1.45)	0.93	-0.70	(-2.01)	1.15	(13.41)	0.33	(1.78)	0.94	-0.21	(-0.95)	1.03	(19.40)	0.93
BSS Swiss Fund	38	-0.42	(-0.88)	1.03	(10.19)	0.03	(1.43)	0.79	-0.72	(-1.12)	1.27	(7.59)	0.47	(1.37)	0.79	0.00	(-0.01)	1.08	(11.27)	0.78
FAR	55	-0.30	(-1.01)	0.57	(10.56)	-0.01	(-0.90)	0.69	-0.35	(-0.90)	0.56	(5.57)	-0.05	(-0.29)	0.69	-0.44	(-1.73)	0.58	(10.78)	0.69
Gesti CH	81	-0.70	(-2.81)	0.81	(16.38)	0.00	(1.39)	0.81	-0.82	(-2.45)	0.86	(9.55)	0.14	(1.08)	0.81	-0.55	(-2.44)	0.77	(18.15)	0.81
FL Trust Switzerland	47	-0.69	(-1.87)	0.96	(14.06)	0.02	(2.53)	0.82	-1.27	(-2.68)	1.23	(9.84)	0.59	(3.00)	0.83	-0.17	(-0.53)	0.91	(13.16)	0.79
Fonsa	161	0.10	(0.81)	0.97	(38.65)	0.00	(-0.30)	0.92	0.18	(1.09)	0.95	(21.22)	-0.05	(-0.79)	0.92	0.08	(0.76)	0.98	(41.44)	0.92
MultiHelvetia	94	-0.23	(-1.42)	0.83	(25.47)	0.01	(2.56)	0.90	-0.24	(-1.08)	0.85	(13.98)	0.10	(1.13)	0.89	-0.05	(-0.36)	0.79	(26.93)	0.89
ParSuisse	98	0.04	(0.18)	0.92	(22.25)	-0.01	(-3.50)	0.88	0.22	(0.73)	0.83	(10.73)	-0.26	(-2.25)	0.88	-0.27	(-1.34)	0.98	(25.25)	0.87
Pictet ValSuisse	174	0.26	(1.99)	0.87	(31.52)	0.00	(-1.09)	0.87	0.22	(1.24)	0.88	(17.77)	-0.01	(-0.13)	0.87	0.20	(1.69)	0.88	(34.02)	0.87
Rotschild Swiss Equity	62	-0.19	(-0.71)	0.96	(20.71)	-0.01	(-1.78)	0.88	-0.03	(-0.09)	0.86	(9.94)	-0.22	(-1.47)	0.88	-0.44	(-1.95)	0.96	(20.57)	0.88
SBC 100 Index Fund Sw.	65	0.06	(0.40)	1.04	(34.97)	0.00	(0.00)	0.95	0.13	(0.59)	1.02	(18.67)	-0.04	(-0.38)	0.95	0.06	(0.47)	1.04	(35.40)	0.95
Schweizeraktien	174	0.03	(0.23)	0.92	(35.54)	0.00	(-1.17)	0.90	0.15	(0.90)	0.88	(19.01)	-0.11	(-1.47)	0.90	-0.03	(-0.28)	0.93	(38.31)	0.90
Skandia Swiss Equity	42	-1.05	(-3.01)	0.86	(10.94)	0.00	(-0.13)	0.79	-1.25	(-2.65)	0.89	(7.71)	0.11	(0.46)	0.79	-1.07	(-3.80)	0.85	(12.34)	0.79
Swissac	138	0.02	(0.16)	0.93	(41.03)	0.00	(-2.03)	0.94	0.04	(0.28)	0.91	(22.45)	-0.07	(-1.08)	0.94	-0.08	(-0.78)	0.94	(44.30)	0.94
Swissbar	137	0.02	(0.16)	0.94	(33.63)	-0.01	(-2.54)	0.91	0.15	(0.80)	0.88	(17.66)	-0.16	(-2.01)	0.91	-0.13	(-1.02)	0.97	(36.33)	0.91
Swissca Small Caps	24	0.41	(0.45)	0.75	(4.18)	-0.01	(-0.24)	0.49	0.72	(0.60)	0.63	(2.32)	-0.27	(-0.46)	0.49	0.28	(0.40)	0.73	(4.58)	0.49
Swissca Switzerland	79	-0.27	(-1.36)	0.96	(24.82)	0.00	(-0.21)	0.89	-0.23	(-0.86)	0.94	(13.66)	-0.04	(-0.33)	0.89	-0.30	(-1.72)	0.96	(25.01)	0.89
SwissValor	174	0.00	(-0.01)	0.87	(21.51)	0.00	(-0.10)	0.76	-0.13	(-0.51)	0.92	(12.68)	0.07	(0.64)	0.76	-0.01	(-0.05)	0.88	(23.06)	0.76
Vontobel Sw. Small Cies	28	0.05	(0.06)	0.76	(4.14)	-0.01	(-0.24)	0.44	0.45	(0.39)	0.62	(2.19)	-0.34	(-0.56)	0.45	-0.07	(-0.10)	0.75	(4.52)	0.44
Vontobel Swiss Equities	50	-0.13	(-0.88)	0.97	(38.96)	0.00	(1.30)	0.97	-0.12	(-0.66)	1.00	(21.59)	0.05	(0.69)	0.97	-0.03	(-0.22)	0.97	(38.92)	0.97

Footnotes

[1] See LHABITANT (1994) for a survey.
[2] For a complete development, see LÉVY (1980).
[3] The results for other sub-periods are given in LHABITANT (1994).
[4] The only exception is the UBZ Liquidity Fund Sfr, with a skewness of -1.03 (fat lower tail) and a kurtosis of 5.62 (very long tailed), which is far from normality. No satisfactory explanation was found about this.
[5] The Pictet General Index, the Pictet Foreign Debtors, the Pictet Domestic Debtors, the Salomon Brothers Foreign Debtors, and the Salomon Brothers Government Bonds.
[6] To check for the influence of the misspecification of the market proxy, we have used various indices. The result is that different market indices can yield to slightly different beta values, and can modify significantly the ranking of the funds according to their betas. Hence, the market portfolio has to be carefully specified.
[7] Its beta is not exactly 1, because it refers to the SBC-100 index, while the beta is measured relative to the SBC General Index.
[8] as some financial institutions do.
[9] including 15.4 % for 1 to 2 month investments.
[10] The rating of money-market funds provides a useful information about short term credit-risk, if it is frequently reexamined.
[11] Note that this is not surprising, since most distributions were considered as being normal.
[12] In a rational market, a portfolio manager's ability to produce a superior return distribution should be associated with the possession of superior information, or a greater ability to process information. A (rational) manager will never admit that he has none, as this would make his services useless!

References

AFTALION, F. et P. PONCET (1991): "Les mesures de performance des OPCVM, Problèmes et solutions", La Revue Banque, Nr. 517, pp. 582-588.
BOOP ISB AG (1994): "Bilanz / Bopp Fondsfnhrer '94", Zurich.
BURKE, G. (1994): "A sharper SHARPE ratio", Futures, Nr. 3, p. 63.
HENRIKSSON, R.D. (1984): "Market timing and mutual fund performance: an empirical investigation", Journal of Business 57, pp. 73-96.
JENSEN, M.C. (1969): "Risk, the pricing of capital assets, and the evaluation of investment portfolios", Journal of Business 42, pp. 167-247.
KATAOKA, S. (1963): "A stochastic programming model", Econometrica 31, pp. 103-129.
LEVY, H. (1980): "Research in finance, volume 2", Jai Press, Greenwich, Connecticut.
LHABITANT, F.-S. (1994): "Le ratio de SHARPE: mythe et limites", Banque et Finance, Décembre, pp. 24-39.
LHABITANT, F.-S. (1994): "Portfolio performance: theoretical and empirical investigations on the Swiss mutual fund market", Research Paper no 9406, H.E.C., University of Lausanne.
MERTON, R. C. (1981): "On market timing and investment performance I: an equilibrium theory of value for market forecasts", Journal of Business 54, nr. 3, pp. 363-406.
MERTON, R. C. and R. HENRIKSSON (1981): "On market timing and investment performance II: statistical procedures for evaluating forecasting skills", Journal of Business 54, nr. 4, pp. 513-533.
SHARPE, W.F. (1966): "Mutual fund performance", Journal of Business 39, January, pp. 119-138.
SHARPE, W.F. (1994): "The SHARPE ratio", The Journal of Portfolio Management, Fall, pp. 49-58.
TREYNOR, J.L. (1965): "How to rate management of investment funds", Harvard Business Review, 43, nr. 1, January-February, pp. 63-76.
TREYNOR, J.L. and K. MAZUY (1966): "an mutual funds outguess the market ?" Harvard Business Review, July-August, Nr. 44, pp. 131-136.
ZIMMERMANN, H. und C. ZOGG-WETTER (1992): "Performance-Messung schweizerischer Aktienfonds. Eine empirische Studien über Markt-Timing und Selektivität", Schweizerische Zeitschrift fnr Volkswirtschaft und Statistik.
ZIMMERMANN, H. et C. ZOGG-WETTER (1992): "Les fonds de placement de fond en comble", La Banque Suisse, Janvier, pp. 24-31.