

## RISK-ADJUSTED PERFORMANCE OF MUTUAL FUNDS: SOME TESTS

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### Abstract

The development of a stock market depends to a great extent on the development of institutional investors. The paper studies the mutual fund industry and applies various tests to evaluate the performance capacity of mutual funds. First, we briefly explain the data, and then we introduce the performance measures used to evaluate funds. Finally, we calculate the performance measures of mutual funds and rank them according to the results. We find the rankings obtained by performing both the Sharpe and Treynor rules to be almost the same, implying that funds are well diversified. The rankings reveal that all analyzed funds outperformed the market on a risk-adjusted basis.

**JEL Classification:** G10 (capital and financial markets), C14 (semi- and non-parametric methods)

**Keywords:** Financial market, portfolio returns, risk measures, mutual funds

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## 1. Introduction

The development and the liquidity of a stock market depend on the development of a class of well-governed institutional investors. There are three types of institutional investors. Pension funds form the first class of institutional investors. Because funded pension schemes have yet to be established or have only recently been set up in transition economies, pension funds are insignificant in terms of the size of assets under management. The insurance industry in transition economies started developing only after 1996. Thus the assets of the second type of institutional investors are marginal in most transition economies. One exception is the Czech Republic, where the insurance market is relatively well developed and is dominated by foreign players.

Investment and mutual funds form the largest group in transition economies. Investment funds largely emerged out of the mass privatization funds used to transfer ownership during privatization. Over the last few years, the mutual fund industry in transition economies has exploded. Recent studies (Khorana *et al.* 2005) found substantial cross-country variation in the development of the fund industry. For the majority of countries, a combination of demand-side, supply-side, and legal and regulatory factors help explain why the fund industry is larger in some countries than in others. In the process of promotion of the mutual fund industry Slovenia was in the forefront among transition economies. This paper studies the mutual fund industry in Slovenia in the first years of its development, i.e. in the period which was characterized by the first important flows to mutual funds. This period is interesting, since this was the period of the decisive breakout of mutual funds and the period where the stock market seems not to be efficient (Jagric *et al.* 2005). In the paper we evaluate the performance of Slovenian mutual funds and try to rank them on the basis of different parameters.

The question of how to evaluate the performance of a fund is far from being academic. Just about a decade ago, investors were almost exclusively interested in funds having large annual returns or, in other words, funds capable of beating the market. An example of a star fund is the Fidelity Magellan mutual fund, under the guidance of Peter Lynch, which outperformed the S&P 500 index in 11 of 13 years from 1977 to 1989 (see Marcus 1990). Meanwhile many funds with outstanding profits during their life have collapsed, and investors are more and more interested in the other dimension of fund performance: risk. There were three typical periods: 1965-1968, 1977-1980, and 1991-1993. The first period included the go-go era of investing, when extremely risky small stocks provided extraordinary returns, and the mutual fund industry responded by creating large numbers of highly aggressive go-go funds. The conservative character of the industry changed during this period; funds accepted uncharacteristically high risks, and the S&P 500 Index's more modest short-term rewards made it look inadequate. The perception grew that mutual fund managers could easily outpace the market. However, when the go-go bubble burst in

1968, these newly formed funds collapsed, the returns of the average fund slumped, and the S&P 500 Index reclaimed its wide margin of superiority in 1969 through 1976 (Bogle 2000). In the other two periods many mutual funds did not recognize the different growth pace of small, mid and large caps.

This paper is organized as follows. First, we briefly explain the data, and then we introduce the performance measures used to evaluate funds: the Sharpe ratio (1994), the Treynor ratio (1965), Jensen's Alpha (1968), the Treynor appraisal ratio, and the Treynor-Mazuy timing measure (1966). Finally, we calculate the performance measures of Slovenian mutual funds and rank them according to the results.

## 2. The Data

The data consist of weekly returns calculated as the difference in logarithm of price in the period 1 January 1997 to 31 December 2003. We analyze only those funds which are older than three years. Some of them are predominantly made up of bonds such as Pika, Polzek, and Piramida (55%), while Rastko (80%), Zajcek, Alpha, Galileo (65%), Hrast (55%), and Vipek are composed predominantly of stocks. Although most funds comprise a balanced combination of stocks and bonds, as a benchmark we use the Ljubljana Stock Exchange - SBI20 index, which is a market capitalization weighted average of the 15 largest companies. In Table 1 we show the annual return for some mutual funds.

**Table 1.** Annual Growth Rate for Different Mutual Funds in Slovenia (1997-2002)

	1997	1998	1999	2000	2001	2002
ALPHA	0.235	0.204	0.233	0.237	0.244	0.531
PIKA	0.164	0.125	0.175	0.097	0.203	0.243
GALILEO	0.285	0.315	0.205	-0.001	0.268	0.599
RASTKO	0.282	0.276	0.331	-0.023	0.209	0.611
PIRAMIDA	0.141	0.142	0.142	0.101	0.141	0.289
ZAJCEK	0.261	0.188	0.160	0.018	0.169	0.537

As a risk-free rate benchmark, we use three-month Treasury bills issued by national banks in selected countries. The average three months Treasury Bill rate was 9 percent for the period 1 July 2000 - 31 December 2003. We believe that it could be more appropriate to apply one-month Treasury bills or any other asset with an even shorter expiry period, however it was not possible to select such assets in the case of the observed market. We think that as in the case of developed countries, where the returns of three-month Treasury bills can be considered as a good proxy of risk-free rate, also in the selected country the three-months returns reflect a true risk-free rate.

Among funds we highlight the Galileo mutual fund, which was the most profitable investment fund for the period of 13 May 2002 to 13 May 2003 according to *The Wall Street Journal Europe* on the basis of annual return. The mutual fund Rastko, managed by the same company (KD Investments, which holds more than sixty per cent of the mutual fund market in Slovenia), had a similar performance.

### 3. Risk Statistics

Funds usually try to attract potential investors by referring to their past performance. Although the past performance does not guarantee or even directly relate to future performance, it usually serves as an initial step in the process of investment decision. Several studies have investigated the predictability of funds returns in the US (Sharpe 1966, Hendricks *et al.* 1993, Malkiel 1995, Carhart 1997, Bollen and Bussen 2005 among others) and in other markets (Otten and Bams 2002 for 5 major European markets, Blake and Timmerman 1998 for the UK, Philippas *et al.* 2007 for Greece, Bilson *et al.* 2005 for Australia among others). The following risk/return measures should rather be referred to as ex-post measures because they are defined as historical averages, rather than expectations of future performance.

Several statistical measures are used to assess risk. For evaluations of risk of mutual funds the most commonly used are  $R^2$  with the market portfolio, standard deviation of returns, and Sharpe, Treynor and Jensen measures.

$R^2$  with market portfolio indicates the percentage of the variation of portfolio returns that is explained by variation in market returns. The higher  $R^2$ , the stronger the correlation between a fund's return and the market return. The regression slope between the fund and the market is defined by coefficient through the well-known relationship of the capital asset pricing model (CAPM):

$$R_t = R_f + \alpha + \beta(R_{mt} - R_f) + \varepsilon_t \quad (1)$$

where  $R_m$  is market return,  $R_f$  is risk-free return, and  $R_t$  is the fund return. The higher the beta value, the higher the correlation between the returns on the market portfolio and the fund. For example, for a risk-free investment beta is zero.

Standard deviation measures fluctuations of returns around their mean value. Standard deviation of a fund represents the total risk, which can be separated into systematic (market risk) and unsystematic risk through the relation  $\sigma^2 = \beta^2 \sigma_M^2 + \sigma_e^2$ . We see how market risk,  $\beta^2 \sigma_M^2$ , is directly related to the beta coefficient in eq. 1. Unsystematic risk,  $\sigma_e^2$ , can be reduced or even eliminated through the proper diversification of the fund.

Over 40 years ago, Sharpe (1966) introduced a measure for the performance of mutual funds and proposed the term "reward-to-variability ratio" to describe it (the measure is also described in Sharpe, 1975). While the measure has gained consider-

able popularity, the name has not. Other authors have termed the original version the Sharpe Index (Radcliff 1990, Haugen 1993), the Sharpe Measure (Bodie *et al.* 1993, Elton and Gruber 1991, Reilly 1989), or the Sharpe Ratio (Morningstar 1993). Generalized versions have also appeared under various names (see for example, BARRA 1992, and Capaul *et al.* 1993). The calculation of the original Sharpe ratio is straightforward. First we define the “excess return” as the return of risky investment in excess of the return on a risk-free investment. The annualized Sharpe ratio is calculated by dividing the annualized excess return by the standard deviation of the return:

$$S_h = \frac{\bar{R} - R_f}{\sigma} \quad (2)$$

Note that the Sharpe ratio, as a measure of risk, uses the total risk or standard deviation of returns. The advantage of using the Sharpe ratio for evaluating portfolios is that it does not depend on the choice of a benchmark (market index).

The Treynor ratio (1965) is another popular indicator of fund performance. It is defined through the relation:

$$T_h = \frac{\bar{R} - R_f}{\beta} \quad (3)$$

The Sharpe and Treynor measures are similar in a way, since they both divide a fund’s excess return by a numerical risk measure. The total risk is appropriate when we are evaluating the risk return relationship for poorly diversified portfolios. On the other hand, the systematic risk is the relevant measure of risk when we are evaluating fully diversified portfolios. For a well-diversified portfolio, the total risk is equal to systematic risk. Rankings based on total risk (Sharpe measure) and systematic risk (Treynor measure) should be identical for a well-diversified portfolio, as the total risk is reduced to systematic risk. Therefore, a poorly diversified fund that ranks higher on the Treynor measure, compared with another fund that is highly diversified, will rank lower on the Sharpe Measure.

The second parameter of the CAPM model, Jensen’s  $\alpha$ , indicates whether the portfolio manager is superior or inferior in stock selection compared to the market. This measure indicates the difference between a portfolio’s actual and expected return given its level of systematic risk. Annualized Jensen’s  $\alpha$  is the maximum amount of money the investor should be willing to pay a fund manager per year. An inferior manager has a Jensen’s  $\alpha$  that is significantly negative, while a superior manager obtains a positive value of  $\alpha$ .

According to Jensen (1968), equilibrium average return on a portfolio would be a benchmark. Equilibrium average return is the return of the portfolio by the market with respect to systematic risk (volatility) of the portfolio. This is a return the portfolio should earn with the given systematic risk. The difference between the equilibrium

average return and the average return of the portfolio indicates superior performance of the fund. This is called alpha ( $\alpha$ ). The appraisal ratio adjusts Jensen's  $\alpha$  for unsystematic risk through the equation:

$$AR_h = \frac{\alpha}{\sigma_e} \quad (4)$$

The smaller the unsystematic risk, the better the results the fund has established as measured by the appraisal ratio.

The Treynor-Mazuy model (1966) shows a manager's ability to shift a fund's beta between riskier and less risky assets according to overall stock market movements. It is defined by including the squared market risk premium in the CAPM model of eq. 1. If the coefficient of that new term is positive, then the manager shows timing ability:

$$R_t = R_f + \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2(R_{mt} - R_{ft})^2 + \varepsilon_t \quad (5)$$

#### 4. Results

Table 2 contains the data on: size of funds (in millions of dollars), average annualized return ( $\mu$ ), excess return ( $D$ ) and standard deviation ( $\sigma_D$ ). We show annualized results calculated from weekly data (multiplying the average weekly return by 52 and the standard deviation of weekly returns by the square root of 52).

**Table 2.** Slovenian Mutual Funds Ranked by the Value of Sharpe Ratio

7/00-12/03	Fund size* mil. \$	Average annualized return ( $\mu$ )	Excess return ( $D$ )	Standard deviation ( $\sigma_D$ )	Sharp ratio ( $S_h$ )
ALPHA	40	0.27	0.18	0.08	2.19
GALILEO	120	0.27	0.19	0.11	1.67
ZAJCEK	8.3	0.24	0.15	0.09	1.62
PIRAMIDA	2.8	0.18	0.09	0.06	1.58
PIKA	2.6	0.17	0.08	0.05	1.58
HRAST	5.5	0.24	0.15	0.10	1.56
RASTKO	43	0.25	0.16	0.11	1.47
VIPEK	3.9	0.22	0.14	0.09	1.47
POLZEK	4.7	0.10	0.11	0.08	1.43

Note: \* value at December 2003

Funds are ranked according to the Sharpe rule, which states that in assessing the comparative merits of two funds we have to choose the fund with the higher Sharpe ratio. This ranking is biased towards funds containing a large share of low risk investments (bonds). An investor with a different risk preference (smaller risk aversion) might prefer a different ranking. For example, Galileo, one of the most profitable mutual funds in the world, is not ranked first by the Sharpe rule.

The Sharpe ratio for mutual funds is typically between 0.5 and 3. A rule of a thumb is that if the annualized Sharpe Ratio is over 1.0, the fund had a 'pretty good' year. Outstanding funds have a Sharpe ratio over 2.0 (Investopedia.com 2007). From this point of view, most Slovenian mutual funds might be characterized as pretty good. The bond component of a portfolio significantly lowers the standard deviation. According to an analysis by Ibbotson Associates, from 1972 to 1997, a portfolio consisting of 25% intermediate-term government bonds and 75% stocks returned an average of 12.2% per year, almost the same as a portfolio consisting entirely of the S&P 500, and at the same time had a higher Sharpe ratio.

In Table 3, we again rank Slovenian mutual funds according to their Sharpe ratios, but this time we report the Treynor ratio, Jensen's  $\alpha$ , coefficient  $\beta$ ,  $R^2$  and the Treynor appraisal ratio. Values of  $\beta$  are lower than one due to the fact that most of the funds are 'balanced,' i.e. capital is allocated between stocks, bonds and cash. Allocation of capital in bonds in general decreases both the return and the standard deviation.

All funds are also specified by a positive Jensen's  $\alpha$ , indicating that managers might have had the superior ability in market stock selection. For the funds Alfa, Galileo, Zajcek, Piramida, Pika, and Hrast, we find a statistically significant  $\alpha$ . For other funds, the hypothesis that  $\alpha$  is zero cannot be rejected.

**Table 3.** Reynor's Ratio Calculated For Different Funds

7/00-12/03	Sharp ratio ( $S_h$ )	Treynor ratio ( $T_h$ )	Coefficient ( $\beta$ )	Jensen's $\alpha$	Treynor appraisal ratio ( $R$ )	$R^2$	t- statistics
ALPHA	2.19	0.40	0.49	0.110	2.11	0.59	3.93
GALILEO	1.67	0.27	0.69	0.071	1.27	0.73	2.32
ZAJCEK	1.62	0.24	0.62	0.049	1.33	0.84	2.43
PIRAMIDA	1.58	0.24	0.38	0.029	1.13	0.80	2.14
PIKA	1.58	0.25	0.32	0.028	1.09	0.73	2.14
HRAST	1.56	0.24	0.63	0.049	1.08	0.78	2.02
RASTKO	1.47	0.23	0.71	0.047	0.87	0.75	1.61
VIPEK	1.47	0.22	0.63	0.034	0.94	0.85	1.71
POLZEK	1.43	0.22	0.49	0.028	0.77	0.77	1.42

Note: Benchmark market portfolio is Slovenian SBI20 index.  
Hypothesis for the t-test:  $H_0 : \alpha = 0, H_1 : \alpha \neq 0$

Table 3 also shows that the funds' ranking is practically the same by the Treynor rule as by the Treynor appraisal ratio. It generally holds that the Sharpe and Treynor ratios provide similar rankings if funds are well diversified. The rankings reveal that all analyzed funds outperformed the market SBI20 on a risk-adjusted basis.

## 5. Concluding Remarks

In this paper we analyzed the performance of Slovenian mutual funds. The funds are ranked on a risk-adjusted basis. We find the rankings obtained by applying both the Sharpe and Treynor rules to be almost the same, implying that funds are well diversified. Some of the funds performed extremely well compared to other mutual funds worldwide. Slovenia's entry into the European Union facilitated investment of foreign money into these funds. This process of investing money is not one-sided, since even now the Slovenian mutual funds are increasingly starting to invest part of their portfolios abroad. Including them in one's portfolio provides exposure to an emerging market that can provide a hedge to negative global trends. For example, this was the case with the Galileo fund, which provided a high return in the globally bearish period of March 2002 -March 2003. However, an obstacle to the wider use of these funds is the relatively small capitalization of the Slovenian market.

Legislation dealing with mutual funds will have to be simplified if Slovenia is to see further development in this field. Apart from changing legislation, much work remains to be done in raising public awareness about this investment option. Although Slovenia's leading mutual funds are expected to see continued growth in the future, they will lose some market share on account of new mutual funds, especially foreign ones.

According to forecasts, the volume of retail savings in mutual funds shall account for no less than 25% of total bank deposits. In the EU, the share of commercial banks in the sale of mutual funds accounts for as much as 92% in Spain, 81% in Austria, and 73% in Germany, while in Slovenia at the moment only a minor share of mutual funds is sold through banks. Therefore, in the future we expect foreign providers of mutual funds, especially commercial banks, to take an aggressive approach to the Slovenian financial market.

Despite the growing interest in mutual funds, which is mainly a result of falling interest rates in the country, Slovenia is still lagging behind the EU in terms of money invested in mutual funds per person. With 370 EUR invested in mutual funds per person, Slovenia is last among all EU members. However, analysts believe that this figure will grow to at least 800 EUR within the next five years, with some predicting that it may well exceed 1000 EUR if some stocks continue to perform extremely well. We believe that Slovenia is at the beginning of a long-term tendency to reallocate the savings of its residents. The reallocation will be a function of falling interest rates, expected tax on interest, gradually progressing pension reform, changed



savings of the population, and improved competitiveness on the Slovenian financial market.

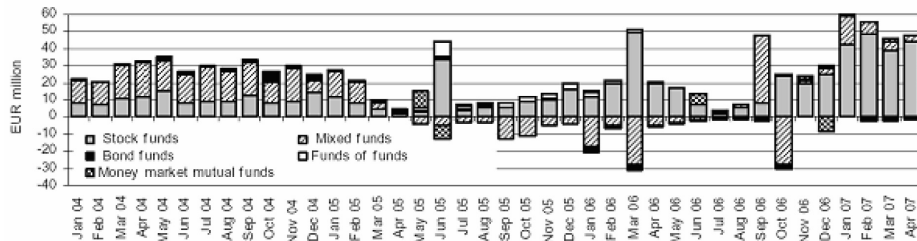
The growing preference of households for other forms of savings over saving in banks is also reflected by the development of mutual funds. Net inflows in mutual funds remain high, since the year-on-year weighted return of the total mutual funds remains very strong (28.3%). As regards further development of Slovenian mutual funds, their operations will gradually move to foreign capital markets and foreign securities. As the majority of relatively unfavourable financial market indicators have been improving (such as poor stock market liquidity, controlled capital flows, insufficient protection of minor shareholders, worse position of foreign investors compared to that of domestic ones, and the absence of a clearly determined legal framework), the stock market seems to be moving to an overbought position.

Slovenia's stock rally has made the equity market very expensive. The growth in the last two years was mainly based on speculations about consolidation and less on business results. The SBI20 (the Slovene Stock Exchange Index) more than quadrupled since the end of 2002. According to Bloomberg data the price-earnings ratio of companies in the index is more than double that of the Morgan Stanley Capital International Emerging Market Index. In July 2007 the P/E ratio reached 38.9, beating China's CSI300 Index (32.9) and doubled the average for the past year. The performance of the domestic equity funds targeting Slovenian stock in the near future will depend on whether merger and acquisition speculation will continue to support shares. Interest rate considerations may play the crucial role.

In the absence of a developed primary security market in Slovenia and the prospect of a growing bubble on the domestic stock market, mutual funds will be forced to invest abroad. Signs of a stock market bubble usually reallocate mutual funds flows, otherwise the funds could suffer losses in the case of financial crises (Strasek and Jagric 2004). Financial crises in the last decade confirm the defensive and cautious behaviour of mutual funds managers in such conditions. Kaminsky *et al.* (2000) found that funds' momentum trading is positive – they systematically buy winners and sell losers. Contemporaneous momentum trading (buying current winners and selling current losers) is stronger during crises.

Savers' attitude towards risk in Slovenia has changed significantly over the last few years (Figure 1). While almost two-thirds of inflows were invested in the somewhat mixed funds in 1997-2004, nowadays the bulk of investment is directed to the more risky stock mutual funds, which have received more than 90% of the total inflows into mutual funds.

The fact, that at the start of 2005 domestic shares represented 43% of mutual funds' investment meant that the domestic capital market still had a significant influence on the returns. The bull market in ex-Yugoslavia stock markets contributed to continuous movement to mutual funds.

**Figure 1.** Net Flows into Mutual Funds

Source of data: [www.finance.si](http://www.finance.si)

Mutual funds face growing competition from new private pension funds, which are tax advantaged. In the longer term, however, mutual funds are expected to benefit from the growing strength of pension funds, as they are likely to make the domestic capital market more efficient (Jagric and Podbregar 2004, Jagric *et al.* 2004). In the last few years the market has been fuelled by money from government-owned pension funds, which hold most of their assets in domestic stocks. Recent trends on the Slovenian capital market suggest that changing saving habits and new opportunities from the integration of Slovenian financial markets into global financial markets are the key determinants for future development of the mutual funds industry.

The high rate of growth of the domestic market in the past two years has ensured that the rates of return achieved by those Slovenian mutual funds that invested in the Slovenian market were very high, by international standards. The high proportion of stock funds represents an important risk feature of domestic investors: in the recent period domestic investors have been less risk averse than they used to be in the past. The high share of equity mutual funds shows that the domestic investors are willing to accept above average risk to achieve above average returns. It seems that their decision making is based on past rates of return.

An optimal strategy for developing the Slovenian market would be the creation of a pan-CEE capital market (Koke and Schroeder 2002), which would be tightly interconnected with some Western exchanges, so that security issuers could benefit from a harmonized regulatory framework and easier access to Western markets.

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