Ministry of Finance
Boks 8008 Dep.
0030 Oslo

Date: 29.09.2015

Government Pension Fund Global – the limit for benchmark deviations

In its letter of 26 June 2015, the Ministry of Finance asks for Norges Bank's advice and views on the introduction of a supplementary risk limit for the Government Pension Fund Global (GPFG), and on extended reporting on risks and returns. The Bank's advice and views are set out below.

Measures of risk
The GPFG's risk is measured in a number of ways. One is the portfolio's standard deviation, often referred to as the fund's total, or absolute, risk. The standard deviation shows how much the return on the fund can be expected to fluctuate in two out of every three years under normal market conditions. Over the past three years, the risk in the fund as measured by the standard deviation has been around 10 percent. Based on the current size of the fund, that is equivalent to almost 700 billion kroner.

The limits for Norges Bank's management of the fund are set out in the management mandate issued by the Ministry. The mandate does not impose a limit on the fund's total risk, but does set a limit for its relative risk, also known as relative volatility or tracking error. This is not risk in an absolute sense but a limit for deviation from a benchmark. The aim is to restrict the deviation between the return on the benchmark and the return on the fund during a given time period. The limit for relative risk is currently set at 100 basis points, or 1 percentage point. A limit of 100 basis points means that the deviation between the return on the fund and the return on the benchmark is not expected to exceed 100 basis points in two out of every three years under normal market conditions. In *Report to the Storting No. 21 (2014-2015)*, the Ministry proposed increasing this limit from 100 to 125 basis points. Based on the current size of the fund, 100 and 125 basis points are equivalent to 70 billion kroner and 87.5 billion kroner respectively.

The measures of risk described above provide a picture of the size of the absolute losses or relative losses that can be expected in a normal year. A limit is now to be introduced for losses that are expected to occur infrequently. A metric or limit of this type is often referred to as extreme loss risk. This limit could, for example, be formulated such that the fund is to be managed so that expected losses in 19 out of every 20 years are no more than a certain amount, and could be set both for absolute losses (the fund as a whole) and relative losses (the difference between the return on the fund and the return on the benchmark). In this letter, we assume that the Ministry is expecting the Bank to set a limit for relative losses, and we will refer to this in the following as extreme deviation risk.

The Bank discussed measures of extreme deviation risk in its letter to the Ministry of 21 October 2009. We stressed that such measures are highly technical, and that appropriate use of them requires qualitative assessments. This is still our opinion. The Bank concluded in 2009 that such limits were not suitable in a general framework such as the mandate from the Ministry. The Ministry is now proposing that the Bank itself sets the limit for extreme deviations, although it is to be submitted to the Ministry before entering into force. In its letter of 26 June 2015, the Ministry gives no indication of whether a strategy that seeks to produce a consistent, stable excess return in most years is preferable to a strategy where the excess return varies more from one year to the next. Nor does the Ministry give any indication of whether the Bank should design its strategy in a way that seeks to limit relative losses in periods when the fund incurs large absolute losses. The Bank interprets this as meaning that these assessments are delegated to the Bank for now.

The Ministry is planning for the Bank to set a limit for large negative deviations from the benchmark index that are expected to occur infrequently. We recommend that this is done by expanding the first paragraph of section 3-6 of the GPFG's management mandate to include a requirement for the Bank to set a limit for large negative deviations that are expected to occur infrequently. The Bank will assume that this limit, like the limit for tracking error, does not include the fund's real estate investments.

Alternative measures

No single measure of risk can capture all relevant risk factors over time. As a result, the Bank already applies supplementary risk limits to capture risks that, based on experience, are not adequately captured by expected tracking error, cf. the Executive Board's mandate for the CEO of Norges Bank Investment Management. Although no explicit limit has been set for large negative deviations that are expected to occur infrequently, the current limits for market and credit risk will help reduce the probability of such deviations in practice. Examples of these constraints are requirements for the minimum overlap between the fund's portfolio and the benchmark index, requirements for credit quality, restrictions on the use of certain types of derivatives, and restrictions on leverage.

The Ministry also asks the Bank to assess different measures of risk for framing extreme deviation risk. One possibility may be the use of scenario analyses. The Bank already uses stress tests based on historical developments and scenarios for future developments to systematically measure and manage market risk in the fund. These analyses could be extended with a limit for extreme deviations in different scenarios. Another option would be to use factor models with limits for extreme deviations derived from the factors in the model. However, the methods mentioned above are highly dependent on the choice of scenarios and factors, and in our opinion they will not be sufficiently precise for use in setting a limit for extreme deviation risk. An historical simulation based on the current portfolio would be better suited to setting a relative limit of this kind.

In a historical simulation, the instruments in the portfolio are valued at historical market prices in each estimation interval. With such an approach, measures such as Value at Risk and expected shortfall will be the relevant metrics for framing the risk of extreme relative losses. Value at Risk will provide a point estimate that specifies the size of an "abnormal" deviation with a given, but low, probability. Expected shortfall will, because it shows the average of all deviations that can be expected beyond a certain probability, include all observations in the tail of the probability distribution. Expected shortfall would therefore provide a better picture of tail risk than Value at Risk does. Expected shortfall is, as far as we know, a widely used measure of extreme loss risk among institutions that employ such a measure. The drawback of expected shortfall is that a single extreme observation could significantly affect the results. For a more detailed discussion of Value at Risk and expected shortfall, we refer to our letter of 21 October 2009 and its second enclosure.

The Bank will initially, and with effect from the turn of the year, formulate the Executive Board's supplementary risk limit for large negative deviations from the benchmark index that are expected to occur infrequently, as a limit for expected shortfall.

Estimation of risk measures

To ensure that the limit for extreme deviations adds to the limit for expected tracking error in the management of risk in the fund, we will make different assumptions when estimating these measures. While the fund's tracking error is measured on the basis of a given statistical distribution (the normal distribution), we will use a historical simulation of relative returns when estimating extreme deviation risk. In addition, we will also use a longer time period than we do for tracking error, which is currently estimated over a period of three years.

Inevitably, the longer the period we estimate over, the harder it will be to obtain historical prices for equities and bonds in the current portfolio (due to new stocks, mergers & acquisitions, etc.). If we choose a long period, we need to establish rules for how any weaknesses in the data series are to be handled. Since a short time series will, in most contexts, contain limited information about potential extreme market movements, there is much in favour of estimating extreme deviation risk over a relatively long period. Calculations that include the turbulent period of 2008-2009 will be more relevant than those that do not. The results of calculations of this kind must nevertheless be interpreted with caution. Even a very long time series can only provide information on possible extreme deviations given historical market fluctuations.

Ang, Brandt and Denison (2014)[1] recommend a two-sided tail risk measure and argue that in this context there should not in theory be any difference between upside and downside risk. They also note that two-sided tail risk measures are not standard practice today. The Bank agrees in principle with Ang, Brandt and Denison (2014) and will aim to shed light on upside

[1] Ang, A., Brandt, M. and Denison, D.: "Review of the Active Management of the Norwegian Government Pension Fund Global", 20 January 2014.

risk as well in its reporting of extreme deviation risk in the fund. The Bank will not, however, set any limit for this.

To ensure that the Bank's limit for large negative deviations from the benchmark index that are expected to occur infrequently adds to the mandate's limit for tracking error, the Bank will initially use a different method (historical simulation) and estimate the supplementary risk measure over a longer time period.

Consequences of the limit

The financial consequences of introducing a limit for large but infrequent negative deviations from the benchmark will be dependent on where how tightly the limit is set. This is a decision that the Ministry is proposing to delegate to Norges Bank.

One of the fund's great strengths is its ability to pursue countercyclical investment strategies. In the fund's management mandate, this is expressed first and foremost through the rules on rebalancing. Rebalancing can mean that the risk in the fund increases in periods when there is particularly great uncertainty in the market. In such market situations, the estimated extreme risk and extreme variance could also increase. We have previously shown how the strategy of rebalancing has helped increase the return on the fund.[2] Through these rebalancing rules, the Ministry expresses a relatively high tolerance of extreme fluctuations in the overall value of the fund.

The Ministry asks the Bank specifically to assess whether the introduction of a limit for large relative losses will impact on the fund's scope to pursue factor strategies that take advantage of the fund's characteristics and strengths. These are strategies that may serve to increase deviation between the composition of the fund and the benchmark, as the weighting of these factors is not reflected in the benchmark. These are also strategies where it is not unreasonable to expect large deviations from the benchmark in periods of market turmoil. In such periods, the Bank, as manager of the fund, has an advantage over other investors because the probability of the owner making large and unexpected withdrawals of capital is small. The Bank can stick to its investment strategies and consider new investment opportunities that may arise in such markets.

The Bank will attempt to design the limit for extreme negative deviations from the benchmark index in a way that does not require unfavourable portfolio adjustments in situations with extreme market movements. The limit will not therefore be absolutely binding. We will also consider linking the limit to whether the market is in a high- or low-volatility regime. For example, the limit could be formulated such that it is binding in normal markets featuring relatively low volatility, but in periods with highly volatile markets there is a process where the Bank must explicitly take a position on whether breaches of the limit will trigger changes in the portfolio. The Bank will report on extreme deviation risk in the same way as it currently reports on compliance with the other limits set on the basis of the provisions in section 3-6 of the mandate.

[2] Discussion Note 4 – 2012: "The history of rebalancing of the fund".

The Bank will endeavour to design the limit for large but infrequent negative deviations from the benchmark in a way that does not restrict the Bank's scope to pursue management strategies that take advantage of the fund's special characteristics.

Public disclosure

The Bank attaches great importance to transparency about the management of the fund. Our goal is for the Norwegian people and other stakeholders to retrieve all the information they require about the fund and its investments unless this information is market-sensitive or cannot be disclosed as a result of agreements we have entered into.

The Bank publishes quarterly and annual reports on the fund's management. These reports consist of an accounting part and a descriptive part. Through these reports, the Bank aims to provide the broadest possible account of the results of its management.

The financial statements are prepared in accordance with International Financial Reporting Standards (IFRS). These require the reports to present information on the policies used to value instruments in the portfolio, the measurement methods that we use, our investment results and an assessment of risk in the management of the fund. As required by IFRS, the reports contain detailed information on matters such as liquidity risk, credit risk, market risk and risk concentration. The Bank's quarterly and annual reports are subject to several layers of auditing and external scrutiny.

The annual report's descriptive part provides a broader account of the fund's management. Besides presenting absolute and relative risk in both the fund's currency basket and Norwegian kroner, it sets out the most important contributors to both absolute and relative returns. Since the fund's inception, we have reported risk-adjusted returns using the risk measure set out in the mandate for the management of the fund (tracking error).

In addition to these annual and quarterly reports, the Bank also provides information on various aspects of its management on www.nbim.no. For example, we publish time series for returns on the fund's equity and fixed-income portfolios with the associated benchmark indices and time series for relevant exchange rates. We also publish information on the fund's factor exposures, holdings and external managers. The Ministry aims to perform a broad review of our management of the fund every four years. The Bank is normally invited to provide input for this review, and in this context we published detailed reports on risk in the management of the fund in both 2010 and 2014. The aim of these reports was to provide the broadest possible picture of the relationship between historical returns, risk and total costs in the management of the fund.

The Bank also publishes other types of information and analyses to help increase public awareness of how we fulfil the management mandate. Key publications in this regard are our discussion notes, position papers, asset manager perspectives and expectations documents. We also publish an annual report on responsible investment.

Ang, Brandt and Denison (2014) singled out a high degree of transparency as one of the fund's strengths. To further strengthen the fund's position, they proposed that the Bank should report in even more detail on risks and returns relative to the benchmark set by the Ministry. They proposed decomposing excess return and risk into different investment strategies, such as factor strategies, diversification of investments beyond the benchmark index, and securities selection.

The Bank intends to follow the recommendations of Ang, Brandt and Denison. We aim to publish a risk report with a new template during the first quarter of 2016. We plan to explain the main components of the internal reference portfolio and the general strategies used in the management of the actual portfolio. We will endeavour to ensure that the methods we use for decomposing risks and returns can be verified externally. In addition, we will report separately on excess return and risk in the environment-based management mandates, and on the effects of other requirements in the mandate. The report will also look more closely at the estimates and calculations of extreme deviations. The Executive Board has sought advice from an expert group on how the Bank can develop its reporting on risks and returns, and the group's recommendations will be taken into account in the design of the new report on risk in the management of the fund.

We have realised significant economies of scale in the fund's management in recent years. Analyses of costs at comparable funds confirm that our management costs are low.[3] The management of the fund (excluding real estate) is currently organised into three main areas: allocation strategies, asset strategies (securities selection) and equity strategies (efficient market exposure). These strategies draw on joint systems, databases and other infrastructure.

The Bank is currently required to report on all relevant risks in the fund's management, cf. section 6-1 of the mandate. We believe that the formulations in the mandate meet any requirements the Ministry may have for detailed reporting on the fund's risks and returns, and that there is therefore no need for the Ministry to issue more detailed disclosure requirements in the mandate. The Bank stressed in its letter of 1 October 2010 that the mandate's reporting requirements should not be tied to a given definition of the management task and management strategies, but allow for the gradual evolution of the investment strategy and mandate over time. The Bank has reported a so-called information ratio (IR) but will also consider other methods and measures for risk adjustment. In the case of risk-adjusted excess return, there is no single model or set of assumptions that can provide a clear answer as to how risk has affected the results. In financial research, a number of different approaches and models are used, which all build on different assumptions and give different results. This supports the use of several different methods to shed light on our results. It is important for us to provide as broad and detailed a picture of the fund's risk and return history as possible.

[3] CEM Benchmarking: "Investment Cost Effectiveness Analysis (for the 5 years ending December 31, 2013) – Norwegian Government Pension Fund Global".

The Bank will bring together its current reporting on risks and returns in the fund in a new annual risk/return report. The Bank believes that this will help give the public a more complete picture of the most important drivers of the fund's risks and returns. We will extend the current reporting with a decomposition of risks and returns between different investment strategies as recommended by Ang, Brandt and Denison (2014) and include this in the new report. Reporting of risks and returns will be expanded.

Measurement of total risk and opportunity cost model

This letter is based on the investment strategy as currently defined in the management mandate. We plan to revert on whether our assessments in this letter could be affected by the ongoing review of the possibility of increased investment in real estate, investment in unlisted infrastructure and the introduction of an opportunity cost model. At the same time we will revert on how the reporting of total risk in the benchmark index and the actual portfolio can be extended.

Yours faithfully

Øystein Olsen　　　　　　　　　　Yngve Slyngstad