Norges Bank

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# Regulation of unlisted investments in the management mandate for the Government Pension Fund Global

In its letter of 27 March 2023, the Ministry of Finance asked Norges Bank to analyse various aspects of investing in unlisted equities. Norges Bank's advice was sent to the Ministry in our letter of 28 November 2023 with the recommendation that the Government Pension Fund Global (GPFG) is permitted to invest in unlisted equities on a general basis. The Ministry's letter of 27 March also asks Norges Bank to consider how investments in unlisted equities might best be regulated in the management mandate. Our advice follows in this letter.

Parts of the GPFG are already invested in unlisted real estate and unlisted renewable energy infrastructure. These investments have some important similarities with unlisted equities. They are not priced continuously in the market like listed investments, and there are no investable benchmark indices in the way there are for listed investments. We have therefore chosen to look at the question of regulating unlisted equities in the context of the regulation of the fund's existing unlisted investments.

Norges Bank's conclusion is that investments in unlisted equities can be regulated in the same way as the fund's existing unlisted investments, i.e. within a limit for relative volatility (tracking error). Norges Bank does not propose changing the current limit of 1.25 per cent.

An advantage with the current regulation is that all relative risk is managed within the same limit. Norge Bank has earlier pointed to that regulating unlisted investments with a limit for relative volatility does present some challenges. These challenges may increase with a larger allocation to unlisted investments. This may warrant consideration of an alternative approach to the regulation of unlisted investments in the longer term. However, it will take time to build up a portfolio of unlisted equities, and we believe that it will be beneficial to gain experience of measuring and managing the risk in unlisted equities with the current regulation.

Considering these experiences, Norges Bank may come back to the Ministry in a few years with a new assessment of how the risks associated with the fund's unlisted investments should be regulated in the mandate.

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**Current regulation**
The Ministry of Finance establishes guidelines for the management of the GPFG in the management mandate. These include definitions of the investment universe, the benchmark index and various risk limits. The owner's risk tolerance is expressed through the benchmark index and risk limits.

One key limit in the management mandate is the limit for expected relative volatility. This limit regulates the amount of expected deviation between the return on the fund's investment portfolio and the benchmark index. The limit is currently set at 1.25 per cent and covers all the fund's investments. The mandate permits up to 7 per cent of the fund to be invested in unlisted real estate and up to 2 per cent in unlisted renewable energy infrastructure. These investments are not part of the fund's benchmark index, and so these investments draw on the limit for expected relative volatility.

The responsibility for what and how much Norges Bank should invest in unlisted real estate and infrastructure, is up to us to decide within the limits of the mandate. When the fund invests in real estate and infrastructure, it must simultaneously invest less in equities and bonds that are included in the benchmark index. Since 2017, Norges Bank has sought to manage real estate and infrastructure investments in such a way that they do not change the fund's equity market risk. Norges Bank aims to ensure that investments in real estate and infrastructure have the same estimated equity market risk as the equities and fixed income that make up the funding of those investments.[1]

No single measure of risk can capture all relevant risk factors over time, especially when it comes to unlisted investments. The Executive Board has therefore issued supplementary risk limits for these investments in accordance with the management mandate, and our letter to the Ministry of 28 November 2023 discusses how the Executive Board will set equivalent risk limits for investments in unlisted equities.

<u>Experience with expected relative volatility as a risk limit for unlisted investments</u>
Expected relative volatility has functioned satisfactorily as a risk limit for investments in unlisted real estate and infrastructure. However, regulating unlisted investments in this way presents a few challenges, and these challenges may increase if unlisted investments make up more of the fund.

The calculation of relative volatility is based on weekly return data, but unlisted investments are not priced continuously in the market. To calculate risk metrics for these investments, returns must therefore be modelled. The return on the fund's unlisted investments is currently modelled using a combination of time series for the estimated market value of unlisted investments and time series for equivalent investments in listed markets – see Enclosure 1 for further details.

These calculations are based on a number of assumptions that can sometimes have a considerable influence on measured risk. Norges Bank has found that short-term

[1] Equity market risk or beta.

fluctuations in listed markets can lead to abrupt changes in measured relative volatility. These changes have been greater in the unlisted portion of the portfolio. It is not possible to adjust the unlisted portfolio quickly in response to large changes in measured relative risk. Relative volatility cannot therefore be used as a management tool in the same way as for listed investments.

Norges Bank invests in real estate and infrastructure to obtain a better diversified portfolio.[2] However, the more that the return profile for these investments differs from the benchmark index, the more these investments will draw on the limit for expected relative volatility. In the long term, expected relative volatility as a risk limit for all of the fund's investments could therefore lead to a portfolio with a less favourable trade-off between return and risk than with an alternative approach to regulating risk.

The challenges described above are not new. Norges Bank wrote in a letter dated 31 January 2014 that consideration might eventually need to be given to whether the management of the fund should be based on an absolute measure of risk. Norges Bank argued that such a measure would ensure that the management of the fund focuses more on the fund's overall volatility and less on the risk of deviation from the benchmark index. In its letter of 26 November 2015, Norges Bank wrote that the model with relative volatility was not well-suited to the fund's investments in unlisted assets and that it would look further into the question of an absolute measure of risk. In its letter of 1 December 2021 Norges Bank pointed out that unlisted investments are more challenging to manage within a limit for relative volatility than listed investments. Norges Bank also outlined an alternative regulation where unlisted investments were excluded from the limit for relative volatility.

In the following we describe how potential investments in unlisted equities might be made with the current regulation. In line with our letter of 1 December 2021, we also outline an alternative approach where unlisted investments are excluded from the limit for relative volatility.

**Regulation of unlisted investments with the investment universe expanded to include unlisted equities**

Unlisted investments are not priced continuously in the market. If the fund's investment universe is expanded to include unlisted equities, we will therefore need to model a representative time series for the return on these investments, as we do today for unlisted real estate and renewable energy infrastructure. There is no standard way to calculate these time series, and the volatility will vary across models. We currently use a model developed by an external supplier, MSCI, for the fund's unlisted real estate investments.

[2] Strategy 25: https://www.nbim.no/en/publications/strategy-for-the-fund-management/strategy-25/. See also NBIM Discussion Note 3-2023.

To calculate a return series for unlisted equity investments, we have chosen to use a corresponding model from MSCI.[3] The model for unlisted equity investments is based on a combination of estimated market values from the data provider Burgiss and market values for listed equity investments. The model gives us an estimated daily return for a given investment in unlisted equities. Based on this time series, we can calculate absolute and relative volatility for unlisted equities.

The volatility in the time series from MSCI is higher than what we find in our own calculations. For reasons of consistency and caution, we have nevertheless used the MSCI model in the calculations below. The advantage of using an external supplier is that the model can be verified by parties other than Norges Bank. If the investment universe is expanded to include unlisted equities, Norges Bank will continue to work on evaluating different models and the assumptions on which they are based.

Continuing with the current regulation

All the fund's investments are regulated by the limit for expected relative volatility of 1,25 per cent. Expected relative volatility was 0,36 per cent as of second quarter 2023. To illustrate how unlisted equity investments might affect use of the limit for relative volatility, we start from the investment strategy for unlisted equities outlined in our letter of 28 November 2023. Table 1 shows how various allocations to unlisted equities might impact expected relative volatility given the current portfolio and market situation. The table also shows the highest measured relative volatility since 2012.

**Table 1:** Expected relative volatility for the fund as a whole for various allocations to unlisted equities

| Allocation to unlisted equities | Expected relative volatility (in basis points) | Highest measured relative volatility since 2012 (in basis points) |
|---|---|---|
| 0 % | 36 | 46 |
| 1 % | 40 | 61 |
| 2 % | 55 | 90 |
| 3 % | 76 | 123 |
| 4 % | 98 | 158 |
| 5 % | 120 | 194 |

Source: MSCI and NBIM calculations. Notes: Calculations based on portfolio and market values at the end of the second quarter of 2023. The allocation to unlisted real estate and infrastructure is kept unchanged in all scenarios. The highest measured relative volatility is for simulations on the current portfolio for 2012 onwards. The unlisted equity portfolio consists of large private equity buyout funds in Europe and the US, and the allocation is funded through the sale of equities in the benchmark index.

[3] MSCI Barra PEQ2. See Enclosure 1 for further detail.

In its letter 28 November Norges Bank writes that an allocation to unlisted equities of 3-5 per cent of the fund will take advantage of the fund's characteristics and allow for sufficient diversification. The calculations in table 1 shows that an allocation to unlisted equities of 3 per cent is possible within the current limit of 1,25 per cent. If unlisted equity investments are included in the fund, it will take a long time to build up an unlisted equity portfolio as stated in our letter to the Ministry of 28 November. Norges Bank makes far from full use of the limit for expected relative volatility today, and does not propose changing the current limit for expected relative volatility of 1.25 per cent.

An alternative approach to regulating unlisted investments

An alternative approach to regulating unlisted investments must ensure that the total portfolio still mirrors the risk level in the reference index. The current management of such investments is organised so that they do not change the equity market risk in the fund. Today’s management of unlisted investments is based on the principles of the opportunity cost model, as recommended by the expert group appointed by the Ministry in 2015.[4]

According to the opportunity cost model, the owner defines an investable benchmark index consisting of equities and bonds against which all investments are measured. The equity share in the investable benchmark index will be an expression of the owner’s risk tolerance, while the manager’s role in the alternative cost model is to build a portfolio that has better return and risk characteristics than the benchmark index. If the fund’s investment universe is expanded to include unlisted equities, the equity share in the funding of these investments will be a key decision for Norges Bank. When choosing the equity share for unlisted equities, our aim will be to ensure that these investments do not increase the fund’s equity market risk relative to the benchmark index, in line with the current management of unlisted investments.

Enclosure 2 presents the effects of unlisted investments on absolute volatility, with and without unlisted equities. If the measured equity market risk of the unlisted investments is equal to the equity market risk of their funding, the absolute volatility of the portfolio will stay largely unchanged. Unlisted equities are in the example funded by the equity part of the reference index. The measured equity market risk for unlisted equities is slightly higher in the MSCI model than for the equities from the reference index that make up the financing of the unlisted equities. In the example that includes unlisted equities, the absolute volatility therefore increases somewhat. In the same enclosure we illustrate the effect of funding unlisted equities with securities that have far less equity market risk. Such a funding will increase equity market risk and absolute volatility in the fund substantially compared to the reference index. Norges Bank will continue to work on evaluating different models and the assumptions on which they are based.

If unlisted investments are excluded from the limit for relative volatility, the risk for these investments can be constrained in several ways. For example, Norges Bank might be

[4] Van Nieuwerburgh, Stanton and de Bever (2015): “A review of real estate and infrastructure investments by the Norwegian Government Pension Fund Global (GPFG)”.

required to fund its various unlisted investments with a given equity share, or to adhere to a quantitative limit on how much unlisted investments may change absolute volatility in the fund. Such a risk limit would ensure that the risk level in the portfolio mirrors the risk level in the reference index.

If unlisted investments are excluded from the limit for expected relative volatility, the benchmark index for listed investments will need to be adjusted for the equities and fixed income securities that make up the funding of the unlisted investments. This will ensure that the risk associated with equity and fixed income management is measured against the relevant part of the benchmark index. Today's portfolio of equities and fixed income, measured in this way, has an expected relative volatility of 0.23 per cent.

**Overall conclusion**
Norges Bank's view is that investments in unlisted equities can be regulated in the same way as the fund's existing unlisted investments, i.e. within a limit for expected relative volatility. Norges Bank does not propose changing the current limit of 1.25 per cent.

Norges Bank will manage unlisted equities with the aim of ensuring that these investments do not increase the equity market risk in the fund relative to the benchmark index. Norges Bank will therefore expand its analysis and reporting regarding the market risk in the fund, the benchmark index and the different asset classes and management units. We will also continue to report on expected relative volatility for different strategies, asset classes and management units.

An advantage with the current regulation is that all relative risk is managed within a single limit. Norges Bank has earlier pointed to that regulating unlisted investments with a limit for relative volatility does present some challenges. These challenges may increase with a larger allocation to unlisted investments. However, it will take time to build up a portfolio of unlisted equities, and we believe that it will be beneficial to gain experience with measuring and managing the risk in unlisted equities with the current regulation. Considering these experiences, Norges Bank may come back to the Ministry in a few years with a new assessment of how the risks associated with the fund's unlisted investments should be regulated in the mandate.

Yours faithfully

Ida Wolden Bache Nicolai Tangen

Enclosures

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## Enclosure 1 - Calculation of volatility for unlisted equities

Unlisted investments are not priced continuously in the market. The return on these investments must therefore be calculated using representative time series. There are several possible approaches. One key difference is between time series based on estimated market values for unlisted investments and time series based on equivalent investments in listed markets. Estimated market values for unlisted equity investments will only be available quarterly. Time series based on valuations of unlisted investments will often appear smoothed and so underestimate the risk associated with this type of investment. Time series based on equivalent investments in listed markets do not include risk factors that are specific to unlisted investments, such as liquidity.

For the fund's real estate investments, we have chosen to use MSCI's risk model (MSCI Barra PRE2) to calculate the return on unlisted real estate. We have therefore decided to use MSCI's equivalent risk model (MSCI Barra PEQ2) to calculate the return on unlisted equity investments in this letter. The model for unlisted equity investments from MSCI is based on a combination of estimated market values from data provider Burgiss and market values for listed equity investments. MSCI's models are available in Norges Bank's systems and are therefore easy to combine with the rest of the portfolio.

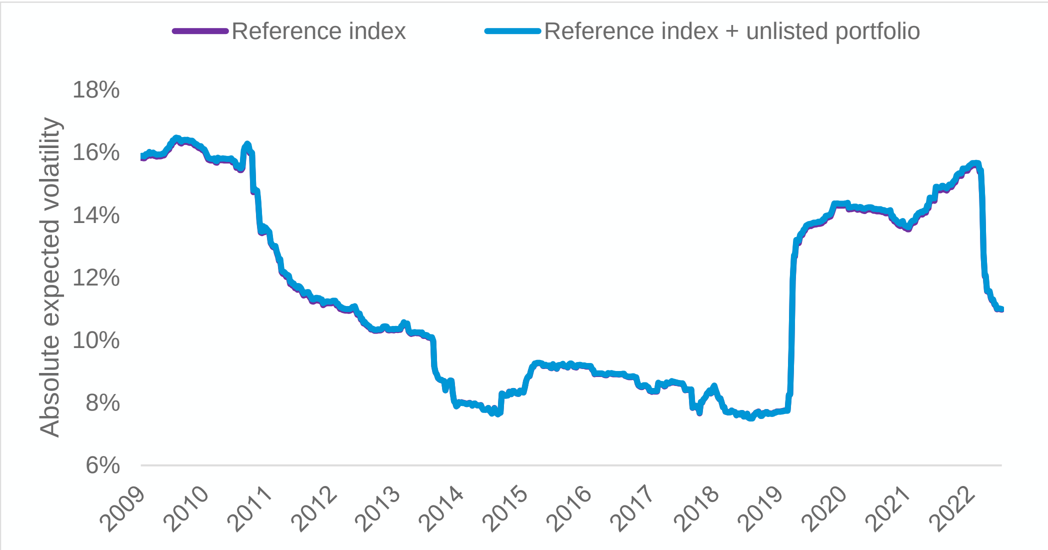
The PEQ2 model calculates the risk for a given investment based on three factors. The first is based on a broad equity index tailored to the region, country and sector in which the unlisted equity investment is made. This listed index is adjusted for MSCI's estimate of market risk (beta) for unlisted equity investments. The second factor is intended to capture the specific risk of unlisted equity investments and will depend on the type of investment. The model has several different types of unlisted equity investments, depending on region (US, Europe and Asia) and type of fund (venture, buyout and private debt). The third represents the risk unique to each individual investment, known as idiosyncratic risk. By design, these three factors are statistically independent of one another.

MSCI's PEQ2 model gives us an estimated daily return for a given investment in unlisted equities. Based on this time series, we can calculate various risk metrics for unlisted equities, such as absolute and relative volatility. The model is based on advanced statistical methods but also on assumptions for market risk and the specific risk for unlisted equity investments. These assumptions can heavily influence the total volatility calculated. The volatility in the time series from MSCI is higher than what we find using our own calculations using the raw data from Burgiss. For reasons of consistency and caution, we have nevertheless chosen to use the MSCI model in the calculations in this letter. If the investment universe is expanded to include unlisted equities, we will continue to work on different models and the assumptions on which they are based.

## Enclosure 2 - Managing market risk for unlisted investments under an alternative regulation

In Chart 1, we calculate expected absolute volatility for the benchmark index and a portfolio consisting of the fund's investments in unlisted real estate and infrastructure. The portfolio is also adjusted for the equities and bonds used to fund these unlisted investments, but is otherwise identical with the reference index. We have used today's asset allocation and performed historical simulations for this portfolio for 2007 onwards. The difference in expected absolute volatility between the benchmark index and the above mentioned portfolio, as shown in Chart 2, will indicate the impact of unlisted investments on the fund's equity market risk, measured by expected absolute risk, in this period. We can see that the fund's unlisted investments have not affected the fund's expected absolute volatility, even in periods of market turmoil.

**Chart 1:** Expected absolute volatility. Simulation of existing portfolio of unlisted investments. Three-year rolling weekly observations. Measured in the fund's currency basket




Source: MSCI and NBIM calculations.

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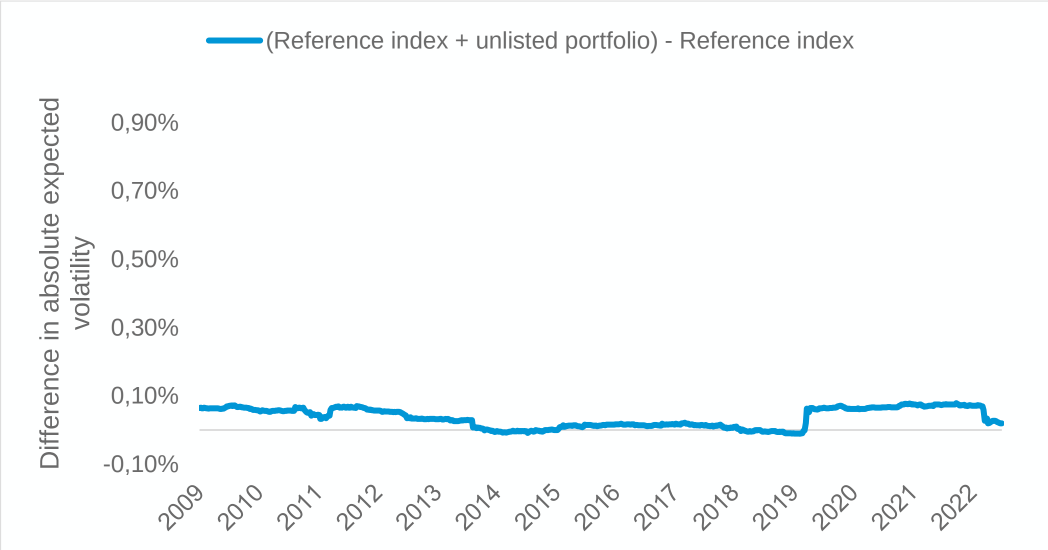
**Chart 2:** Difference in expected absolute volatility. See note in Chart 1



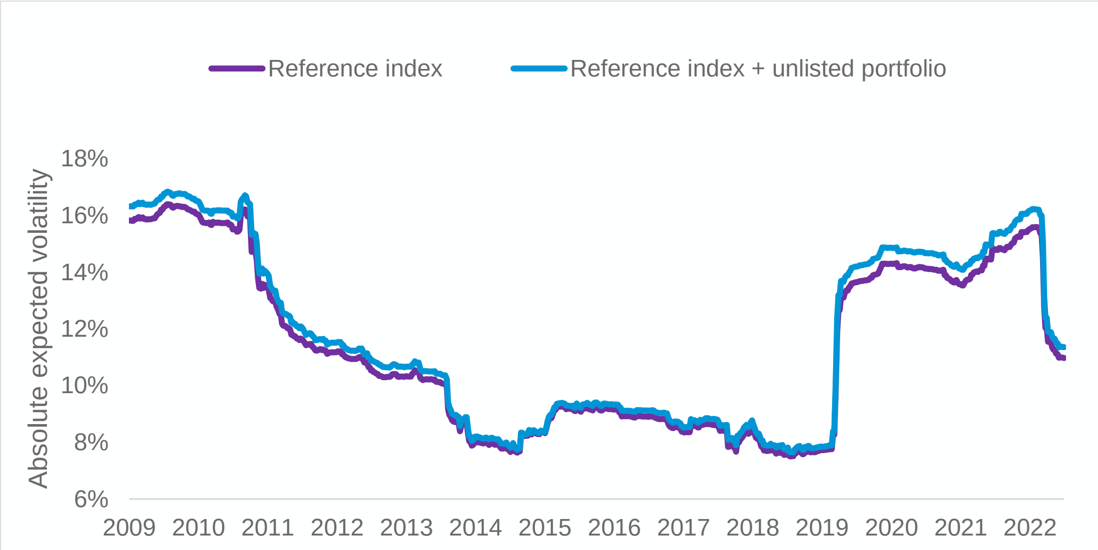

Source: MSCI and NBIM calculations.

We have also calculated expected absolute volatility for a much larger allocation to unlisted investments than today, including unlisted equities.[5] Chart 3 shows that the difference in absolute volatility increased somewhat, especially in periods of market turmoil. This is because measured equity market risk for unlisted equities in the MSCI model is slightly higher than for the equities from the reference index that make up the funding of the unlisted equities in this example. All in all, these calculations indicate that the contribution from unlisted investments to the fund's absolute volatility is sufficiently stable that it can be constrained by a quantitative requirement, even with a larger allocation to unlisted investments. If the fund's investment universe is expanded to include unlisted equities, the equity share in the funding of these investments will be a key decision for Norges Bank. Norges Bank will continue to work on evaluating different models and the assumptions on which they are based.

If the aim is for expected absolute volatility to be a good measure of risk for unlisted investments, it should ensure that Norges Bank funds unlisted investments with a combination of equities and bonds with the same estimated equity market risk as these investments. In Chart 4, we calculate expected absolute volatility where unlisted equities are funded with bonds instead of equities. We can see that absolute volatility increases substantially for this portfolio. A limit on the difference in expected absolute volatility with and without the unlisted portfolio could therefore limit the equity market risk these investments entail in an appropriate manner.

[5] 5 per cent unlisted equities, 3 per cent unlisted real estate and 2 per cent unlisted renewable energy infrastructure.

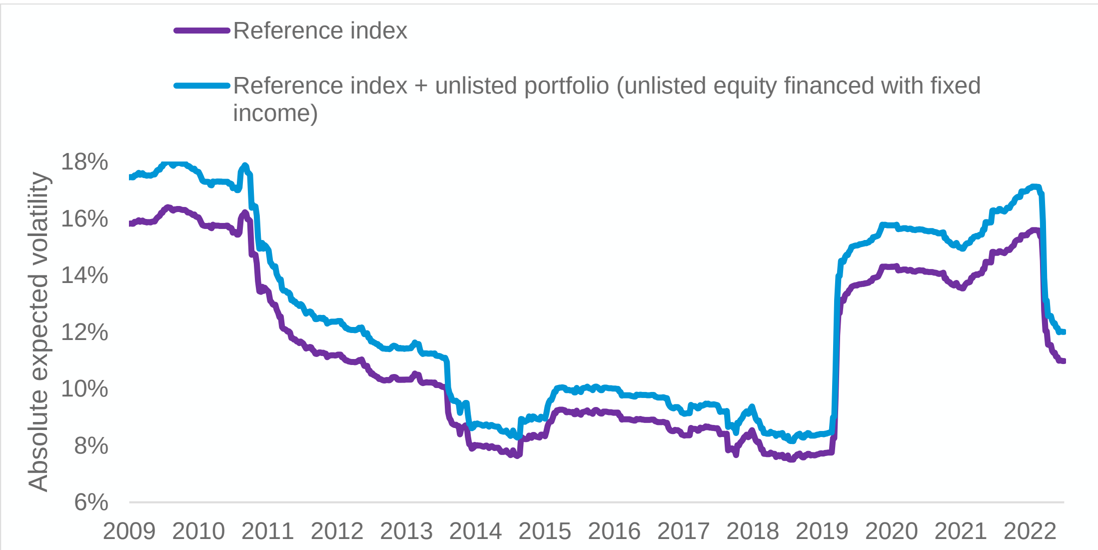
**Chart 3:** Expected absolute volatility. Simulation of a 10 per cent allocation to unlisted investments*. Three-year rolling weekly observations. Measured in the fund's currency basket




Source: MSCI and NBIM calculations.

*5 per cent unlisted equities, 3 per cent unlisted real estate and 2 per cent unlisted renewable energy infrastructure.

**Chart 4:** Expected absolute volatility. Simulation of a 10 per cent allocation to unlisted investments*. Three-year rolling weekly observations. Unlisted equities funded with bonds. Measured in the fund's currency basket




Source: MSCI and NBIM calculations.