

Results of six years of active management

A good investment management performance may be due to skill, chance or luck. A high return may just as easily indicate that high risk has been taken, as that capital has been well managed.

This article presents various types of analysis that can be performed to evaluate results. The analysis has been conducted on data on the excess return resulting from Norges Bank's management of the Government Petroleum Fund from 1998 to 2003.

The performance of the Petroleum Fund

Norges Bank's management of the Petroleum Fund is measured periodically against a benchmark defined by the Ministry of Finance. This is a portfolio composed of equities and fixed income instruments from various geographical regions (Europe, Asia and America), according to a specific weighting ratio. In choosing the benchmark portfolio, the Ministry of Finance in effect sets the most important return and risk properties of the Petroleum Fund. At the same time, the benchmark provides a baseline for measuring how well the capital in the Fund is being managed, and an appropriate incentive structure can be established.

The return on the Fund and on the benchmark are often called the absolute return on these portfolios. The excess return on the Fund is defined as the difference between the return on the Fund and the return on the benchmark. Other terms used are relative return, or return differential. The excess return is a measure of how well the manager has performed his task. As we shall see, however, a series of excess return figures does not necessarily say much about the quality of the management.

The first chart shows the absolute monthly return on both the Petroleum Fund and the benchmark. It is difficult to distinguish between the two series of return figures. The variations range from minus 6 to plus 8 per cent. The two series mirror one another closely, or, in technical language, they 'track' one another almost perfectly. The same applies to the equity and fixed income portfolios.

The second chart shows variations in excess return. The scale here runs from minus 0.3 to plus 0.5 per cent, which is considerably less than the range for the absolute rates of return. This appears to indicate that the risk associated with active management, for which Norges Bank is responsible, is insignificant compared with the risk associated with the absolute return, for which the Ministry of Finance is responsible. Table 1 shows the mean annual excess return in basis points (100 basis points equals 1 per cent) for the individual years in the period 1998-2003 and the period as a whole. The standard deviation of the excess return and its t-value are also shown [1](#), [2](#).

Table 1: Excess return – basis points (annual)

	Total	Equities	Fixed income
Mean 1998	17.01		
Mean 1999	112.85	274.29	1.68
Mean 2000	25.78	70.29	6.70
Mean 2001	16.81	46.26	7.42
Mean 2002	30.17	23.72	44.40
Mean 2003	50.28	54.07	46.67
Mean all years	42.15	93.73	21.37
<i>Whole period:</i>			
Standard deviation	39.85	91.37	13.27
t-value	2.59	2.29	3.60

The Petroleum Fund has achieved a positive excess return in each of the six years. The annual variation in excess return for the Fund as a whole has been about 40 basis points, while the equity and fixed income portfolios have recorded variations of about 90 and 13 basis points, respectively. The variation is calculated as the standard deviation of the actual excess return rates.

The t-values show that the excess return is significantly higher than zero for both the overall Fund and for the equity and fixed income portfolios individually. There is therefore a low probability that the Fund has achieved a positive excess return during these years purely by chance.

Chart 1: Absolute return. Per cent

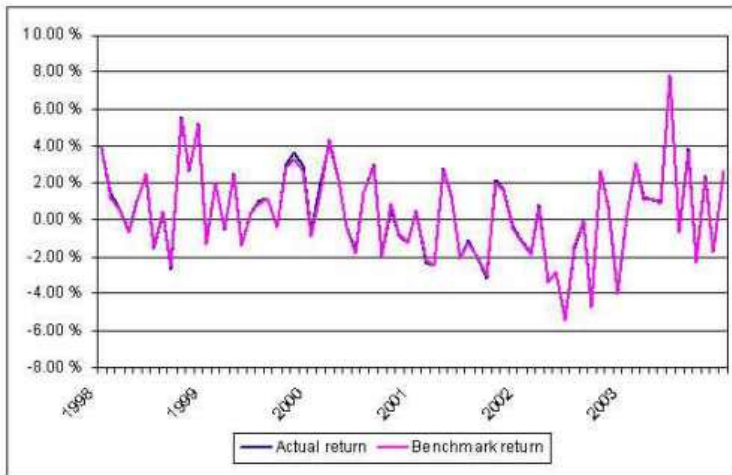
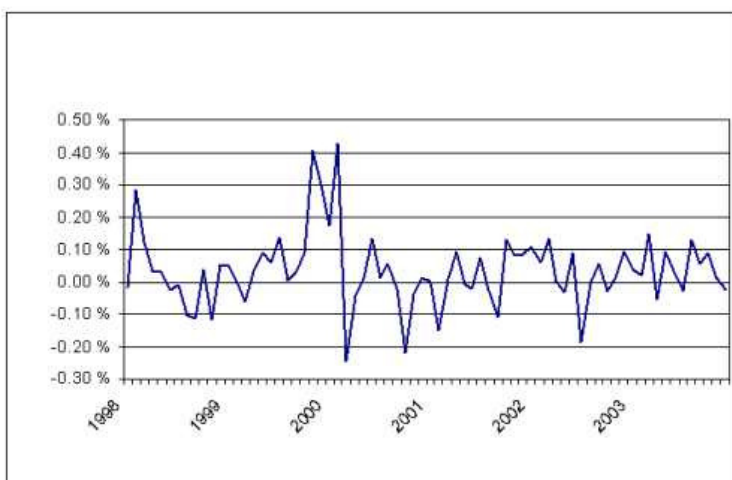


Chart 2: Excess return. Per cent



Absolute and relative risk

The most widely used measure of risk is the standard deviation of the return. This is a statistical concept that indicates the magnitude of the variations in return that may be expected in normal periods [\(3\)](#).

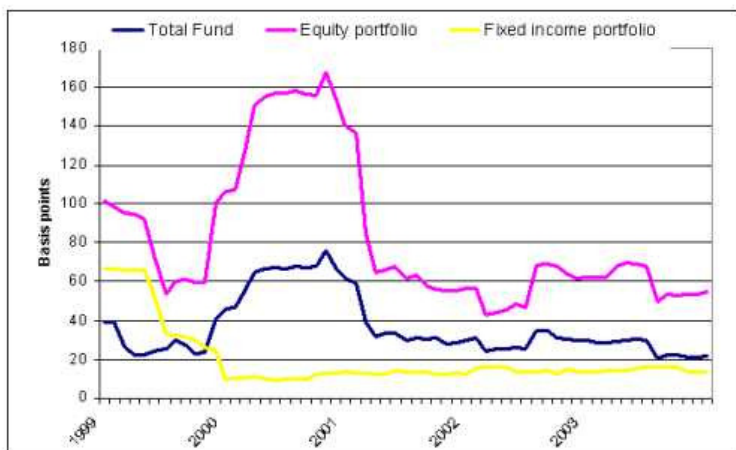
The standard deviation of the absolute return on the Fund, i.e. the absolute risk or volatility, is about 6 per cent measured in terms of the Fund's currency basket. Given that the return is normally distributed, this means that there is a 68% chance that the return on the Fund, measured in foreign currency, will not deviate more than + 6 percentage points from the expected nominal return on the Fund over a one-year horizon. The probability of the return on the Fund lying outside this interval is 32 per cent, and there is a 16 per cent chance that the return will be more than 6 percentage points lower than the expected nominal return.

The Ministry of Finance has stipulated limits as to how far Norges Bank can deviate from the benchmark portfolio. One of these is an upper limit of 1.5 per cent (150 basis points) on expected tracking error, defined as the standard deviation of the difference between the return on the actual portfolio and the return on the benchmark (see the Annual Report for a more detailed account of the guidelines).

The relative risk of the Petroleum Fund has varied around an average of about 40 basis points, which is substantially lower than the tracking error limit set by the Ministry of Finance (see Chart 3). Equity portfolio risk has been considerably higher (about 90 basis points), while fixed income portfolio risk has been lower (about 13 basis points). The risk of the total portfolio and the equity portfolio have been relatively stable since the beginning of 2001. The high tracking error in 2000 was largely driven by a few extreme (monthly) rates of return towards the end of 1999 and in early 2000. Fixed income portfolio risk has varied little since the beginning of 2000. The high volatility in 1999 was due to 2-3 months with large variations in excess return in 1998.

The Petroleum Fund is currently worth about NOK 845 billion. A tracking error of 40 basis points means that an excess return of from NOK -3.4 billion to NOK +3.4 billion can be expected in 2 of 3 years, and that the variation will be higher than this in 1 of 3 years.

Chart 3: Ex post relative risk



Ex post vs ex ante risk

The actual rates of return on the portfolios form the point of departure for risk calculations, and the results are therefore called ex post estimates. There are alternatives to this means of calculating risk. With the aid of a risk model (RiskManager from supplier RiskMetrics), Norges Bank estimates the expected risk on the portfolios (see the article 'Measuring and managing market risk' published on the Petroleum Fund's website in 2003). In contrast to the ex post risk estimates, the ex ante estimates are based on current positions and an updated risk picture. However, the starting point for the ex post estimates is the return on a portfolio with a composition that varies from month to month, and which typically will not be identical to the current portfolio. The ex ante estimates therefore provide a better forecast for the future, both because they are based on the current portfolio composition, and because they are based on up to date correlations and volatilities.

It is important to be aware that a series of return rates only represents one outcome or one realisation of quite a large number of possible ones. In consequence, the historical rates of return do not necessarily span the entire range of possibilities, nor are risk assessments based on actual rates of return necessarily representative of risk in the future. Another disadvantage of this method of calculation is that extreme observations influence risk measurements for several months ahead.

Historical covariance

Correlation coefficients represent a quantification of the covariance of the rates of return of different portfolios, profit centres or positions. Correlation coefficients vary in the interval -1 to +1. A positive correlation coefficient means that on average a high return on one position is accompanied by a high return on another position. When the correlation coefficient is negative, a high return on one security is accompanied by a low return on the other security. Table 2 shows some important relationships. The first column shows the overall risk of the portfolio (which consists of 5 units), given that each unit (profit centre or position) has a risk of 100. With perfect correlation, the total risk would be 500, which is 5 multiplied by 100. With a correlation of 0, the risk is reduced to 224, which represents 45 per cent of 500. A low correlation between portfolios therefore results in lower overall risk than a high correlation.

Table 2: Risk and correlations

	5 units	Share	10 units	Share	15 units	Share
Corr=1	500	1.00	1 000	1.00	1 500	1.00
Corr=0.8	458	0.92	906	0.91	1 353	0.90
Corr=0.5	387	0.77	742	0.70	1 095	0.73
Corr=0.25	316	0.63	570	0.57	822	0.55
Corr=0	224	0.45	316	0.32	387	0.26

The two middle columns in the table show what happens if the number of units is increased to 10, each with a risk of 100. Given 0 correlation, the total risk will be 316, which is 31.6 per cent of 1000. With 15 units and a correlation of 0, the total risk will only be 26 per cent of 1500. When the number of units (positions) is increased, the risk does not increase proportionally, unless the correlation between the positions is equal to 1.

Table 3 shows the historical correlations between absolute and relative rates of return for the overall Fund, the equity portfolio, the fixed income portfolio and the associated benchmarks (4). The following conclusions can be drawn from the table:

- There is perfect positive correlation between the absolute return on the overall Fund and the return on the benchmark portfolio for the overall Fund. The same applies to the absolute return on the equity portfolio and equity benchmark, and to the fixed income portfolio and fixed income benchmark. This means that the actual portfolios are very similar to the respective benchmarks.
- The correlation between the absolute return on the equity portfolio and the absolute return on the fixed income portfolio is 0.11, which is not significantly different from 0. In practice, this means that there has not been any relationship between the absolute rates of return on the equity and fixed income portfolios.
- The correlation between the excess rates of return on the equity and fixed income portfolios is negative (-0.27), which means that a positive excess return on the equity portfolio is accompanied by a negative excess return on the fixed income portfolio, and vice versa. In other words, there is a substantial diversification gain. This helps to keep the tracking error of the total portfolio low.

- There is low correlation between excess return rates and the return on the benchmarks. This means that Norges Bank's active management does not contribute to any particular increase in the level of absolute risk, for which the Ministry of Finance is responsible. (5)

Table 3: Historical correlations between absolute and relative rates of return

	Petroleum Fund	Petroleum Fund benchmark	Equity portfolio	Equity benchmark	Fixed income portfolio	Fixed income benchmark	Excess return on Fund	Excess return equities	Excess return fixed income
Petroleum Fund	1.00								
Petroleum Fund benchmark	1.00	1.00							
Equity portfolio	0.88	0.87	1.00						
Equity benchmark	0.88	0.88	1.00	1.00					
Fixed income portfolio	0.57	0.58	0.11	0.11	1.00				
Fixed income benchmark	0.57	0.58	0.10	0.11	1.00	1.00			
Excess return on Fund	0.17	0.12	0.30	0.26	-0.11	-0.12	1.00		
Excess return equity portfolio	0.13	0.10	0.19	0.14	-0.09	-0.08	0.77	1.00	
Excess return fixed income portfolio	0.07	0.06	0.05	0.06	0.08	0.04	0.26	-0.27	1.00

Relationship between active risk, the risk of the benchmark portfolio and the risk of the Fund

Given the management style of Norges Bank Investment Management, the active management component and hence the magnitude of the tracking error has little effect on the absolute volatility of the portfolio (see also the article "Highest possible return with lowest possible risk". The absolute risk of the benchmark portfolio is currently measured at 6 per cent in terms of the Fund's currency basket. The correlation between excess return and the return on the benchmark portfolio has historically been lower than 0.2. Table 4 shows how active management affects the total risk associated with the Fund. The first column shows the magnitude of the active risk, while the next three columns show what the absolute volatility of the Fund will be, given three different assumptions regarding the correlation between the absolute return on the benchmark portfolio and the excess return.

Table 4: Absolute risk as a function of the level of active risk and correlations

Active risk	Correlations		
	0	0.25	1
0.20 %	6.00 %	6.05 %	6.20 %
0.40 %	6.01 %	6.11 %	6.40 %
0.60 %	6.03 %	6.18 %	6.60 %
0.80 %	6.05 %	6.25 %	6.80 %
1.00 %	6.08 %	6.32 %	7.00 %
1.20 %	6.12 %	6.41 %	7.20 %
1.50 %	6.18 %	6.54 %	7.50 %
5.00 %	7.81 %	8.72 %	11.00 %
10.00 %	11.66 %	12.88 %	16.00 %

With a correlation of 0.25, the absolute volatility of the portfolio will increase from 6 per cent, given no active management, to 6.54 per cent, given full utilisation of the limit of 150 bp for tracking error. If the excess return is not correlated with the absolute return, the absolute volatility will rise from 6 to 6.18 per cent. Only with perfect correlation will active risk and the benchmark portfolio's risk add to the absolute risk of the Fund (see last column in table).

The relationship between return and risk.

Expected return, risk and market efficiency

It is usual to assume that, for the average investor, a loss is experienced as more negative than a corresponding gain is experienced as positive. Such an investor is said to be risk averse. Market participants' risk aversion leads to risky investments, such as equities and corporate bonds, being priced so that the expected return on these investments is greater than the return on less risky investments, such as bank deposits. The risk premium increases with increased risk differential.

It is also usual to assume that financial markets are relatively efficient. This means that relevant information is rapidly reflected in prices for financial assets, and that it is difficult for an individual investor to achieve an average return over time

that is greater than the average investor (the market) achieves on investments with comparable risk.

Given efficient markets, we would therefore expect that over time the return on the Petroleum Fund and other funds would be the same as the return on the relevant benchmark, i.e. that on average the excess return would be equal to 0.

Probability and excess return

In an efficient market, the probability of achieving a positive excess return for a given year is 50 per cent. If the possibility of a positive excess return one year is independent of the possibility of a positive excess return the following year, the probability at the start of the second year will remain 50 per cent, irrespective of what happened in the first year. Table 5 shows the probability of a manager achieving a positive excess return for 1, 2, 3, 4, 5 and 6 years in succession, given that the manager has no special informational or analytical advantage. There is a less than 2 per cent chance of a positive excess return in each of the first six years. With a universe of 1000 managers (chosen at random), it may be assumed that about 16 of these will achieve a positive excess return six years in succession even if they are actually no more skilled than the average manager. This is an important point of departure for evaluating Norges Bank's results for the first six years.

Table 5: Probability of excess return

No. of years	Probability
1	50.00 %
2	25.00 %
3	12.50 %
4	6.25 %
5	3.13 %
6	1.56 %

Information ratio

The purpose of taking increased risk is to achieve a higher expected return. The information ratio (IR) is often used to evaluate the quality of the management compared with other managers and with previously achieved results. IR is calculated as the ratio between excess return and tracking error. A high information ratio means that the excess return is high relative to the active risk or, to put it another way: there is a high return per unit of risk taken. In an efficient market, the excess return is expected to be zero, and the expected information ratio is consequently also 0. A positive information ratio may be due to skill or to chance. After adjusting for the costs associated with active management, most managers will achieve a negative excess return, and consequently also a negative information ratio.

In Table 6, it is assumed that the expected excess return is 0 and the relative risk is 0.4 per cent (40 basis points), which is the average risk associated with the Fund in the period 1998 to the present. The first column shows outcomes for excess return, the second shows the appurtenant information ratio, and the third shows the probability of achieving an information ratio that is the same size or higher.

Table 6: Excess return, IR and probabilities

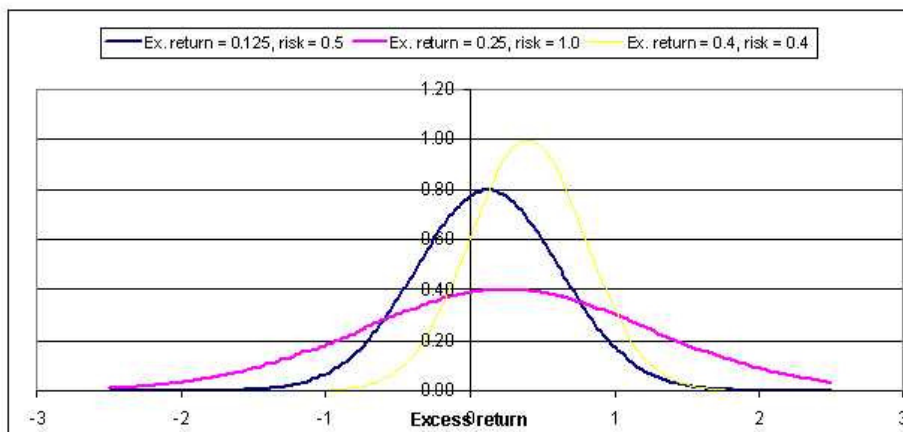
Excess return	IR	Probability	No. of years
0	0.00	0.50	2.00
0.1	0.25	0.40	2.49
0.2	0.50	0.31	3.24
0.3	0.75	0.23	4.41
0.337	0.84	0.20	5.00
0.4	1.00	0.16	6.30
0.5	1.25	0.11	9.47
0.6	1.50	0.07	14.97
0.7	1.75	0.04	24.96

Expected excess return=0, tracking error=0.4 per cent.

Given that the manager has no special skills, the expected information ratio will be 0, and the probability of a positive information ratio being obtained in a given year will be 50 per cent.

In order to achieve an information ratio of 1.0 with a risk of 40 basis points, the excess return must also be equal to 40 basis points. The probability of achieving an information ratio this high or higher in a given year is 16 per cent. It can be expected to occur in about 1 of 6 years, on average. In other words, if the manager does not have the skill to add value, the probability of observing information ratios exceeding 1.0 is relatively low.

Chart 4: Probability distribution



Three risk profiles has been plotted on Chart 4. An expected excess return of 12.5 bp is accompanied by a risk of 50 bp. This corresponds to an information ratio of 0.25. The second scenario also assumes an information ratio of 0.25, but here it is assumed that the risk of 100 bp is accompanied by an expected return of 25 bp. The assumption is that higher risk results in a higher expected return. A third scenario, which results in an information ratio of 1.00, is also plotted on the chart. This last scenario is based on the results achieved in the Petroleum Fund: a positive excess return equivalent to 40 bp on average over the 6 years, and a relative risk of 40 bp.

Table 7: Probabilities

	Expected excess return=0.125% Tracking error=0.5%	Expected excess return=0.25% Tracking error=1.0%	Expected excess return=0.4% Tracking error=0.4%
Actual excess return < -2	0.00	0.01	0.00
Actual excess return < -1	0.01	0.11	0.00
Actual excess return < -0.25	0.23	0.31	0.05
Actual excess return < 0	0.40	0.40	0.16
Actual excess return > 0	0.60	0.60	0.84
Actual excess return > 0.25	0.40	0.50	0.65
Actual excess return > 1	0.04	0.23	0.07
Actual excess return > 2	0.00	0.04	0.00

Chart 4 and Table 7 illustrate that:

- A risk of 100 bp (pink curve) results in a wider outcome spread than a risk of 50 bp (blue curve). There are two aspects to increased risk: the possibility of favourable outcomes improves, but is counteracted by an increased risk of unfavourable outcomes.
- There is substantial risk associated with the excess return for the following year. With a relative risk of 50 bp and an expected excess return of 12.5 bp, the probability of a negative information ratio is 40 per cent. The probability of a return lower than -100 bp, which corresponds to an IR of less than -2, is 1 per cent (one in 100 years). With a risk of 100 bp, the probability of a return lower than -100 bp, which corresponds to an IR of -1 or lower, increases to 11 per cent (about 1 in 10 years). An increase in risk therefore leads to a substantially larger risk of unfavourable outcomes, even though the risk increase is compensated for by a higher expected return.
- An expected excess return of 40 bp and a tracking error of 40 bp result in a 16 per cent probability that the actual excess return and information ratio will be negative (see the green curve in Chart 4 and third column in Table 7). However, it cannot be assumed that the green curve represents the range of outcomes for Norges Bank in the future.

In choosing a management style, it is necessary to weigh the increased expected return against increased risk in the form of a greater probability of unfavourable outcomes. This is the essence of every investment decision: expected return, risk and risk tolerance.

Analysis of excess return in the Petroleum Fund

Information ratio

Table 8 shows the information ratio of the Petroleum Fund, the equity and fixed income portfolios calculated as the ratio between the mean monthly excess return for a year and the standard deviation of the excess return for that same year, and similarly for the period 1998-2003 viewed as a whole. Norges Bank's objective is to achieve an information ratio of 0.25 or higher. There is considerable variation in the information ratio from one year to the next for all three portfolios. The average information ratio for the Fund as a whole is calculated to be 1.06, while the equity portfolio has had an information ratio of 1.03 and the fixed income portfolio of 1.61. T-rates are higher than 2, and it can therefore be concluded that the information ratios are significantly higher than 0.

Table 8: Information ratios based on ex post risk

	Total Fund	Equities	Fixed income
Average 1998	0.44		
Average 1999	2.44	2.58	0.18
Average 2000	0.42	0.50	0.50
Average 2001	0.58	0.82	0.62
Average 2002	1.02	0.38	3.35
Average 2003	2.28	0.99	3.50
Average all years	1.06	1.03	1.61
T-rate	2.59	2.29	3.60

As indicated above, ex ante risk measurements result in a different estimate for portfolio risk from ex post measurements. Table 9 shows the information ratio based on ex ante risk estimates for a given month. On average, the ex ante estimates have been lower throughout the period than the ex post estimates, except for the fixed rate portfolio. That is an important reason why the average IR based on ex ante risk measurements for the total fund and the equity portfolio is higher than the average IR based on ex post measurements. The information ratio based on ex ante risk measurements is significantly higher than zero for the total and equity portfolios. Note too that the IR based on ex ante risk is lower than the ex post IR in both 2002 and 2003 for the Fund as a whole and for the equity and fixed income portfolios individually.

Table 9: Information ratios based on ex ante risk

	Total Fund	Equities	Fixed income
Average 1998	0.27		
Average 1999	5.84	5.76	0.11
Average 2000	0.79	1.12	0.26
Average 2001	0.55	0.74	0.26
Average 2002	0.81	0.34	1.14
Average 2003	1.47	0.79	2.05
Average all years	1.18	1.54	0.81
T-value	2.88	3.44	1.82

Alpha

Management skill can also be judged by estimating how large the return on the portfolio should be given the risk taken, and then calculating the difference between actual return and risk-adjusted return. If the return on the portfolio is higher than the risk-adjusted return, the manager has achieved a risk-adjusted excess return and hence outperformed the market. The opposite is the case if the risk-adjusted excess return is negative. (6)

In the following analysis, the excess return in the Petroleum Fund is adjusted for the Fund's "market exposure" relative to the benchmark portfolio. (7) The analyses provide insight on a number of important points:

- · Alpha. This variable is a measure of the return adjusted for the beta portfolio's beta (market risk). If alpha is higher than 0, it means that the risk-adjusted excess return is positive. This in turn means that the manager has added value over and above that which can be achieved by changing the market risk of the portfolio relative to the market risk of the benchmark. When alpha is less than 0, the risk-adjusted excess return is negative.
- · Beta. This is a measure of whether the return on the actual portfolio is more or less sensitive than the return on the benchmark. If beta is larger than 1, it means that a return of, for example, 10 per cent on the benchmark will, on average, be accompanied by a return of more than 10 per cent on the actual portfolio. If beta is less than 1, the return on the actual portfolio will on average be less than 10 per cent.
- · R squared. This statistic explains how large a share of the variation in the return on the actual portfolio can be attributed to the variation in the return on the benchmark.
- · t-values. If the t-value of alpha is higher than 2, it means we can discard the null hypothesis that a positive excess return is generated by chance. If the t-value of beta is higher than 2, beta is significantly different from 0. In the present case, however, we are most interested in whether beta is significantly different from 1.

Chart 5: Actual return vs benchmark return Petroleum Fund (1998-2003)

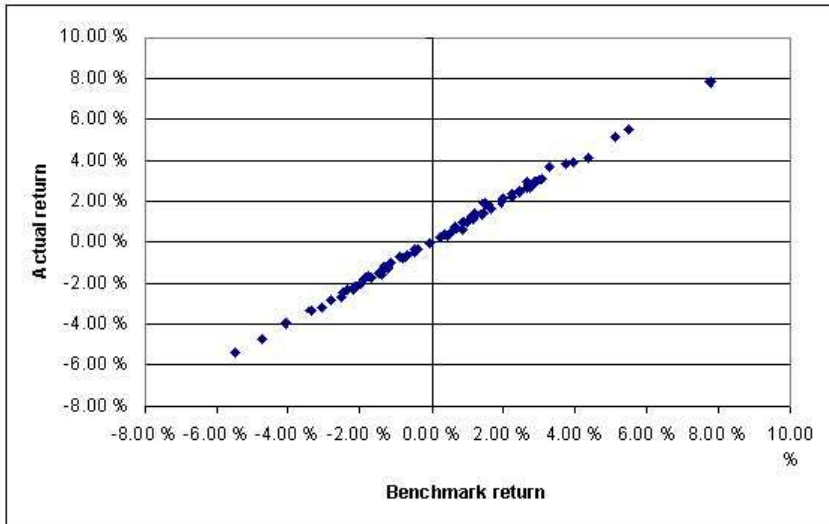


Chart 5 shows the actual monthly return on the Petroleum Fund plotted against the return on the benchmark for the period 1998 to 2003. Each point on the chart corresponds to the return on the actual portfolio and the return on the benchmark for a given month in the period. All the observations plot on a virtually straight line with a gradient of 1. This indicates that the Fund has a beta relative to the benchmark equal to 1. The point at which the line cuts the y axis corresponds to the portfolio's alpha. On the figure, it is difficult to see whether the intersection point is below or above origo. The same picture also applies to the equity and fixed income portfolio, so these charts are not included here.

Chart 6: Excess return vs benchmark return Petroleum Fund (1998-2003)

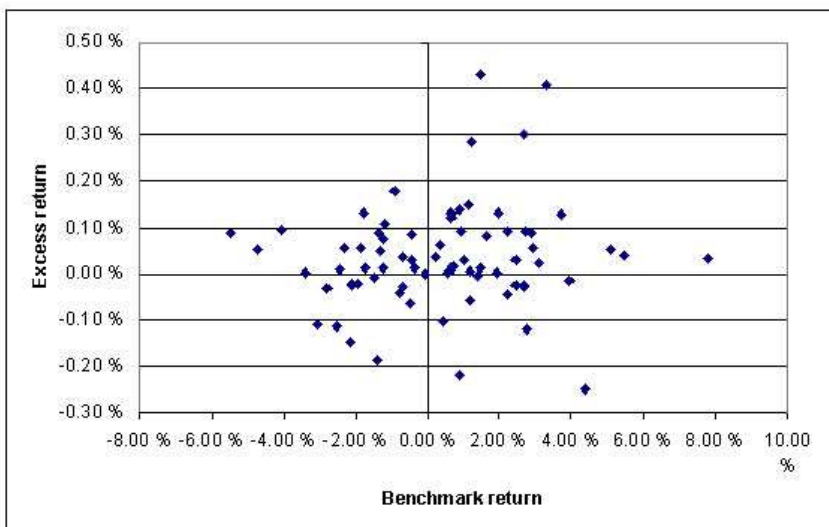


Chart 6 shows the relationship between the excess return for a month and the return on the benchmark in the same month for the period from 1998 to 2003. This chart does not reveal any definite pattern. On the contrary, the excess return appears to be independent of the return on the benchmark. Again, the same picture emerges for the equity and fixed income portfolios.

The charts provide important information about the return on the Petroleum Fund and the benchmark, but no concrete figures for the important relationships. However, these are shown in Table 10.

The first column shows the estimates for alpha and beta, respectively. An alpha of 0.000328 corresponds to 3.28 basis points per month or 39.41 basis points per year. The mean excess return was 42.15 basis points per year (see Table 1). In other words, risk adjustment of the excess return results in only a minor reduction in the excess return. This is because the actual portfolio has a beta that is somewhat higher than 1, and the actual portfolio therefore has somewhat higher "systematic risk" than the benchmark. The T-value of alpha is higher than 2, which means that the risk-adjusted excess return is significantly higher than 0. Thus there is statistical evidence for claiming that the risk-adjusted excess return is not due to chance, but can be attributed to management skill.

Table 10: Actual return vs benchmark return

	Coefficient	t-value	T-stat > 1	R squared
Alpha	0.00033	2.39		
Beta	1.00574	182.29	1.04	0.998

The t-value of the beta is significantly higher than 0, but the figure in the next column shows that it is not significantly higher than 1. An r squared of 0.998 means that the variation in the return on the benchmark explains 99.8 per cent of the variation in the return on the Fund. Other analyses show that the return due to active management is (linearly) independent

of the return on the benchmark. This means that there is no general rule that a high return in the markets is accompanied by a high excess return, nor that the excess return on the Fund is negative when markets perform poorly.

Empirical research on the results of active management

A large number of articles have been published which discuss whether managers' mutual funds and pension funds have historically achieved an excess return. One important conclusion of several articles is that on average managers do not achieve a positive risk-adjusted excess return. The surveys are based on performance data for many years for a large number of securities funds. The risk-adjusted return equals 0 on average before management costs and is negative after costs have been deducted. This result is relatively intuitive. The average of managers represents "the market" and the market can obviously not outperform the market.

Another question that has been the subject of many analyses is whether those managers who have a positive risk-adjusted return one year, also achieve a positive excess return in subsequent periods or, alternatively, whether managers with a poor performance one year also perform poorly in subsequent years. This is called 'persistence' in the literature.

Some of the first surveys published in the 1990s concluded that there were indications of persistence in the return series of the various managers. (8) The results were explained as being due to these managers having access to special information, or being particularly good at identifying equities with a high or low future return.

An important survey from 1997 is based on a larger number of managers than earlier surveys. (9) Moreover, managers who left the business because of poor results are included. This last is important, because if we estimate the return only of managers who survive, it will look as though managers on average have achieved a better result than they actually have.

Carhart shows that much of the excess return previously recorded for the best managers vanishes when adjusted for relevant risk factors. This underscores how important a benchmark is for determining whether managers are succeeding in achieving a risk-adjusted excess return or not.

Managers who do best in an absolute sense one year, also have a greater chance of doing best the following year. But of the 10 per cent best funds one year, as many as 80 per cent disappear from the best 10 per cent the following year. The winners one year are often among the losers the following year. There is some tendency for the few who are among the best managers the one year also to be among the best the following year, but an even greater tendency for the losers also to be losers the following year. However, the ranking of the best managers appears to vary haphazardly from one year to the next. The data reveals no tendency for those managers who are among the 10 per cent best managers still to be in this category two years after their top placing, but there is a tendency for the losers to remain among the losers for several years following the original ranking.

The article concludes that there is little foundation for claiming that managers are capable of identifying loser and winner equities consistently over time. The managers with the best performances earn just enough money to cover expenses and transaction costs, while the majority of managers have a negative risk-adjusted return, on average, after expenses.

The literature shows that there are some managers who, even though they do not achieve a risk-adjusted excess return that is statistically significant, actually perform better than other managers, both absolutely and relatively. It is also indicated that there is persistence in this difference between managers.

It is argued that this difference is due to the fact that some managers have an investment style which is more consistent over time than that of others. An article from 2002 reveals that the managers who have the most consistent investment style over time also achieve better absolute and relative results than managers who have a less consistent style. (10) Furthermore, it is documented that the managers who achieve the poorest results are often the same managers who have an investment style that drifts over time.

Summary

The main conclusion that can be drawn from the results achieved in the Petroleum Fund is that active management by Norges Bank has resulted in a significant positive contribution to the Fund's performance.

The excess return has been achieved without any appreciable change in the absolute risk associated with the Fund. For all practical purposes, active management by Norges Bank does not affect the Petroleum Fund's total risk.

The low active risk is a result of the management style. There is no relationship between the excess return rates in the equity and fixed income portfolios, and there is also little relationship between the excess return rates of the various mandates in the equity and fixed income portfolios, respectively.

As a result of low active risk and other factors, the information ratio has been very high, and is significantly higher than 0. This means that Norges Bank has contributed high value added per unit of active risk, which is an expression of effective use of risk.

The excess return measured as alpha is also significantly higher than 0. Analyses reveal that the Petroleum Fund has the same systematic risk as the benchmark portfolio. Thus the excess return has not been achieved by taking a risk that the client could equally well have taken by changing the benchmark. The return associated with active management is in reality independent of the return on the benchmark.

1) Standard deviation as a measure of risk is explained in the next section of the article. The t-value is a test statistic used to determine whether a variable is statistically different from another variable, or whether the observed difference may simply be due to chance. When the t-value is over 2, it is usual to say that the difference is not due to chance, but reflects something structural.

2) The figures may differ somewhat from those presented in the Annual Report for 2003. This is because the figures in this article are calculated as a simple arithmetical mean of the monthly return rates, which are annualised by multiplying by the number of months in a year. The calculations are carried out in this way in order to ensure consistency with other calculations in the article.

3) See article "Measuring and managing market risk" on Norges Bank's website.

4) The correlation between, for example, the absolute return on the equity portfolio and on its benchmark is shown at the intersection of the fourth line and the third column. This correlation is equal to 1.00.

5) With the exception of the conclusion in the second bullet point above, these results are a consequence of Norges Bank's management style.

6) The information ratio says nothing about how much better the manager has performed than the market. For example, the excess return used in calculating the information ratio is not adjusted for the portfolio's "market exposure" compared with that of the benchmark.

7) The point of departure for the analysis is well known statistical methodology (standard regression analysis).

8) Hendricks, Patel and Zeckhauser (1993), Goetzmann & Ibbotson (1994), Brown & Goetzmann (1995) and Wermers (1996), Grinblatt & Titman (1992), Elton, Gruber, Das & Hlavka (1993) and Elton, Gruber, Das & Blake (1996). See also Jensen (1969) who finds no indications of persistence.

9) Carhart (1997).

10) Brown & Harlow (2002).



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