

# Return and risk

Government Pension Fund Global

2018

Our mission is to  
safeguard and build  
financial wealth for  
future generations



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# High long-term return after costs

**The fund's strategies must be evaluated as a combined strategy and over at least five years.**

Oslo, 20 March 2019



**Yngve Slyngstad**  
CEO, Norges Bank  
Investment Management

The fund's value in Norwegian kroner fell by 233 billion in 2018, the first decrease since 2002. The weak return of -6.1 percent in 2018 is still well within what we might expect to see in a single year. The return on the fund has exceeded expectations, with an annual return over the last 10 years of 8.3 percent. We should not expect this return to be repeated in the coming decade.

The reference index in the management mandate is the starting point for our investments, and is based on widely used indices from FTSE and Bloomberg Barclays Indices. We tailor this starting point by setting a more practical benchmark which we refer to as the reference portfolio. In 2018, our return lagged the reference index by 0.3 percent. Three-quarters of this came from the difference between the reference index and the reference portfolio.

The fund has outperformed the reference index by 0.25 percent annually since we started out more than 20 years ago. The relative return comes from several investment strategies that must be evaluated as a combined strategy. The time horizon is also important, and the strategies should be evaluated over at least five years. Even this has some challenges since the strategies adapt to markets and change over time. An investment strategy that replicates the reference index is challenging for a fund with our long horizon, large size and global scope, and would have underperformed the benchmark since inception.

We distinguish between actual risk and relative risk in this report. We also present risk adjustments using different metrics. These exercises are not meant to give conclusive answers, but to provide additional insights into our results. Caution and nuance are required when evaluating numbers. Investment risk is multidimensional, and any risk management must be adaptive, inquisitive and flexible.

We strive to achieve good investment results for the owners of the fund in uncertain and complex markets, and remain humble towards the task entrusted.



# A turbulent year

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**The return on the fund was -6.1 percent, the second weakest annual return since inception.**

Oslo, 20 March 2019



**Dag Huse**  
Chief Risk Officer, Norges Bank  
Investment Management

Despite a strong rally in equity markets in January, the return for the year was ultimately defined by a very weak final quarter. Long-term interest rates increased for most of the year, followed by a sharp decline towards year-end.

Equity investments returned -9.5 percent, fixed income 0.6 percent and unlisted real estate 7.5 percent. The fund's relative return was -0.30 percentage point, with an average expected relative volatility of 0.31 percentage point for the year.

Volatility returned to the markets in 2018. An increased focus on geopolitical events, combined with uncertainty around the speed of economic growth, resulted in higher levels of both realised and implied volatility than typically seen in recent years. Bursts of short-term volatility triggered by more technical reasons also contributed to market turbulence. Equity markets also saw large differences in returns, across both countries and sectors.

This report presents our main investment strategies and include return, risk estimates and cost data for them individually. This year, we have also included additional analysis on the key drivers of absolute risk for the fund. We have added a section on the consequences of changing asset correlations, as well as one on equity sector risk characteristics across time horizons. As the fund approaches a strategic equity weight of 70 percent, variables such as country and sector composition within equities will have an increasing impact on the long-term risk characteristics.

The fund's long-term investment horizon dictates a long-term horizon for risk management. 2018 was a year when climate risk increasingly made the financial headlines. Environmental, social and governance risks are also important elements of our risk assessment work but are outside the scope of this report.

Supporting the long-term management of the fund also means paying attention to short-term risks. Balancing these risk horizons on an ongoing basis is a key challenge for a fund like ours.





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# Investments

# Investments

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**The fund's investments are diversified across asset classes, regions and sectors. The goal is to have well-diversified investments that spread risk and generate a high long-term return.**

The fund is invested in three asset classes: equities, fixed income and unlisted real estate. At the end of 2018, the fund's asset allocation was 66.3 percent equity investments, 30.7 percent fixed-income investments and 3.0 percent unlisted real estate investments.

## Equity investments

The fund had equity investments in 70 countries at the end of 2018. 41.0 percent of the equity portfolio was invested in North America, 34.0 percent in Europe and 22.2 percent in Asia and Oceania. 89.0 percent of our equity investments were in developed markets and 11.0 percent in emerging markets, including frontier markets.

The fund's largest equity sector is financials, accounting for 23.7 percent of the fund's equity holdings at the end of 2018. Industrials and technology were the second- and third-largest sectors at 12.9 percent and 12.6 percent respectively, with the technology sector overtaking consumer goods in 2018.

The equity portfolio was invested in 9,158 listed companies at the end of 2018. The three largest equity holdings at year-end were all companies in the technology sector. Microsoft Corp was the largest stock by market value, with Apple Inc and Alphabet Inc in second and third position.

The fund's average holding in the world's listed companies, measured as its share of the reference index for equities, was 1.4 percent at the end of 2018. In Europe, the average ownership share was 2.5 percent.

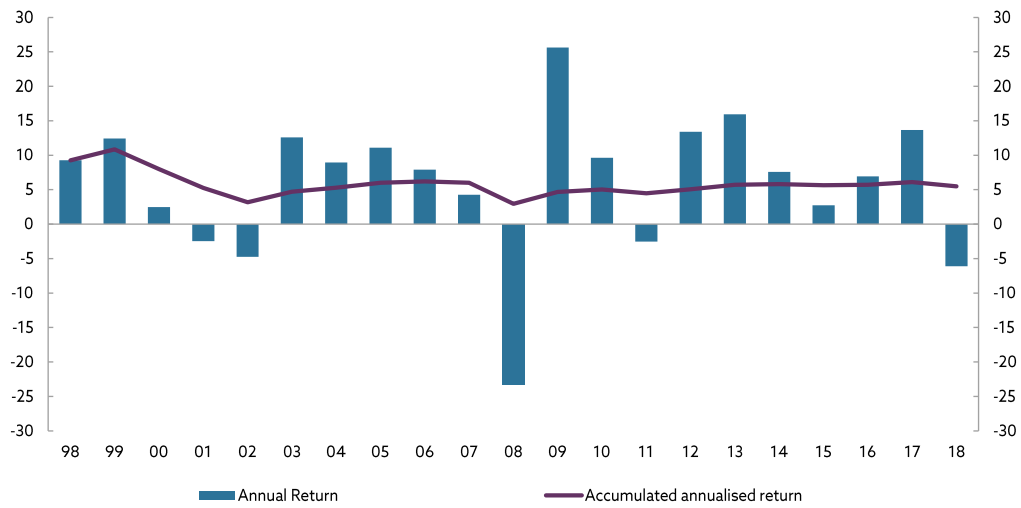
## Fixed-income investments

The fund's bond holdings were denominated in 26 different currencies at the end of the year, down from 31 currencies at year-end 2017. Bonds denominated in the four most liquid currencies together made up 86.5 percent of the fund's fixed-income investments: 45.7 percent in US dollars, 26.3 percent in euros, 10.1 percent in Japanese yen and 4.3 percent in British pounds. Bond holdings in emerging-market currencies accounted for 8.9 percent of fixed-income investments.

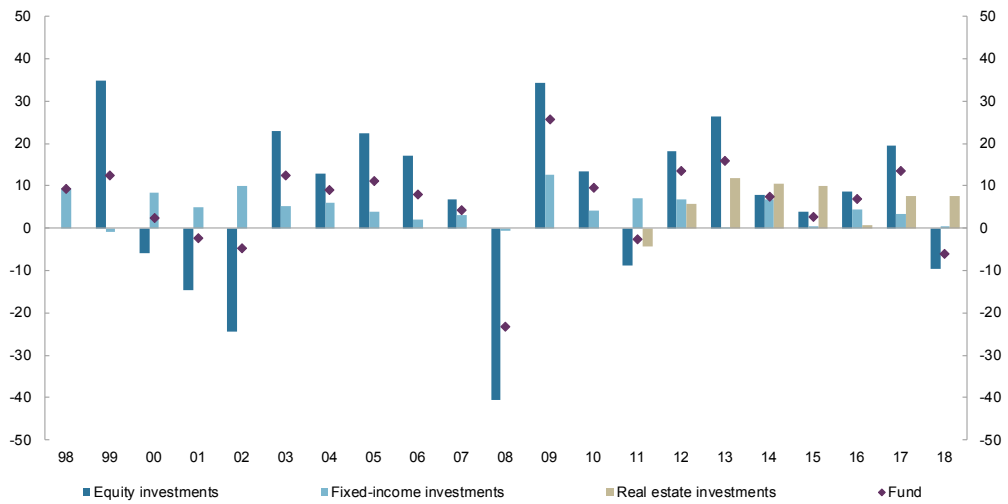
Government bonds constituted 56.6 percent of the fund's fixed-income investments, government-related bonds 13.3 percent, and inflation-linked bonds 5.5 percent. The allocation to the corporate bond sector was 24.1 percent, while securitised bonds, consisting primarily of European covered bonds, represented 5.6 percent of the fund's fixed-income investments at the end of 2018.

The fund's fixed-income portfolio had an average duration of 6.3 and an average yield of 2.4 percent. The fund's average ownership share in fixed-income markets, measured as its share of the reference index for bonds, was 0.7 percent.

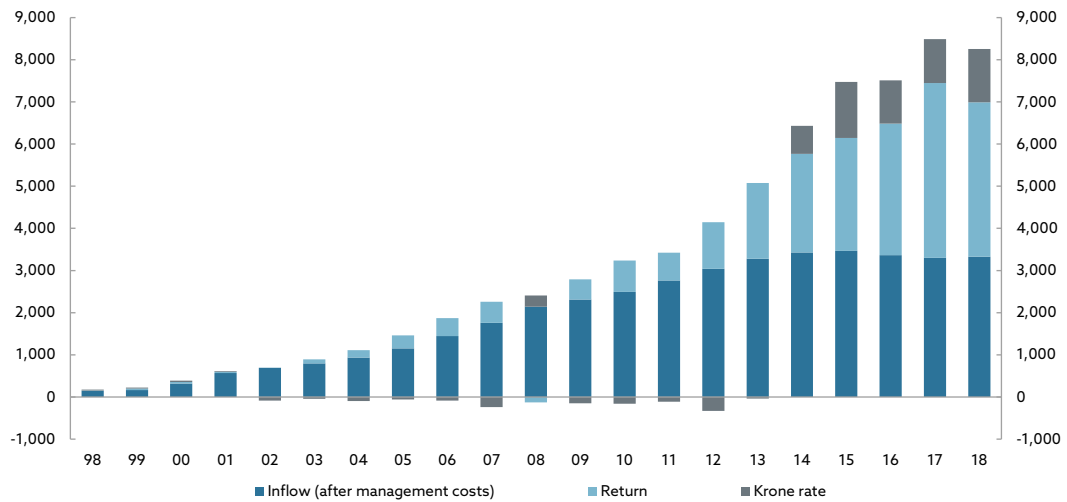
**Chart 1** The fund's annual return and accumulated annualised return. Percent



**Chart 2** Annual return on the fund's asset classes. Percent



**Chart 3** Decomposition of the fund's market value. Billions of kroner



**Table 1** Regional composition of the fund's equity holdings

Region	Millions of kroner <sup>1</sup>	Percent
<b>North America</b>	<b>2,243,147</b>	<b>41.0</b>
United States	2,124,610	38.8
Canada	118,537	2.2
<b>Europe</b>	<b>1,864,921</b>	<b>34.0</b>
United Kingdom	512,347	9.4
France	278,329	5.1
Germany	267,986	4.9
Switzerland	245,059	4.5
Spain	95,470	1.7
Netherlands	94,037	1.7
Sweden	90,114	1.6
Italy	78,247	1.4
Denmark	51,409	0.9
Finland	41,459	0.8
Belgium	34,987	0.6
<b>Asia</b>	<b>1,094,288</b>	<b>20.0</b>
Japan	486,598	8.9
China	197,742	3.6
South Korea	96,298	1.8
Taiwan	90,340	1.6
Hong Kong	69,236	1.3
India	64,050	1.2
<b>Oceania</b>	<b>123,695</b>	<b>2.3</b>
Australia	116,938	2.1
<b>Latin America</b>	<b>84,431</b>	<b>1.5</b>
Brazil	53,451	1.0
<b>Africa</b>	<b>43,234</b>	<b>0.8</b>
South Africa	36,781	0.7
<b>Middle East</b>	<b>25,043</b>	<b>0.5</b>

<sup>1</sup> Does not sum up to total market value of equity investments due to cash and derivatives.

**Table 2** Sector composition of the fund's equity holdings

Sector	Millions of kroner <sup>1</sup>	Percent
<b>Financials</b>	<b>1,299,103</b>	<b>23.7</b>
Banks	524,912	9.6
Real estate	288,280	5.3
Insurance	266,309	4.9
Financial services	219,601	4.0
<b>Industrials</b>	<b>708,762</b>	<b>12.9</b>
Industrial goods and services	592,560	10.8
Construction and materials	116,202	2.1
<b>Technology</b>	<b>689,838</b>	<b>12.6</b>
Technology	689,838	12.6
<b>Consumer goods</b>	<b>653,764</b>	<b>11.9</b>
Personal and household goods	267,455	4.9
Food and beverage	241,557	4.4
Automobiles and parts	144,751	2.6
<b>Health care</b>	<b>626,847</b>	<b>11.4</b>
Health care	626,847	11.4
<b>Consumer services</b>	<b>589,709</b>	<b>10.8</b>
Retail	312,757	5.7
Travel and leisure	154,347	2.8
Media	122,605	2.2
<b>Oil and gas</b>	<b>320,756</b>	<b>5.9</b>
Oil and gas	320,756	5.9
<b>Basic materials</b>	<b>271,304</b>	<b>5.0</b>
Chemicals	150,430	2.7
Basic resources	120,874	2.2
<b>Telecommunications</b>	<b>163,344</b>	<b>3.0</b>
Telecommunications	163,344	3.0
<b>Utilities</b>	<b>155,333</b>	<b>2.8</b>
Utilities	155,333	2.8

<sup>1</sup> Does not sum up to total market value of equity investments due to cash and derivatives.

**Table 3** Currency composition of the fund's bond holdings

Currency	Millions of kroner <sup>1</sup>	Percent
US dollar	1,157,451	45.7
Euro	666,827	26.3
Japanese yen	256,250	10.1
British pound	109,355	4.3
Canadian dollar	93,096	3.7
Australian dollar	63,304	2.5
South Korean won	43,299	1.7
Mexican peso	40,599	1.6
Swiss franc	28,668	1.1
Brazilian real	23,284	0.9
Indonesian rupiah	23,278	0.9
Swedish krona	23,232	0.9
South African rand	21,088	0.8
Indian rupee	17,089	0.7
Malaysian ringgit	16,958	0.7
Singapore dollar	15,693	0.6
Danish krone	12,771	0.5
Russian ruble	10,649	0.4
Colombian peso	9,649	0.4
New Zealand dollar	8,216	0.3
Polish zloty	6,034	0.2
Philippine peso	5,065	0.2
Turkish lira	2,966	0.1
Thai baht	2,088	0.1
Yuan renminbi	1,974	0.1
Chilean peso	966	0.0

<sup>1</sup> Does not sum up to total market value of fixed-income investments due to cash and derivatives.

**Table 4** Sector composition of the fund's bond holdings

Sector	Millions of kroner <sup>1</sup>	Percent
<b>Government bonds</b>	<b>1,433,456</b>	<b>56.6</b>
Government bonds	1,433,456	56.6
<b>Government-related bonds</b>	<b>336,579</b>	<b>13.3</b>
Agencies	159,691	6.3
Local authorities	110,036	4.3
Supranational	57,409	2.3
Sovereign	9,443	0.4
<b>Inflation-linked bonds</b>	<b>139,396</b>	<b>5.5</b>
Inflation-linked bonds	139,396	5.5
<b>Corporate bonds</b>	<b>609,314</b>	<b>24.1</b>
Industrials	313,046	12.4
Financials	252,867	10.0
Utilities	43,401	1.7
<b>Securitised bonds</b>	<b>141,105</b>	<b>5.6</b>
Covered bonds	141,105	5.6

<sup>1</sup> Does not sum up to total market value of fixed-income investments due to cash and derivatives.



**Table 5** Largest holdings of equities and bonds excluding sovereigns as at 31 December 2018. Covered bonds issued by financial institutions and debt issued by other underlying companies are included in the bonds. Millions of kroner

Name	Sector	Equities	Bonds	Total
Apple Inc	Technology	62,740	7,176	69,915
Microsoft Corp	Technology	64,715	1,853	66,568
Alphabet Inc	Technology	57,634	792	58,426
Amazon.com Inc	Consumer services	54,771	2,985	57,756
Nestlé SA	Consumer goods	53,914	2,291	56,205
Royal Dutch Shell Plc	Oil and gas	51,274	1,627	52,902
Novartis AG	Health care	39,494	3,505	42,999
Roche Holding AG	Health care	39,573	1,968	41,541
Berkshire Hathaway Inc	Financials	33,423	4,936	38,359
JPMorgan Chase & Co	Financials	24,913	12,972	37,885
Bank of America Corp	Financials	22,345	13,726	36,071
HSBC Holdings Plc	Financials	27,020	8,853	35,873
Canada Mortgage & Housing Corp	Government-related		31,785	31,785
Johnson & Johnson	Health care	29,184	2,183	31,367
BP Plc	Oil and gas	25,368	3,462	28,830
AT&T Inc	Telecommunications	17,389	11,424	28,813
Kreditanstalt für Wiederaufbau	Government-related		27,475	27,475
Verizon Communications Inc	Telecommunications	20,331	6,932	27,263
Banco Santander SA	Financials	16,839	10,341	27,180
Tencent Holdings Ltd	Technology	26,340	788	27,128
Facebook Inc	Technology	27,059		27,059
TOTAL SA	Oil and gas	24,780	1,876	26,656
Wells Fargo & Co	Financials	16,790	8,732	25,522
Pfizer Inc	Health care	21,172	2,819	23,991
SAP SE	Technology	20,705	3,202	23,907
Taiwan Semiconductor Manufacturing Co Ltd	Technology	23,746		23,746
Samsung Electronics Co Ltd	Technology	23,551		23,551
Exxon Mobil Corp	Oil and gas	23,377		23,377
Linde Plc	Basic materials	22,467		22,467
Sanofi	Health care	18,473	3,707	22,180
UnitedHealth Group Inc	Health care	19,606	2,557	22,163
Comcast Corp	Consumer services	13,323	7,751	21,073
Citigroup Inc	Financials	11,577	8,643	20,219
Visa Inc	Financials	19,592	214	19,806
European Investment Bank	Government-related		19,530	19,530
Credit Suisse Group AG	Financials	11,457	8,024	19,482
Cisco Systems Inc	Technology	18,158	925	19,083
GlaxoSmithKline Plc	Health care	18,191	803	18,995
Procter & Gamble Co/The	Consumer goods	18,724		18,724
Merck & Co Inc	Health care	18,144	320	18,464

# Global investments

## North America

2,141 companies  
2,085 bonds from  
582 issuers  
341 properties

## Latin America

258 companies  
107 bonds from  
30 issuers

## International organisations

141 bonds from  
15 issuers



## Europe

1,903 companies  
1,725 bonds from  
500 issuers  
391 properties

## Asia

4,117 companies  
567 bonds from  
82 issuers  
5 properties

## Middle East

164 companies  
8 bonds from  
4 issuers

## Africa

213 companies  
12 bonds from  
2 issuers

## Oceania

362 companies  
166 bonds from  
39 issuers



# Reference index

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**The strategic reference index is defined in the mandate set by the Ministry of Finance. It reflects the most important decisions that determine how developments in the broad markets affect the total return on the fund over time.**

We seek to safeguard the long-term international purchasing power of the fund at acceptable risk. This objective has remained unchanged since inception. However, the reference index derived from this goal has evolved over time. The authority to set and change the reference index rests with the Ministry of Finance. The Ministry has drawn on advice from Norges Bank, as well as independent experts. On matters of strategic importance for the fund's overall return and risk, the Ministry has used national budget documents and periodic white papers to anchor decisions on fund strategy in the Storting (the Norwegian parliament).

The fund's investment strategy is laid down in the management mandate, in which the Ministry defines the fund's investment universe. The investment universe is limited to listed equities, tradable fixed-income instruments and unlisted real estate. In addition, the fund can be invested in the equity of unlisted companies where the board has expressed an intention to seek a public listing.

In financial theory, the term "market portfolio" is used to describe the most diversified portfolio. In practical terms, this theoretical construct is both unobserved and un-investable.

While market-weighted portfolios are passive in the sense that they require the fewest transactions, the asset owner may choose to depart from market weights and construct a reference index which better reflects the fund's specific objectives and characteristics. The Ministry of Finance has chosen a reference index that deviates from market weights along several dimensions. The most important is the choice of an equity share of 70 percent. Another important departure from market weights is the decision to overweight European equities and underweight North American equities, and the decision to weight government bonds according to respective issuers' GDP.

The Ministry has chosen to base the reference index on an externally provided representation of the opportunity set. The external index providers choose which securities are to be included in the index, assign constituent weights, and decide how these weights change over time.

The Ministry has formulated a rebalancing regime for the fund. Rebalancing requires active trading to return the portfolio to its strategic targets. The design of the rebalancing regime will have important consequences for the long-run return and risk characteristics of the fund.

Finally, the Ministry has formulated the objective for the manager. The objective is to maximise returns within the mandate's restrictions. Deviations between the actual portfolio and the reference index have been contained through tracking error constraints. Since February 2016 the tracking error limit has been 125 basis points.

### The strategic reference index

The composition of the strategic reference index has evolved over time. It currently consists of listed equities and bonds. At the end of 2018, while under transition from a strategic equity share of 62.5 percent towards a new strategic allocation of 70 percent, the actual equity share in the reference index stood at 67.3 percent while the fixed-income share was 32.7 percent.

Unlisted real estate is a separate asset class in the portfolio, but not a part of the fund's reference index. The decision on how much and when to invest in unlisted real estate has been delegated to Norges Bank as the manager of the fund within the limits laid down in the management mandate.

**Table 6** The fund's benchmark return measured in various currencies. Annualised. Percent

	Since 01.01.1998	Last 10 years	Last 5 years	2018
US dollar	5.44	6.77	2.47	-8.15
Euro <sup>1</sup>	5.24	8.88	6.37	-3.52
British pound	6.77	8.07	8.00	-2.45
Norwegian krone	6.29	9.06	10.03	-2.77
Currency basket	5.22	7.74	4.70	-5.82

<sup>1</sup> Euro was introduced as currency on 01.01.1999. WM/Reuters' Euro rate is used as estimate for 31.12.1997.

**Table 7** The fund's benchmark return, 5-year buckets, measured in various currencies. Annualised. Percent

	1998-2002	2003-2007	2008-2012	2013-2017
US dollar	2.86	12.67	2.50	6.96
Euro <sup>1</sup>	3.82	5.44	4.64	8.98
British pound	3.46	7.99	6.74	10.96
Norwegian krone	1.74	7.32	3.00	15.52
Currency basket	2.78	8.52	3.14	8.96

<sup>1</sup> Euro was introduced as currency on 01.01.1999. WM/Reuters' Euro rate is used as estimate for 31.12.1997.

### Equity reference index

The reference index for equities is based on the FTSE Global All Cap index, which is a global market capitalisation-weighted index comprising 7,864 stocks in 48 countries at the end of 2018, equating to roughly 98 percent of the world's investable market capitalisation. FTSE conducts an annual review of all countries in the index, as well as those being considered for inclusion, against minimum standards of governance and investability. Eligible securities are assigned to a country and are required to pass screens for liquidity, free float and foreign ownership restrictions prior to being included.

The equity reference index deviates from the composition of the FTSE Global All Cap index along two important dimensions: geographical distribution and ethical exclusions. In terms of the geographical distribution, the reference index has a larger weight in European developed markets and a lower weight in the US and Canada compared to market capitalisation weights. The weighting of other countries is close to the FTSE Global All Cap index, with the exception of Norway and securities denominated in Norwegian kroner, as the fund is not allowed to invest in these types of securities. In addition, securities issued by companies excluded by Norges Bank under the guidelines for observation and exclusion from the fund are not included in the reference index.

The Ministry of Finance has initiated a review of the fund's reference index for equities. The Ministry has decided not to include any new countries in the equity reference index until a decision on the future composition of the benchmark has been taken. In its letter to Norges Bank, the Ministry of Finance has asked for analysis and assessments by 1 June 2019.

**Table 8** The fund's equity benchmark versus the FTSE Global All Cap Index (GEISAC) by country as at of 31 December 2018

Country	Share of equity benchmark Percent	Share of FTSE GEISAC index Percent	Deviation of the FTSE GEISAC index	
			Percentage points	Millions of kroner
UK	9.2	5.4	3.9	207,951
Germany	4.9	2.6	2.2	120,211
France	5.2	3.0	2.2	117,633
Switzerland	4.7	2.5	2.1	115,283
Netherlands	1.9	1.0	0.9	47,073
Czech Republic	0.0	0.0	0.0	-407
Malaysia	0.3	0.3	0.0	-501
Norway	0.0	0.3	-0.3	-14,931
Canada	2.1	3.0	-0.9	-46,810
US	38.1	53.8	-15.8	-849,529

**Table 9** The fund's equity benchmark versus the FTSE Global All Cap Index (GEISAC) by sector as at close of 31 December 2018

Sector	Share of equity benchmark Percent	Share of FTSE GEISAC index Percent	Deviation of the FTSE GEISAC index	
			Percentage points	Millions of kroner
Financials	23.0	21.9	1.1	58,553
Consumer goods	12.0	11.0	1.1	56,786
Oil and gas	6.3	5.9	0.4	22,918
Health care	11.6	11.2	0.3	17,804
Telecommunications	3.1	2.8	0.3	16,535
Basic materials	4.8	4.6	0.2	10,351
Utilities	2.9	3.3	-0.4	-20,447
Industrials	13.0	13.4	-0.4	-22,754
Consumer services	10.6	11.5	-0.8	-44,901
Technology	12.7	14.4	-1.8	-94,846

### Fixed-income reference index

The reference index for fixed income consists of two sub-indices: one for government bonds and one for corporate bonds. Each sub-index is assigned a fixed weight, and the reference index is rebalanced back to these weights on a monthly basis. The government sub-index is assigned a weight of 70 percent and draws its constituents from three different Bloomberg Barclays indices in 22 currencies, including both developed and emerging markets. The corporate sub-index is assigned a weight of 30 percent and comprises all securities issued in seven developed markets and included in the corporate sector and the covered bond sub-sector of the Bloomberg Barclays Global Aggregate index. Bloomberg Barclays Indices evaluates the fixed-income landscape annually. To be considered for inclusion in its flagship indices, government issuers must be rated investment-grade and the currencies sufficiently tradable, convertible and hedgeable for international investors.

The Bloomberg Barclays Global Aggregate is a global market capitalisation-weighted index of investment-grade debt from 24 local currency markets, including government, government-related, corporate and securitised bonds. The most significant difference between the fixed-income reference index and the Bloomberg Barclays Global Aggregate is that while government bonds in the Bloomberg Barclays index are market-weighted, government bonds in the fund's reference index are weighted according to the size of the respective issuing countries' GDP. Another difference is that

agencies, local authorities, sovereigns, MBS pass-through bonds, ABS and CMBS are not included in the benchmark, while inflation-linked bonds are. For corporate bonds, the main difference is the number of currencies. The Bloomberg Barclays Global Aggregate includes corporate bonds issued in 14 currencies, while the reference index only includes bonds issued in US dollars, Canadian dollars, euros, British pounds, Swedish kronor, Danish kroner and Swiss francs. The reference index also has a higher weight of covered bonds than the Bloomberg Barclays Global Aggregate.

The Ministry of Finance has initiated a review of the fund's reference index for fixed income. The Ministry has decided not to include any new currencies in the reference index until a decision on the future composition of the benchmark has been taken.

**Table 10** The fund's fixed-income benchmark versus the Bloomberg Barclays Global Aggregate index by currency as at 31 December 2018

Currency	Share of fixed-income benchmark Percent	Share of Bloomberg Barclays Global Aggregate index Percent	Bloomberg Barclays Global Aggregate index	
			Percentage points	Millions of kroner
Euro	26.6	24.5	2.1	54,826
Mexican peso	1.6	0.3	1.4	35,837
Swiss franc	1.4	0.6	0.9	22,584
South Korean won	2.1	1.3	0.9	22,441
Canadian dollar	3.3	2.6	0.7	18,564
Chilean peso	0.1	0.0	0.1	2,259
Norwegian krone	0.0	0.1	-0.1	-2,647
Indonesian rupiah	0.0	0.3	-0.3	-7,223
US dollar	44.9	45.3	-0.4	-11,086
Japanese yen	7.0	16.8	-9.8	-258,133

**Table 11** The fund's fixed-income benchmark versus the Bloomberg Barclays Global Aggregate index by sector as at 31 December 2018

Sector	Share of fixed-income benchmark Percent	Share of Bloomberg Barclays Global Aggregate index Percent	Bloomberg Barclays Global Aggregate index	
			Percentage points	Millions of kroner
Inflation-linked bonds	6.6	0.0	6.6	172,190
Treasuries	60.6	54.4	6.3	163,965
Industrial	14.3	10.2	4.2	108,990
Financial institutions	10.0	6.9	3.1	80,815
Covered	3.8	2.7	1.1	30,090
Supranational	2.8	2.2	0.6	16,248
Utility	1.8	1.5	0.4	9,619
ABS	0.0	0.3	-0.3	-6,871
CMBS	0.0	0.8	-0.8	-21,679
Sovereign	0.0	1.2	-1.2	-31,382
Local authorities	0.0	2.9	-2.9	-74,741
Agencies	0.0	5.4	-5.4	-141,808
MBS Passthrough	0.0	11.7	-11.7	-305,436

### **Ethical exclusions**

The guidelines for observation and exclusion from the Government Pension Fund Global, issued in 2004, have evolved over time. The Ministry has appointed a Council on Ethics to research and evaluate companies, and to make recommendations on exclusions based on the criteria set out in the guidelines. When companies are excluded from the fund, they are also removed from the reference index.

Two types of criteria are set out in the guidelines. One set relates to specific product types and excludes companies that produce tobacco, or certain weapons that violate fundamental humanitarian principles. Product-based exclusions have reduced the cumulative return on the equity reference index by around 1.8 percentage points, or 0.07 percentage point annually. Both the exclusion of weapons manufacturers and tobacco companies have contributed to the reduced return.

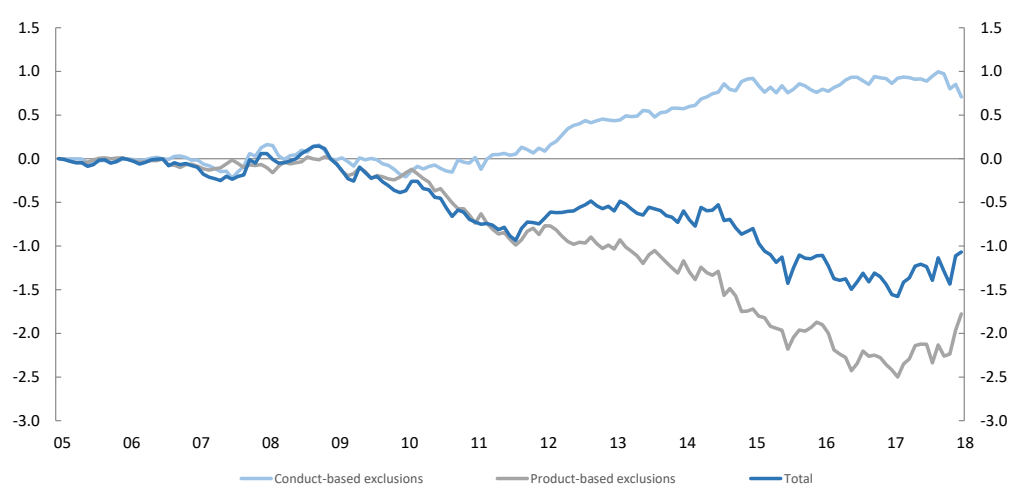
A separate set of criteria excludes companies where there is an unacceptable risk of conduct that contributes to serious or systematic human rights violations, serious violations of the rights of individuals in situations of war or conflict, severe environmental damage, gross corruption or other serious violations of fundamental ethical norms. Conduct-based exclusions have increased the cumulative return on the equity reference index by around 0.7 percentage point, or 0.03 percentage point annually.

The Ministry revised the guidelines in February 2016. Two new criteria were introduced. First, the corporate conduct criteria were broadened to cover companies that are responsible for acts or omissions that, on an aggregated company level, lead to unacceptable greenhouse gas emissions. Second, a product-based coal criterion was introduced. Mining companies and power producers that derive 30 percent or more of their revenue from thermal coal, or base 30 percent or more of their operations on thermal coal, may now be excluded.

Since the first exclusion in 2006, the equity reference index has returned 1.1 percentage points less than an unadjusted equity reference index. On an annualised basis, the return has been 0.04 percentage point lower.



**Chart 4** Return impact of equity reference index exclusions relative to an unadjusted index. Measured in dollars. Percentage points



**Table 12** Contribution to return impact of equity benchmark index exclusions by exclusion criterion as at 31 December 2018. Market value in billions of kroner. Contribution measured in dollars. Percentage points

Criterion	Number of excluded companies from benchmark <sup>1</sup>	Market value in benchmark if not excluded	2018	2006-2018 annualised
<b>Product-based exclusions</b>	<b>105</b>	<b>142</b>	<b>0.17</b>	<b>-0.07</b>
Production of specific weapon types	19	63	-0.07	-0.05
Production of tobacco	18	47	0.30	-0.02
Thermal coal mining or coal-based power production	68	31	-0.06	0.00
<b>Conduct-based exclusions</b>	<b>33</b>	<b>44</b>	<b>-0.03</b>	<b>0.03</b>
Human rights violations	5	13	-0.02	-0.01
Serious violations of the rights of individuals in situations of war or conflict	2	0	0.00	0.00
Severe environmental damage	17	27	-0.01	0.03
Gross corruption	2	1	0.00	0.00
Other particularly serious violations of fundamental ethical norms	3	3	0.00	0.00
Severe environmental damage and human rights violations	4	0	0.00	0.00
<b>Total</b>	<b>138</b>	<b>186</b>	<b>0.14</b>	<b>-0.04</b>

<sup>1</sup> Includes companies that are not in the reference index universe.

# Reference portfolio

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**The objective for the fund is the highest possible return after costs, while operating within the bounds of the management mandate. The reference portfolio serves as a tool for achieving this objective.**

The fund is benchmarked to a reference index that is based on publicly available equity and fixed-income indices from external providers. These indices represent liquid investment alternatives for a typical broad equity or fixed-income investor.

Characteristics of the fund such as its large size, long investment horizon and low liquidity requirements may mean that some deviations from the reference index are appropriate. In addition, the management mandate from the Ministry of Finance contains certain requirements which are not reflected in the reference index and which require adjustments to be made. The reference portfolio is the result of these adjustments to the reference index. The reference portfolio was established in 2011 and has evolved in subsequent years.

The adjustments can be broadly classified into four categories, each of which seeks to improve the fund's total long-term return and risk profile. The reference portfolio aims to expand the universe of investments, gain and manage exposure to systematic factors, incorporate requirements in the management mandate and implement adjustments and transitions in the investment universe, all in a cost-efficient manner. In this section, we describe the range of adjustments that have been made as part of the reference portfolio in each of these categories.

### Universe expansion

The reference portfolio includes a larger and more diverse range of securities in its investment universe than the reference index.

The reference index is based on publicly available indices. These indices are designed to cater to a wide variety of investors, many of which have short-term liquidity needs that are not met in all markets and countries. In addition, several markets do not meet market access criteria due to local market taxes and regulations, quota systems or currency convertibility issues. For these reasons, index providers often limit or exclude certain countries or types of securities.

The fund is not always subject to the same constraints or liquidity requirements that a typical investor faces. This implies that it should not necessarily exclude markets in the same way

as the index provider. By including a broader set of countries and market segments, the reference portfolio can benefit from reduced risk through increased diversification. In addition to the diversification benefits, these markets and segments can potentially also offer additional sources of return through the harvesting of liquidity and other premiums.

Since its inception in 2011, the reference portfolio has included a number of markets that have been outside the reference index. Some of these markets have subsequently become part of the reference index or been excluded from the reference portfolio. Frequent and/or large changes to the investment universe of the reference index are challenging to implement for a large investor, and the reference portfolio ensures that the investment universe is more stable.

**Table 13** Additional markets included in the reference portfolio. From inception in 2011 to December 2018

Equities		Fixed income <sup>1</sup>	
Bangladesh	Mauritius	Brazil	Russia
Botswana	Morocco	China	South Africa
China A	Oman	Colombia	South Korea
Croatia	Qatar	Hungary	Taiwan
Estonia	Romania	India	Thailand
Ghana	Saudi Arabia	Indonesia	Turkey
Jordan	Slovakia	Malaysia	
Kenya	Sri Lanka	Mexico	
Kuwait	Tunisia	Philippines	
Lithuania	Vietnam	Poland	

<sup>1</sup> Government bonds in local currency.

One example of constraints on investors is the restrictions placed on foreign investors wishing to invest in the Chinese equity market. In the past, investors have not been able to access the local Chinese equity market without being granted a quota by the Chinese authorities. This is despite the Chinese equity market being similar in size to that of Japan and hence representing a meaningful proportion of global equity market capitalisation. These restrictions contributed to the exclusion of China A shares – the local Chinese equity market – from standard equity indices.

In 2005, the fund obtained quotas to invest in the local Chinese equity market, starting in 2008. Since a typical investor still could not invest in China A shares, however, the Chinese market continued to be excluded from the reference index. The fund then needed to deviate from the reference index in order to make use of the allotted quota. It was therefore natural to include the addition of local Chinese equities in the reference portfolio.

In general, the addition of equity markets in the reference portfolio is modest in size. The additional countries and market segments receive weights in line with the principles followed by the Ministry of Finance's reference index. For equities, the reference portfolio uses adjusted market capitalisation to weight its constituents.

For fixed income in emerging markets, the reference portfolio initially included new markets using the same weighting principles as the reference index, i.e. GDP weights. Today, the reference portfolio generally weights fixed

income in emerging markets according to market capitalisation to avoid country allocations that are oversized relative to the local bond market. This helps to avoid liquidity issues, i.e. allocating to assets that cannot be bought or sold at reasonable cost. Aside from generally lower liquidity, possible reasons for limited investability are capital controls such as taxes or investment quotas, implicit restrictions due to local pension fund regulation, or intervention by local central banks.

Allocations to emerging-market bonds over developed-market bonds are often associated with exposure to 'carry' strategies. The carry strategy overweights bonds or currencies with relatively high interest rates, and underweights similar assets with relatively low interest rates. Standard indices for government bonds are not intended to capture this risk factor. We further adjust the market capitalisation weights in the reference portfolio for fixed income in emerging markets to capture the positive expected returns associated with exposure to the carry factor. Our universe expansion efforts in general, and this reweighting in particular, mean that the reference portfolio has a certain exposure to carry. To some extent, this can therefore be considered as gaining exposure to systematic factors.

Adjustments to expand the universe contributed -7 basis points to the return difference between the reference portfolio and the reference index over the period 2013–2018. Most of this return difference comes from the inclusion of additional emerging markets in the fixed-income part of the reference portfolio.

### Systematic factors

The management mandate from the Ministry of Finance includes several requirements that are not reflected in the reference index. One of these is that the total portfolio should be composed in such a way that the expected relative return is exposed to several systematic risk factors. The reference portfolio contains these risk factor exposures.

Implementing these additional exposures in the reference portfolio ensures transparency by capturing their allocation effect at a strategic level. The reference portfolio currently includes three systematic equity strategies: value, quality and size. These strategies are versions of well-known risk factors that have been explored extensively in the academic literature.

The value strategy overweights stocks with low valuations (value stocks) and underweights stocks with high valuations (growth stocks) using measures such as price-to-earnings or price-to-dividend ratios. The quality strategy aims to capture positive expected returns associated with a strategy that overweights high-quality stocks and underweights low-quality stocks, using measures such as profitability and earnings quality. The size strategy aims to capture positive expected returns associated with a strategy that overweights smaller stocks and underweights larger stocks, measured by market capitalisation. The size strategy can also be thought of as universe expansion to the extent that the companies that are overweighted proxy for other small companies not included in the reference index.

There is a large academic literature on risk factors, and in general it provides evidence that these systematic equity strategies earn positive expected returns. While there is generally a

consensus around the presence of these factors, there is less agreement on the underlying explanation for their existence.

The value and size adjustments were initially introduced into the reference portfolio in December 2012, and the quality adjustment in December 2015. The allocations to systematic risk factors contributed 1 basis point to the return difference between the reference portfolio and the reference index over the period 2013–2018. The majority of the positive performance comes from the quality adjustment in the reference portfolio.

### Mandate requirements

The management mandate from the Ministry of Finance includes additional requirements that are not reflected in the reference index. One such requirement is to take differences in countries' fiscal strength into account in government bond investments. Another requirement is an allocation to environment-related investments.

The reference portfolio incorporates fiscal strength considerations when setting country weights for government bonds and ensures transparency by capturing this mandated allocation effect at a strategic level. One key role of government bonds in a traditional equity-bond portfolio is to diversify equity risk and hence reduce overall portfolio volatility. Not all government bonds are suited to this role, however. As an example, some bond markets fell in value alongside equity markets during the European sovereign debt crisis that emerged around 2010.

The management mandate explicitly requires that "the Bank shall seek to take account of differences in fiscal strength between countries in the composition of government bond

investments.” Fiscal strength considerations are an integral part of the fund’s fixed-income management in several ways. First, the government part of the fund’s reference index for bonds is based on GDP weights. In a market value-weighted index, a country that issues more debt will be assigned a higher weight, whereas its weight in a GDP-weighted index will vary with its economic output only, all else equal.

Second, the fund takes credit ratings into account and aims to keep the share of “high-yield” bonds below 5 percent of the total bond portfolio. Credit rating agencies also attach importance to fiscal strength in their ratings. Metrics such as government debt-to-GDP, government debt-to-revenue, interest expense-to-revenue receipts, debt dynamics, debt structure and other contingent liabilities are all important in this regard.

Third, the fiscal strength requirement is implemented as an explicit adjustment within the allocation to government bonds. With GDP weights as the starting point, the reference portfolio adjusts the weights assigned to countries. These adjustments are based on internal indicators of fiscal strength and are currently only applied to countries in the euro area. Rather than being based on price or financial market data, the set of fiscal strength indicators includes variables such as fiscal budget balance, debt servicing costs and the maturity profile of outstanding government debt.

The fiscal strength requirement effectively lowers the weight of countries with weak government finances and reinvests in countries with stronger government finances within the euro area. The fiscal strength adjustment therefore typically improves the reference portfolio’s ability to dampen volatility during times of fiscal stress in developed markets. This insurance-type return profile, however, comes at a cost. The fiscal strength adjustment, viewed in isolation, results in lower expected risk and return on the government bond allocation in the reference portfolio.

The management mandate also requires the Bank to establish environment-related mandates. Through these mandates, funds are invested in selected companies that are likely to benefit from the transition towards a greener, lower-carbon economy. These environmental investments tend to fall into three main categories: low-emission energy and alternative fuels, clean energy and energy efficiency, and clean technology and natural resource management. The allocation effect of the environment-related mandates was included in the reference portfolio in 2016 and 2017.

The mandated allocations described in this section contributed roughly 0 basis points to the return difference between the reference portfolio and the reference index over the period 2013–2018. The total contribution has been positive for the environment-related mandates and negative for the fiscal strength adjustment.

### Universe adjustments and transitions

The reference portfolio also includes a range of additional adjustments to the composition of the reference index. Several of these adjustments aim to improve the cost efficiency of the reference index and the rebalancing rules that it follows.

One set of adjustments in the reference portfolio targets the rebalancing rules that are in place for the reference index. Differences in performance across the components of the reference portfolio mean that allocations and exposures change over time. The allocations therefore need to be rebalanced to ensure that the intended exposure and weights are maintained. Naturally, rebalancing requires trading and incurs transaction costs, so the trade-off between deviations from intended exposures and transaction costs needs to be taken into consideration.

To improve cost-efficiency, the reference portfolio applies customised rebalancing rules. One example where customisation is needed is in the fixed-income reference index, which follows a GDP weighting methodology. The weights in the reference index are set according to GDP values on an annual basis, and rebalancing back to these weights occurs at the end of each month over the following year.

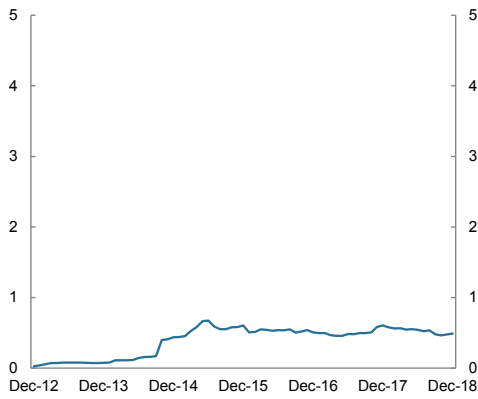
Due to movements in foreign exchange markets, currency weights can drift substantially away from these initial weights. Frequent monthly rebalancing can therefore result in high turnover. In order to reduce the turnover that results from this rebalancing, the reference portfolio follows a more gradual and nuanced rebalancing regime.

The reference portfolio also includes adjustments that attempt to mitigate other sources of turnover. One example is the turnover that arises from changes in “free float” in the equity reference index. Equity index providers typically adjust the market capitalisation weights of index constituents to ensure that the shares that are included in the index are available for trading, known as “free-float” adjustment.

The free-float adjustments in the index vary over time and generate higher turnover relative to purely market capitalisation-based weights. Index providers adjust the market capitalisation for free float based on various public and proprietary data sources on shareholders, and changes in ownership patterns often result in changes to the index weights. The reference portfolio tilts security weights towards full market capitalisation weights.

The reference portfolio also takes into account issues such as market liquidity and fund inflows and outflows, both in its composition and when implementing changes to the fund’s strategic reference index. One example is through adjustments to the composition of government bond holdings. Some bond markets are dominated by local market participants due to local pension regulations. For instance, the academic literature has provided some evidence of regulation-induced price pressures in the UK index-linked bond market, which has a considerably longer duration than other developed markets. The reference portfolio adjusts the allocation to inflation-linked bonds by excluding UK bonds from this segment.

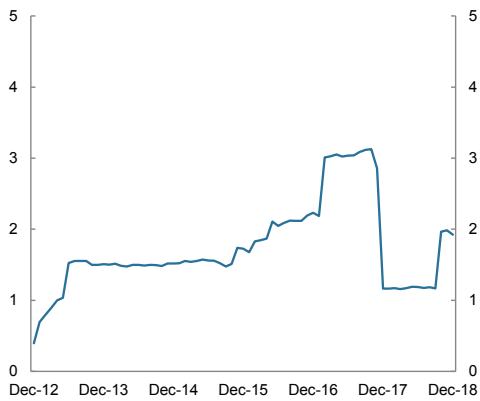
**Chart 5** Adjustments due to universe expansion in the reference portfolio for equities.  
Over-weighted stocks. Percent of fund



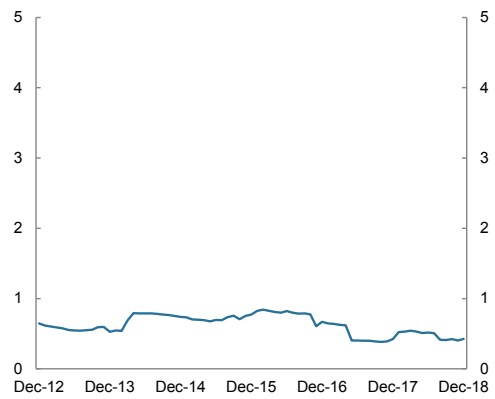
**Chart 6** Adjustments due to universe expansion in the reference portfolio for fixed income.  
Over-weighted bonds. Percent of fund



**Chart 7** Adjustments due to systematic factors in the reference portfolio for equities.  
Over-weighted stocks. Percent of fund



**Chart 8** Adjustments due to the fiscal strength factor in the reference portfolio for fixed income.  
Under-weighted bonds. Percent of fund





The reference portfolio is also used to implement changes to the reference index at a different, often slower, pace. For instance, the fund reduced its strategic allocation to European equities in 2013. The reference portfolio implemented this transition over a longer horizon than the reference index in order to avoid high volumes of transactions in European equities over a short period of time. The longer implementation period resulted in an overweight of European stocks relative to the reference

index and contributed to a meaningful increase in the fund's tracking error.

Universe adjustments and transitions contributed -5 basis points to the return difference between the reference portfolio and the reference index over the period 2013–2018. Most of this return difference comes from the transition to new regional equity weights in 2013.

**Table 14** Contribution to relative return differences between the fund's reference portfolio and the reference index in 2018. Percentage points

	Equity	Fixed income	Total
Universe expansion	-0.04	-0.09	-0.13
Systematic factors	-0.05		-0.05
Mandate requirements		0.01	0.01
Universe adjustments	-0.02	-0.02	-0.04
<b>Reference portfolio versus the reference index</b>	<b>-0.12</b>	<b>-0.10</b>	<b>-0.22</b>

**Table 15** Contribution to relative return differences between the fund's reference portfolio and the reference index for 2013–2018. Annualised. Percentage points

	Equity	Fixed income	Total
Universe expansion	-0.01	-0.06	-0.07
Systematic factors	0.01		0.01
Mandate requirements	0.01	-0.01	0.00
Universe adjustments	-0.02	-0.02	-0.05
<b>Reference portfolio versus the reference index</b>	<b>-0.01</b>	<b>-0.09</b>	<b>-0.11</b>

### Allocation to real estate

We allocate to real estate to improve the overall risk-return profile of the fund. Real estate returns have had varying, and at times low, correlation to those of equities and fixed income. Therefore, the fund's total risk can be reduced by including real estate.

The reference index expresses the asset owner's market and currency risk preferences through the required equity share and currency composition. In addition to interest rate risk, these choices are among the most important determinants of the expected return and risk of a well-diversified equity and bond portfolio.

From January 2017, the allocation to real estate is no longer defined by the fund's reference

index. Authority has been delegated to Norges Bank to decide the allocation to real estate and how it should be funded.

We allocate to real estate to obtain a more diversified total portfolio. Allocation to real estate can add market and currency risk to the total portfolio. The additional systematic risk is controlled through balanced funding of this asset class, in order to maintain the fund's overall market and currency risk.

We obtain exposure to real estate through both unlisted and listed markets. The unlisted and listed portfolios are funded using the same model, but adjustments for market risk and currency are tailored to each investment.

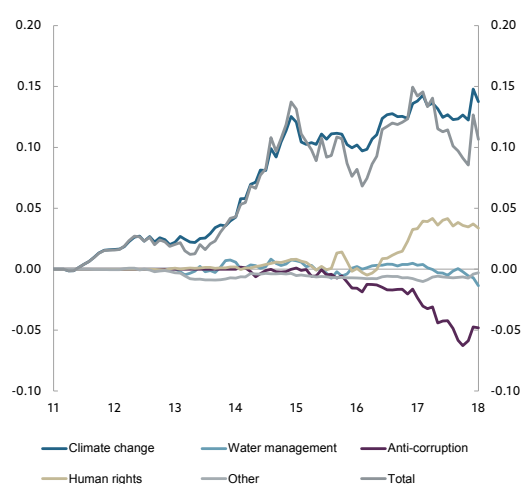


### Risk-based divestments

The integration of environmental, social and governance issues into our risk management may result in divestment from companies where we see elevated long-term risks. These are companies that do business in a way that we do not consider sustainable or could have negative financial consequences.

Since 2012, risk-based divestments have made a positive contribution to the cumulative return on the equity reference portfolio of around 0.11 percentage point, or 0.01 percentage point annually. Divestments linked to climate change and human rights have made positive contributions of 0.14 and 0.03 percentage point respectively, while divestments linked to anti-corruption and water management have reduced the cumulative return on the equity reference portfolio by 0.05 and 0.01 percentage point respectively.

**Chart 9** Return impact of risk-based divestments on the reference portfolio for equities, compared to a portfolio not adjusted for risk-based divestments. Measured in dollars. Percentage points



**Table 16** Contribution to return impact of equity reference portfolio risk-based divestments as at 31 December 2018. Market value in billions of kroner. Contribution measured in dollars. Percentage points

Expectation	Number of companies divested <sup>1</sup>	Market value in the reference portfolio if not sold		Contribution to return impact	
		2018	2012-2018 annualised	2018	2012-2018 annualised
Climate change	142	11.9	0.01	0.01	
Water management	46	3.9	-0.01	0.00	
Anti-corruption	22	6.6	-0.02	0.00	
Human rights	21	3.8	0.00	0.00	
Other	9	0.7	0.00	0.00	
<b>Total</b>	<b>240</b>	<b>26.9</b>	<b>-0.01</b>	<b>0.01</b>	

<sup>1</sup> Includes companies that are not in the reference portfolio universe.



2

Return

# Return

**The fund's investment return was -6.12 percent in 2018 but has been 5.47 percent on an annualised basis since inception.**

The fund's total market value decreased by 233 billion kroner to 8,256 billion kroner in 2018. The investment return for the year was -485 billion kroner. The krone weakened against the main currencies the fund invests in, increasing the fund's net asset value by 224 billion kroner. Net inflows of capital amounted to 29 billion kroner.

The fund has received a total of 3,327 billion kroner, net of management costs, since the first inflow of capital in May 1996. The cumulative investment return since inception has been 3,666 billion kroner. Changes in the value of the krone against the currencies we invest in account for the remaining 1,263 billion kroner of the fund's market value.

## **Fund return**

In 2018, the fund returned -6.12 percent. Equity investments returned -9.49 percent, fixed-income investments 0.56 percent and unlisted real estate investments 7.53 percent.

Over the last five years, the fund's annualised return has been 4.75 percent. Equity investments have returned 5.66 percent, fixed-income investments 3.05 percent and real estate investments 7.19 percent.

Since inception, the fund's annualised investment return has been 5.47 percent. Equity investments have returned 5.31 percent and fixed-income investments 4.56 percent.

The fund has had positive annual returns in 16 out of 21 years since inception. Equity investments have had a positive return in 14 out of 20 years, and fixed-income investments in 19 out of 21 years. The return on unlisted real estate has been positive in seven out of eight years.

**Benchmark return**

The fund's equity benchmark returned -8.80 percent in 2018.

The main contributor to the negative return was European stocks with a return of -12.64 percent. Asian stocks performed similarly poorly with a return of -12.28 percent, while North American stocks performed comparatively well at -3.25 percent.

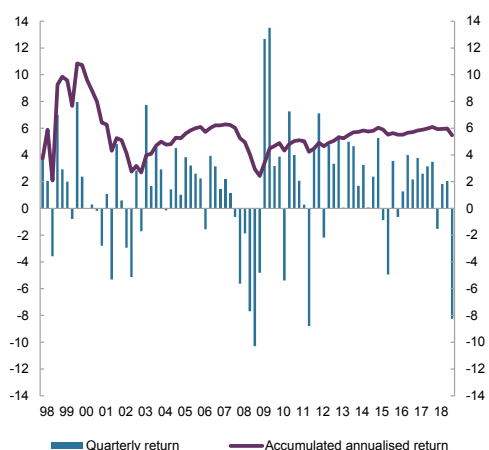
Benchmark returns are presented in both the fund's currency basket and local currency in order to show the impact of exchange rate movements on investment returns. The differences between these returns depend on currency movements and were particularly pronounced in emerging markets such as Brazil,

Russia, Turkey and South Africa, which saw lower returns in the fund's currency basket due to weakening local currencies.

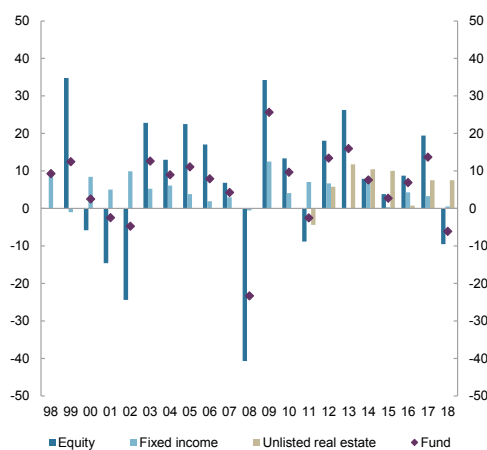
Health care stocks performed the best in 2018 with a return of 2.67 percent. Technology stocks lost -3.78 percent in 2018, but are still the best-performing sector when measured over the last five years. The worst-performing sector in 2018 was basic materials at -14.88 percent.

The return on the fixed-income benchmark in 2018 was 0.56 percent. While the local return on bonds denominated in the major currencies (dollars, euros, pounds and yen) was in all cases within the -0.5 to 1.0 percentage point range, the main contribution to their currency basket return came from the local currency weakening

**Chart 10** The fund's quarterly and accumulated annualised return. Percent



**Chart 11** Annual return for the fund's asset classes. Percent







(euro and pound) or strengthening (dollar and yen) against the fund's currency basket.

Treasuries were the best-performing sector in the benchmark in 2018 at 1.68 percent. Measured in local currency, the return on the benchmark's government bonds, including

supranationals, returned 1.29 percent, while the benchmark's corporate bonds, including covered bonds, returned -1.54 percent. Government and corporate bonds have had essentially the same local-currency returns over the most recent five-year period, with a difference of just 0.01 percentage point.

**Table 17** Absolute return per year, measured in the fund's currency basket. Percent

Year	Fund	Equity investments	Fixed-income investments	Unlisted real estate investments <sup>1</sup>
2018	-6.12	-9.49	0.56	7.53
2017	13.66	19.44	3.31	7.52
2016	6.92	8.72	4.32	0.78
2015	2.74	3.83	0.33	9.99
2014	7.58	7.90	6.88	10.42
2013	15.95	26.28	0.10	11.79
2012	13.42	18.06	6.68	5.77
2011 <sup>2</sup>	-2.54	-8.84	7.03	-4.37
2010	9.62	13.34	4.11	-
2009	25.62	34.27	12.49	-
2008	-23.31	-40.71	-0.54	-
2007	4.26	6.82	2.96	-
2006	7.92	17.04	1.93	-
2005	11.09	22.49	3.82	-
2004	8.94	13.00	6.10	-
2003	12.59	22.84	5.26	-
2002	-4.74	-24.39	9.90	-
2001	-2.47	-14.60	5.04	-
2000	2.49	-5.82	8.41	-
1999	12.44	34.81	-0.99	-
1998	9.26	-	9.31	-

<sup>1</sup> Includes listed real estate investments from 1 November 2014 to the end of 2016.

<sup>2</sup> Unlisted real estate investments from 1 April 2011.

**Table 18** Absolute return key figures, measured in the fund's currency basket. Annualised. Percent

	Since 01.01.1998	Last 10 years	Last 5 years	2018
Return on equity investments <sup>1</sup>	5.31	10.54	5.66	-9.49
Return on fixed-income investments	4.56	4.52	3.05	0.56
Return on unlisted real estate investments <sup>2</sup>			7.19	7.53
Return on fund	5.47	8.33	4.75	-6.12

<sup>1</sup> Since 01.01.1999.<sup>2</sup> Includes listed real estate investments from 1 November 2014 to the end of 2016.**Table 19** Absolute return, 5-year buckets, measured in the fund's currency basket. Annualised. Percent

	1998–2002	2003–2007	2008–2012	2013–2017
Return on equity investments <sup>1</sup>	-4.85	16.28	-0.59	12.94
Return on fixed-income investments	6.26	4.00	5.87	2.96
Return on unlisted real estate investments <sup>2</sup>	-	-	-	8.03
Return on fund	3.19	8.92	3.14	9.26

<sup>1</sup> Since 01.01.1999.<sup>2</sup> Includes listed real estate investments from 1 November 2014 to the end of 2016.**Table 20** The fund's real return, measured in the fund's currency basket. Annualised. Percent

	Since 01.01.1998	Last 10 years	Last 5 years	2018
Fund return (nominal)	5.47	8.33	4.75	-6.12
Annual inflation	1.77	1.69	1.37	1.70
Annual management fees	0.08	0.07	0.06	0.05
Real return	3.56	6.46	3.27	-7.74

**Table 21** Fund return, key figures, measured in various currencies. Annualised. Percent

	Since 01.01.1998	Last 10 years	Last 5 years	2018
US dollar	5.69	7.35	2.52	-8.44
Euro <sup>1</sup>	5.49	9.47	6.42	-3.83
British pound	7.02	8.66	8.05	-2.75
Norwegian kroner	6.54	9.65	10.08	-3.07
Currency basket	5.47	8.33	4.75	-6.12

<sup>1</sup> Euro was introduced as currency on 01.01.1999. WM/Reuters' Euro rate is used as estimate for 31.12.1997.**Table 22** Fund return, 5-year buckets, measured in various currencies. Annualised. Percent

	1998–2002	2003–2007	2008–2012	2013–2017
US dollar	3.27	13.09	2.50	7.26
Euro <sup>1</sup>	4.23	5.84	4.65	9.28
British pound	3.87	8.39	6.74	11.27
Norwegian kroner	2.15	7.71	3.01	15.84
Currency basket	3.19	8.92	3.14	9.26

<sup>1</sup> Euro was introduced as currency on 01.01.1999. WM/Reuters' Euro rate is used as estimate for 31.12.1997.

**Table 23** Equity benchmark return by region and country. Annualised. Percent

	The fund's currency basket		Local currency	
	2018	5-Year	2018	5-Year
<b>North America</b>	<b>-3.25</b>	<b>9.63</b>	<b>-5.21</b>	<b>7.62</b>
United States	-2.53	10.20	-4.94	7.86
Canada	-14.80	0.95	-9.43	3.89
<b>Europe</b>	<b>-12.64</b>	<b>2.18</b>	<b>-10.28</b>	<b>4.29</b>
United Kingdom	-10.93	0.88	-7.74	4.06
France	-11.42	4.20	-9.26	5.87
Germany	-20.03	0.99	-18.08	2.61
Switzerland	-7.28	4.51	-8.53	4.42
Spain	-14.46	-1.42	-12.37	0.15
Netherlands	-12.52	5.04	-10.39	6.71
Sweden	-10.16	2.06	-5.13	6.54
Italy	-15.78	0.52	-13.72	2.13
Denmark	-12.27	8.86	-9.92	10.61
Finland	-4.44	5.54	-2.11	7.22
Belgium	-23.30	1.72	-21.43	3.35
Austria	-20.13	2.31	-18.18	3.95
Ireland	-14.55	7.16	-12.46	8.87
Portugal	-9.29	-2.54	-7.08	-0.99
Greece	-30.11	-20.93	-28.41	-19.67
Russia	0.28	-0.07	17.53	11.62
Hungary	-3.67	13.63	2.05	17.23
Czech Republic	-6.16	2.25	-3.08	2.61
Poland	-10.77	0.61	-5.92	2.88
Turkey	-40.54	-7.70	-18.65	8.29
<b>Asia</b>	<b>-12.28</b>	<b>5.94</b>	<b>-14.29</b>	<b>4.55</b>
Japan	-11.65	6.03	-16.09	4.67
China	-17.10	5.78	-19.03	3.73
South Korea	-18.36	3.36	-17.02	2.30
Taiwan	-7.30	7.53	-6.62	5.89
Hong Kong	-9.04	5.90	-11.17	3.84
India	-9.16	13.03	-3.11	13.33
Singapore	-7.18	3.31	-7.70	2.65
Thailand	-5.35	8.79	-7.78	6.28
Malaysia	-3.94	-1.38	-4.34	1.12
Indonesia	-5.54	7.85	-2.36	9.14
Philippines	-14.74	4.32	-12.41	5.63
Pakistan	-26.03	-1.85	-9.27	1.53
<b>Oceania</b>	<b>-9.90</b>	<b>3.18</b>	<b>-2.61</b>	<b>5.90</b>
Australia	-10.52	2.85	-3.05	5.60
New Zealand	3.27	11.43	6.81	13.62
<b>Latin America</b>	<b>-4.19</b>	<b>0.19</b>	<b>4.14</b>	<b>7.29</b>
Brazil	1.67	2.67	15.85	10.97
Mexico	-13.68	-5.75	-15.26	0.08
Chile	-17.53	2.61	-9.24	6.17
Colombia	-11.11	-7.83	-5.68	0.09
Peru	12.53	14.57	9.74	12.14
<b>Africa</b>	<b>-22.27</b>	<b>1.26</b>	<b>-12.36</b>	<b>5.94</b>
South Africa	-22.52	1.48	-12.20	5.82
Egypt	-11.89	-3.55	-13.46	13.78
<b>Middle East</b>	<b>5.93</b>	<b>3.09</b>	<b>7.03</b>	<b>2.01</b>
Israel	-3.89	0.81	0.88	0.13
Qatar <sup>1</sup>	33.76		30.42	
United Arab Emirates	-2.78	2.89	-5.18	0.70

<sup>1</sup> Qatar was introduced to the reference index on 19.09.2016.

**Table 24** Equity benchmark return by sector. Annualised. Percent

	The fund's currency basket		Local currency	
	2018	5-Year	2018	5-Year
<b>Financials</b>	<b>-12.32</b>	<b>4.36</b>	<b>-11.69</b>	<b>4.73</b>
Banks	-17.89	1.15	-16.66	2.04
Nonlife insurance	-2.13	8.92	-2.23	8.80
Life insurance	-16.01	4.26	-15.29	4.87
Real estate investment and services	-8.17	5.57	-8.50	5.18
Real estate investment trusts	-5.90	8.16	-5.92	7.69
Financial services	-7.92	8.14	-7.88	7.84
<b>Industrials</b>	<b>-14.73</b>	<b>4.63</b>	<b>-14.94</b>	<b>4.67</b>
Construction and materials	-18.08	3.80	-17.57	4.58
Aerospace and defense	-6.28	3.66	-6.31	3.89
General industrials	-17.65	0.66	-17.60	0.55
Electronic and electrical equipment	-17.54	6.04	-18.84	5.31
Industrial engineering	-21.27	3.55	-21.62	3.60
Industrial transportation	-13.81	5.48	-13.35	5.50
Support services	-3.25	8.49	-3.85	8.49
<b>Technology</b>	<b>-3.78</b>	<b>13.99</b>	<b>-5.16</b>	<b>12.48</b>
Software and computer services	-1.09	14.64	-2.46	13.14
Technology hardware and equipment	-6.87	13.24	-8.26	11.69
<b>Consumer goods</b>	<b>-11.73</b>	<b>5.63</b>	<b>-11.80</b>	<b>5.77</b>
Automobiles and parts	-22.18	0.78	-22.84	0.54
Beverages	-8.66	6.27	-7.80	7.39
Food producers	-7.11	5.60	-7.73	5.49
Household goods and home construction	-14.60	5.99	-14.63	6.15
Leisure goods	-18.86	11.44	-20.14	9.81
Personal goods	-2.48	7.51	-1.64	7.97
<b>Health care</b>	<b>2.67</b>	<b>9.48</b>	<b>2.12</b>	<b>9.03</b>
Health care equipment and services	6.27	15.24	5.25	14.11
Pharmaceuticals and biotechnology	1.30	7.56	0.96	7.31
<b>Consumer services</b>	<b>-4.89</b>	<b>6.47</b>	<b>-5.16</b>	<b>6.25</b>
Food and drug retailers	-5.67	1.31	-3.78	1.63
General retailers	-0.88	9.32	-2.10	8.72
Media	-7.50	4.63	-6.47	4.84
Travel and leisure	-7.22	7.43	-7.95	7.08
<b>Oil and gas</b>	<b>-8.92</b>	<b>-1.31</b>	<b>-7.16</b>	<b>-0.55</b>
Oil and gas producers	-6.43	0.46	-4.46	1.49
Oil equipment, services and distribution	-24.16	-11.10	-23.49	-11.54
Alternative energy	-6.86	0.60	-6.37	0.42
<b>Basic materials</b>	<b>-14.88</b>	<b>2.84</b>	<b>-13.36</b>	<b>3.61</b>
Chemicals	-15.37	4.42	-15.28	4.65
Forestry and paper	-14.90	8.55	-12.28	10.13
Industrial metals and mining	-22.61	-1.32	-20.34	-0.44
Mining	-7.27	0.22	-2.57	2.63
<b>Telecommunications</b>	<b>-8.94</b>	<b>0.99</b>	<b>-8.53</b>	<b>1.67</b>
Fixed line telecommunications	-6.14	2.23	-5.97	2.49
Mobile telecommunications	-11.90	-0.25	-11.28	0.86
<b>Utilities</b>	<b>1.37</b>	<b>6.69</b>	<b>2.47</b>	<b>7.18</b>
Electricity	4.50	8.90	5.12	8.88
Gas, water and multiutilities	-2.66	3.93	-0.98	5.06

**Table 25** Fixed-income benchmark return by region and currency. Annualised. Percent

	The fund's currency basket		Local currency	
	2018	5-Year	2018	5-Year
<b>North America</b>	<b>1.63</b>	<b>4.37</b>	<b>-0.31</b>	<b>2.54</b>
US dollar	2.07	4.73	-0.46	2.51
Canadian dollar	-4.25	-0.01	1.79	2.90
<b>Europe</b>	<b>-2.24</b>	<b>1.69</b>	<b>0.51</b>	<b>3.74</b>
Euro	-1.90	1.54	0.49	3.16
British pound	-3.86	2.78	-0.42	6.02
Swiss franc	1.77	2.39	0.40	2.29
Swedish krona	-4.08	-1.48	1.29	2.85
Danish krone	-0.51	1.90	2.15	3.53
Polish zloty	-0.48	1.95	4.93	4.26
Czech koruna	-4.15	1.20	-1.01	1.56
Russian ruble <sup>1</sup>	-13.15		2.06	
Hungarian forint <sup>2</sup>	-6.29		-0.72	
<b>Asia</b>	<b>5.61</b>	<b>3.78</b>	<b>2.16</b>	<b>2.62</b>
Japanese yen	6.27	3.29	0.93	1.97
South Korean won	4.36	5.26	6.07	4.17
Hong Kong dollar	3.75	3.34	1.33	1.34
Singapore dollar	3.14	3.47	2.58	2.83
Thai baht	4.05	7.34	1.38	4.87
Malaysian ringgit	4.44	1.60	4.01	4.17
<b>Oceania</b>	<b>-2.55</b>	<b>2.36</b>	<b>4.97</b>	<b>5.00</b>
Australian dollar	-3.14	2.15	4.94	4.88
New Zealand dollar	1.69	3.77	5.18	5.81
<b>Latin America</b>	<b>3.89</b>	<b>-1.63</b>	<b>2.55</b>	<b>4.42</b>
Mexican peso	4.40	-1.66	2.48	4.43
Chilean peso	-5.90	1.46	3.56	4.98
<b>Africa</b>		<b>1.41</b>		<b>5.08</b>
South African rand <sup>3</sup>		1.41		5.08
<b>Middle East</b>	<b>-6.33</b>	<b>4.05</b>	<b>-1.68</b>	<b>3.35</b>
Israeli shekel	-6.33	4.05	-1.68	3.35

<sup>1</sup> Russian ruble was introduced to the reference index on 1 April 2014.

<sup>2</sup> Hungarian forint was introduced to the reference index on 3 April 2017.

<sup>3</sup> South African rand was removed from the reference index on 30 November 2017

**Table 26** Fixed-income benchmark return by sector. Annualised. Percent

	The fund's currency basket		Local currency	
	2018	5-Year	2018	5-Year
<b>Government (including supranationals)</b>	<b>1.35</b>	<b>2.96</b>	<b>1.29</b>	<b>3.13</b>
Treasuries	1.68	2.96	1.52	3.13
Inflation-linked bonds	-1.11	3.19	-0.68	3.36
Supranational	0.13	2.35	1.06	2.66
<b>Corporate (including covered bonds)</b>	<b>-1.27</b>	<b>3.48</b>	<b>-1.54</b>	<b>3.14</b>
Financials	-0.92	3.68	-1.38	3.20
Industrials	-1.16	4.26	-2.03	3.25
Utilities	-2.89	4.15	-2.75	4.04
Covered	-1.79	0.66	0.38	2.17

# Relative return

The return on the fund was 30 basis points lower than the return on the reference index in 2018. Since the fund's inception, the annualised return on the fund has been 25 basis points higher than that on the reference index.

Investment returns on all of the fund's investments, including real estate, are measured against the fund's reference index, which comprises an equity index based on FTSE Group's Global All Cap stock index and a bond index based on various bond indices from Bloomberg Barclays Indices.

When we buy real estate, we sell bonds and equities in the same currency to limit active currency risk. The relative return on real estate management is the difference between the return on the fund's unlisted and listed real estate investments and the return on the bonds and equities sold to buy them. Similarly, we report the relative return on equity and bond investments against benchmark indices that are adjusted for the funding of the fund's unlisted and listed real estate investments.

**Table 27** Relative return. Percentage points

	2018
<b>Fund</b>	<b>-0.30</b>
Equity investments	-0.69
Equity management	-0.69
Fixed-income investments	0.00
Fixed-income management	-0.01

The return on the fund was 30 basis points lower than the return on the reference index in 2018. Since inception, the annualised return on the fund has been 25 basis points higher than that on the reference index.

The fund has outperformed its reference index in 16 out of 21 years since 1 January 1998, equity management in 15 out of 20 years, and fixed-income management in 15 out of 21 years.

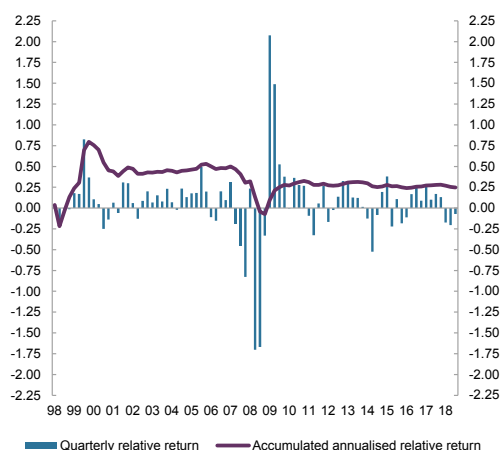
Equity management had a relative return of -69 basis points in 2018, measured against its actual funding. Since 1 January 1999, the annualised relative return for equity management has been 44 basis points. The relative return on fixed-income management was -1 basis point in 2018, measured against its funding, and has been 14 basis points, on an annualised basis, since 1 January 1998.

Since 2017, all real estate investments have been included in the fund's relative return. Real estate management, composed of both unlisted and listed real estate investments, returned 2.8 percent in 2018. The return on the equities and bonds sold to finance these real estate investments was -2.7 percent. The relative return for the fund's real estate management was therefore 5.5 percentage points.

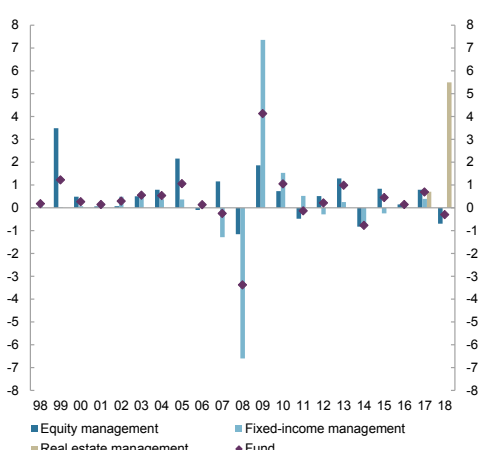
**The use of benchmarks**

Investment strategies and mandates are measured relative to performance benchmarks. This section provides an overview of the use of benchmarks in Norges Bank Investment Management, with an emphasis on the link between the benchmark from the Ministry of Finance, the internal reference portfolio, funding and performance benchmarks for particular investment mandates, and how they all fit together to produce the final investment portfolio.

**Chart 12** The fund's quarterly and accumulated annualised relative return. Percentage points



**Chart 13** Annual relative return on the fund's asset management. Percentage points



While the total return on the fund is largely determined by the Ministry of Finance benchmark, the internal reference portfolio is tailored to better fit the characteristics of the fund by improving geographical diversification, gaining exposure to additional sources of systematic risk, reducing turnover and funding the real estate portfolios. The reference portfolio is rule-based and serves as a starting point for the management of the fund. The rules governing the reference portfolio are based on a trade-off between ensuring appropriate aggregate exposures and keeping the complexity low. Implementing the reference portfolio in a strictly mechanical manner could result in excessively high transaction costs or undesirable exposures relative to the Ministry of Finance benchmark.

In addition to the internal reference portfolio, we use funding benchmarks and performance benchmarks to implement the fund's investment strategies. These two types of benchmarks serve different purposes in implementing and measuring the fund's investment strategies.

We need to sell assets to finance a given investment mandate, and funding benchmarks are used to express which assets we sell. The combination of funding assets is tailored to each

investment mandate in order to maintain the fund's overall sector or country exposures. As a result, the mix of assets we sell does not necessarily match the assets in the performance benchmark.

The mandates within security selection are highly specialised within a certain sector or market, and we therefore use tailored performance benchmarks to measure the relative performance of any given investment mandate. Performance benchmarks are designed to match the scope of each particular investment mandate in order to accurately measure the relative performance.

The asset management strategy implements the reference portfolio and manages the funding of mandates under the security selection investment strategy. The asset management performance is measured relative to the reference portfolio after the funding of security selection.

In combination, this means that security selection is measured against performance benchmarks, while asset management is measured against the reference portfolio after eliminating the effect of the corresponding funding benchmarks.



**Table 28** Return on real estate investments in 2018. Measured in the fund's currency basket. Percent

	2018
Return on unlisted real estate investments	7.5
Return on listed real estate investments	-10.3
Return on real estate management	2.8
Funding benchmark for real estate management	-2.7

**Table 29** Relative return on the fund's asset management. Measured in the fund's currency basket. Percentage points

	Fund <sup>1</sup>	Equity management	Fixed-income management	Real estate management
2018 <sup>2</sup>	-0.30	-0.69	-0.01	5.49
2017 <sup>2</sup>	0.70	0.79	0.39	0.70
2016	0.15	0.15	0.16	
2015	0.45	0.83	-0.24	
2014	-0.77	-0.82	-0.70	
2013	0.99	1.28	0.25	
2012	0.21	0.52	-0.29	
2011	-0.13	-0.48	0.52	
2010	1.06	0.73	1.53	
2009	4.13	1.86	7.36	
2008	-3.37	-1.15	-6.60	
2007	-0.24	1.15	-1.29	
2006	0.14	-0.09	0.25	
2005	1.06	2.16	0.36	
2004	0.54	0.79	0.37	
2003	0.55	0.51	0.48	
2002	0.30	0.07	0.49	
2001	0.15	0.06	0.08	
2000	0.27	0.49	0.07	
1999	1.23	3.49	0.01	
1998	0.18		0.21	

<sup>1</sup> Includes real estate management from 01.01.2017. Relative return prior to 2017 is calculated on equity and fixed-income management only.

<sup>2</sup> Measured against actual funding.

The fund's allocation to real estate is funded with a combination of equity and fixed income, which is tailored to the specific real estate investments. We adjust the funding to currency and market risk. The reference portfolio, as the starting point for our equity and fixed-income investments, reflects these funding adjustments. This allows accurate measurement of the relative return contributions from all other investment strategies.

This layered benchmark structure ensures that the relative performance of fund allocation, security selection and asset management combined equals the investment portfolio performance relative to the Ministry of Finance benchmark.



**Table 30** Relative return. Measured in the fund's currency basket. Annualised

	Since inception	Last 10 years	Last 5 years	2018
Return on fund (percent) <sup>1</sup>	5.47	8.33	4.73	-6.12
Return on fund benchmark (percent) <sup>1</sup>	5.22	7.74	4.70	-5.82
<b>Relative return on fund (percentage points)<sup>1</sup></b>	<b>0.25</b>	<b>0.58</b>	<b>0.03</b>	<b>-0.30</b>
Return on equity management (percent) <sup>2</sup>	5.31	10.54	5.67	-9.49
Return on equity benchmark (percent) <sup>2</sup>	4.87	10.21	5.65	-8.80
<b>Relative return on equity management (percentage points)<sup>2</sup></b>	<b>0.44</b>	<b>0.34</b>	<b>0.02</b>	<b>-0.69</b>
Return on fixed-income management (percent)	4.56	4.52	3.05	0.56
Return on fixed-income benchmark (percent)	4.41	3.65	3.13	0.57
<b>Relative return on fixed-income management (percentage points)</b>	<b>0.14</b>	<b>0.87</b>	<b>-0.08</b>	<b>-0.01</b>

<sup>1</sup> Includes real estate management from 01.01.2017. Relative return prior to 2017 is calculated on the equity and fixed-income management only.

<sup>2</sup> Equity management since 01.01.1999.

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**Table 31** Relative return, 5-year buckets. Measured in the fund's currency basket. Annualised

	1998–2002	2003–2007	2008–2012	2013–2017
Return on fund (percent) <sup>1</sup>	3.19	8.92	3.15	9.25
Return on fund benchmark (percent) <sup>1</sup>	2.78	8.52	3.14	8.96
<b>Relative return on fund (percentage points)<sup>1</sup></b>	<b>0.41</b>	<b>0.40</b>	<b>0.01</b>	<b>0.29</b>
Return on equity management (percent) <sup>2</sup>	-4.85	16.28	-0.59	12.95
Return on equity benchmark (percent) <sup>2</sup>	-5.63	15.37	-0.59	12.52
<b>Relative return on equity management (percentage points)<sup>2</sup></b>	<b>0.78</b>	<b>0.90</b>	<b>0.01</b>	<b>0.42</b>
Return on fixed-income management (percent)	6.26	4.00	5.87	2.96
Return on fixed-income benchmark (percent)	6.09	3.97	5.44	2.98
<b>Relative return on fixed-income management (percentage points)</b>	<b>0.17</b>	<b>0.03</b>	<b>0.43</b>	<b>-0.02</b>

<sup>1</sup> Includes real estate management from 01.01.2017. Relative return prior to 2017 is calculated on the equity and fixed-income management only.

<sup>2</sup> Equity management since 01.01.1999.

### Investment strategies 2013–2018

The fund's annualised relative return of 18 basis points over the last six years can be divided into contributions from the main investment strategies employed for the management of the fund, as well as asset classes. Fund allocation strategies have contributed -10 basis points, security selection strategies 10 basis points and asset management strategies 18 basis points to the annualised relative return for the fund as a whole over the last six years.

### Fund allocation

Fund allocation aims to improve the fund's exposure to broad markets and sources of return. The three strategies it employs to achieve this are the internal reference portfolio, the real estate strategy and allocation decisions. Fund allocation made a negative contribution of 10 basis points to the fund's relative return in the six-year period 2013–2018.

### Internal reference portfolio

Through a series of adjustments to publicly available equity and fixed-income indices, the reference portfolio is adjusted to better fit the characteristics of the fund. The reference portfolio aims to expand the universe of investments, gain and manage exposures to systematic factors, incorporate requirements in the management mandate and implement adjustments to the investment universe, all in a cost-efficient manner. The internal reference portfolio made a negative contribution of 11 basis points to the fund's relative return in the period 2013–2018. Adjustments to the fixed-income reference index contributed -9 basis

points to the fund's relative return, while equity index adjustments contributed -1 basis point.

### Real estate

Following the amendment of the management mandate from the Ministry of Finance with effect from January 2017, the fund's real estate investments are measured against the fund's reference index of global equity and bond indices. In the operational implementation of the fund's real estate strategy, the fund's unlisted and listed real estate investments are measured against internal funding benchmarks that consist of tailored equity and bond holdings in the same currency as the real estate investments.

The real estate investment strategy contributed 4 basis points to the fund's relative return over the period 2013–2018. Unlisted real estate investments contributed 5 basis points, and listed real estate investments -1 basis point.

### Allocation decisions

Allocation decisions are made to balance transaction costs and expected risk and return when rebalancing the portfolio back to the strategic exposures. Within emerging markets, allocation decisions are made to refine the reference portfolio to avoid high transaction costs, manage risk and capture a changing opportunity set. This entails allocation to frontier markets and emerging-market debt, as well as the use of tailored benchmarks for external managers.

Overall, allocation decisions contributed -3 basis points to the fund's relative return in 2013–2018.

A more detailed review of the factor adjustments made can be found in chapter 1.3 Reference portfolio.

Cross-asset allocation decisions made a positive contribution of 2 basis points, and equity-related decisions -5 basis points. In 2018, the fund lost on the long-held strategic overweight in Chinese equities, country allocation and the use of tailored benchmarks for external managers in emerging markets. Fixed income-related decisions on aggregate have had a negligible impact.

#### Security selection

Security selection strategies seek to generate excess return over carefully designed benchmarks and include both internal and external selection strategies. Together, security selection strategies have contributed 10 basis points to the fund's annualised relative return since 2013.

#### Internal security selection

The main activity within internal security selection is to identify and invest in companies expected to generate better long-term investment returns than their competitors.

The internal security selection strategy has contributed negligibly to the fund's relative return over the last six years. The equity portfolios within internal security selection have had an immaterial impact on the fund's annualised relative return, while the fixed-income portfolios have contributed 1 basis point.

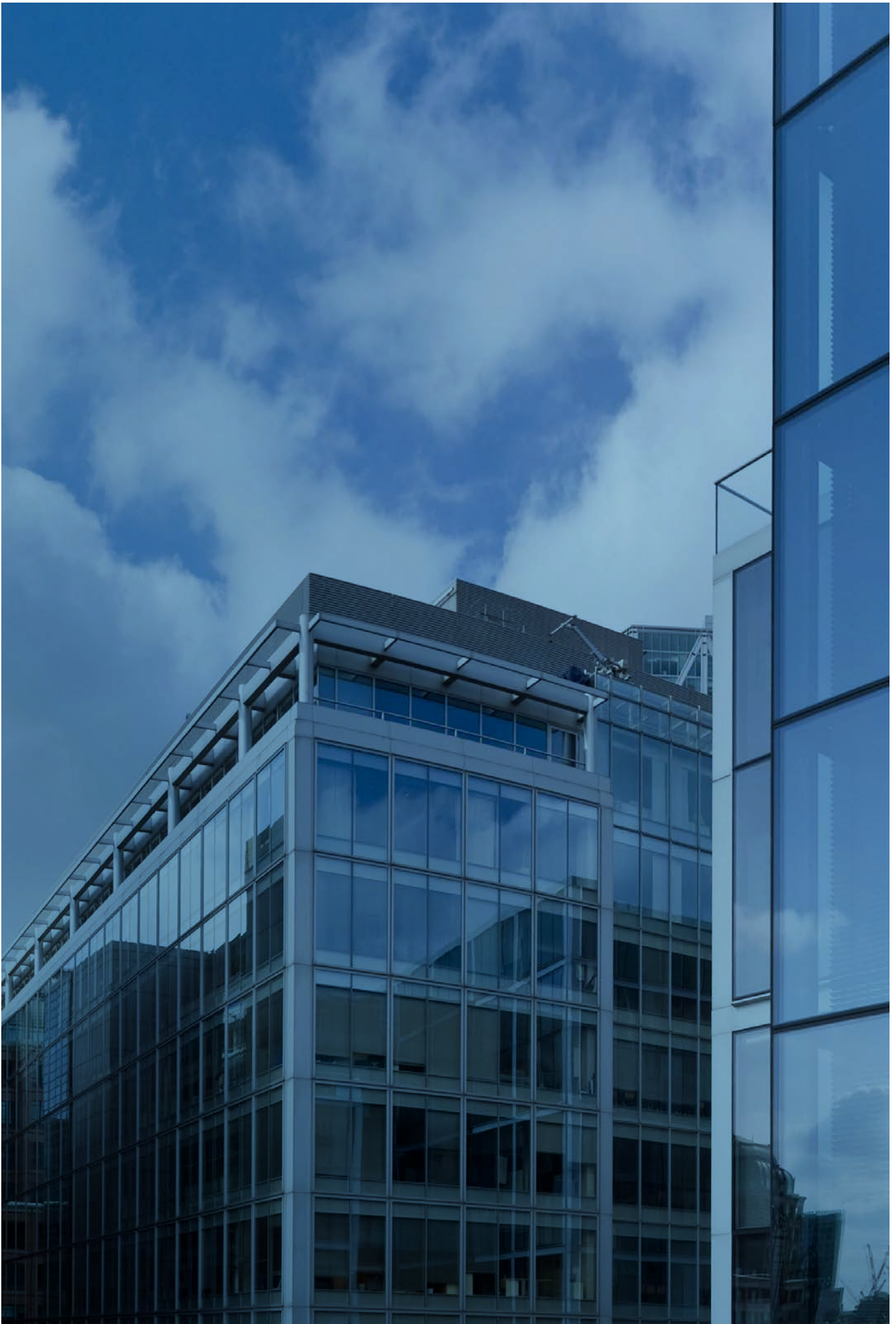
The fund's investments within industry sectors change as a result of internal security selection. The overall impact of such changes to the fund's equity investments has made negligible contribution to the fund's relative return in the

period 2013–2018. The single largest positive impact came from changing investments in the basic resources sector, which contributed 1 basis point to the fund's relative return. Insurance, financial services and utilities also contributed 1 basis point per year, while retail made a negative contribution of 2 basis points per year.

Although the main activity is to change the fund's investments within sectors, internal security selection also has an impact on its investments across sectors. An increase in the fund's equity investments in financial services contributed 1 basis point to the fund's annual relative return during the period, as financial services outperformed the market. Underweights in health care and technology each contributed -1 basis point. Overall, changes to the composition of the fund's equity investments across sectors had a negative impact of 1 basis point per year on the fund's relative return.

As regards the impact of changing the fund's equity investments within countries, the single largest impact came from investments in Germany, which contributed 1 basis point to the fund's relative return. The contribution from changing the fund's investments in Switzerland contributed -2 basis points. The combined impact on the fund's relative return from changing the geographical distribution across regions was immaterial.

The fixed-income portfolios within internal security selection invest in corporate bonds. The contribution to the fund's relative return over the last six years has been 1 basis point.



### External security selection

Norges Bank Investment Management utilises external equity managers with expertise in markets and segments where it is not expedient to build internal expertise, and where local knowledge is important to understand the inherent environmental, social and governance risks. Local equity managers invest in specific countries in emerging and frontier markets, and small capitalisation companies in selected countries in developed markets. Previous mandates for environment-related investments were ended in 2018. On average, 4.3 percent of the fund was managed by external equity managers in the period.

The external security selection strategy has contributed 10 basis points to the fund's annualised relative return over the last six years. Each of the mandates in emerging markets and small capitalisation developed markets is measured against a broad benchmark within its respective country or a benchmark having a market capitalisation composition corresponding to the mandate objective. Both the small capitalisation developed market mandates and the mandates for emerging and frontier markets have contributed positively to the relative return. Within emerging-market mandates, all regions have contributed positively to the relative return, with Asia contributing the most.

### Asset management

Asset management encompasses a broad range of systematic strategies for both equities and fixed income. In the period 2013–2018, the asset management strategy contributed 18 basis points to the fund's annualised relative return.

### Asset positioning

Asset positioning implements the targeted market exposures with the aim of enhancing investment returns and lowering transaction costs for the fund. Over the last six years, asset positioning has contributed 14 basis points to the fund's annualised relative return.

The investment strategy's equity investments have contributed 6 basis points over the six-year period. Of this, integrated market exposure and relative market strategies have accounted for 5 basis points. European equities have contributed the most, followed by Asian equities. Broken into market segments, the largest contribution has come from large-capitalisation companies in developed markets, followed by emerging market companies and developed small capitalisation companies.

Asset positioning's fixed-income investments have contributed 7 basis points. Strategies pursued are tactical macro positions in areas like duration, curvature, inflation break-even and country exposure, and mean reversion positions across instruments, sectors and issuers. In addition, there are positions related to transition activity in order to reduce transaction costs.

Investments in government, government-related and covered bonds in developed markets have contributed 4 basis points. European bonds have made the largest contribution of 2 basis points, while North American bonds have contributed 1 basis point. Investments in corporate bonds have contributed 4 basis points to the fund's relative return.

The contribution from fixed income has been driven by strategies focusing on variation in issuer and sector spread curves, as well as new-issue premiums. Investments in emerging-market bonds were part of the asset management strategy until the end of 2016, and have contributed 1 basis point to the fund's relative return measured over the last six years. Balanced duration positions across countries have contributed most.

#### Systematic factors

In addition to the risk factors inherent in the reference portfolios, the asset management strategy has been positioned towards systematic factors. In 2018, this exposure was singled out in a separate strategy, and in the first ten months comprised the main part of the total exposure of the fund to risk factors, namely its full exposure to value- and quality-related factors. The strategy's exposure contributed -8 basis points to the fund's relative return in 2018, which corresponds to an annualised contribution of -2 basis points over the six-year period. Positioning towards value was the biggest detractor to performance in 2018.

The fund has facilitated exposure towards systematic risk factors through dedicated exposures from within the asset management strategy, as well as through factors in the reference portfolio construction. In total these exposures have made a marginally positive contribution over the last six years, with positioning towards high-quality stocks contributing the most at 3 basis points.

#### Securities lending

Securities lending is an integrated part of our asset management strategies and plays an important role in well-functioning markets by increasing liquidity and contributing to more efficient price discovery. We use both direct internal lending and external agency lending through our custodian Citibank. The fund's securities lending activities contributed 6 basis points to the fund's relative return over the period 2013–2018. Lending of equity investments contributed 5 basis points during the period. The Asia and Oceania region accounted for 44 percent of revenues from equity lending, while the Americas and Europe contributed 27 and 29 percent respectively. To counter the diminishing returns to equity lending due to reduced demand from an underperforming hedge fund industry and incremental supply from an increasingly consolidated asset management industry, Norges Bank Investment Management increased its fixed-income lending by structuring balance sheet-efficient funding trades with its counterparties. As a result, fixed-income lending contributed 1 basis point to the fund's return over the six-year period.



**Table 32** Contributions to fund relative return from investment strategies in 2018. Percentage points

	Equity management	Fixed-income management	Real estate management	Allocation	Total
Fund allocation	-0.32	-0.10	0.19	-0.01	-0.24
Reference portfolio	-0.12	-0.10			-0.22
of which systematic factors	-0.05				-0.05
Allocations	-0.20	-0.01	0.00	-0.01	-0.21
Real estate			0.19		0.19
Unlisted real estate			0.24		0.24
Listed real estate			-0.05		-0.05
Security selection	-0.10	0.06			-0.04
Internal security selection	-0.14	0.06			-0.09
External security selection	0.05				0.05
Asset management	-0.06	0.04			-0.01
Asset positioning	-0.02	0.02			0.01
Systematic factors	-0.09	0.01			-0.08
Securities lending	0.04	0.02			0.06
<b>Total</b>	<b>-0.47</b>	<b>0.00</b>	<b>0.19</b>	<b>-0.01</b>	<b>-0.30</b>

**Table 33** Contributions to fund relative return from investment strategies for 2013–2018. Annualised. Percentage points

	Equity management	Fixed-income management	Real estate management	Allocation	Total
Fund allocation	-0.07	-0.10	0.04	0.02	-0.10
Reference portfolio	-0.01	-0.09		0.00	-0.11
of which systematic factors	0.01				0.01
Allocations	-0.05	0.00	0.00	0.02	-0.03
Real estate			0.04		0.04
Unlisted real estate			0.05		0.05
Listed real estate			-0.01		-0.01
Security selection	0.10	0.01			0.10
Internal security selection	0.00	0.01			0.00
External security selection	0.10				0.10
Asset management	0.10	0.08		0.01	0.18
Asset positioning	0.06	0.07		0.01	0.14
Systematic factors <sup>1</sup>	-0.02	0.00			-0.02
Securities lending	0.05	0.01			0.06
<b>Total</b>	<b>0.13</b>	<b>-0.01</b>	<b>0.04</b>	<b>0.03</b>	<b>0.18</b>

<sup>1</sup> Systematic factors as a sub-strategy of Asset management was added in 2018.

# Return and costs

**Norges Bank maintains a high level of cost awareness in the management of the fund. Total management costs as a share of assets under management have been relatively stable over recent years, despite the build-up of a portfolio of unlisted real estate investments and an increased equity share.**

## Management costs by strategy

We pursue a variety of investment strategies in our management of the fund. These strategies complement and influence one another, and there are cost synergies between the strategies. For example, costs related to a specific system or data feed might be utilised in multiple strategies.

We allocate costs to the different strategies based on actual costs or by using allocation keys such as number of employees or volume. Salary and other personnel costs, research and costs related to external specialist expertise are allocated to the relevant strategy based on actual costs. Costs related to office premises and IT infrastructure are allocated to the relevant strategy based on number of employees. Specific system costs are allocated to each strategy based on usage.

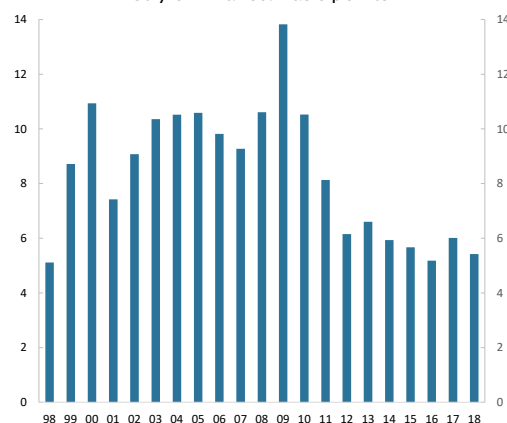
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The overall goal is to achieve the highest possible return after costs and to manage the fund in a cost-efficient manner.

The complexity of the assignment has increased, with investments in additional markets and currencies and increased expectations and requirements related to responsible investment and reporting.

The Ministry of Finance has delegated responsibility for the management of the fund to Norges Bank. The Ministry reimburses Norges Bank for costs incurred in the management of the fund in the form of a management fee. Costs are reimbursed up to an upper limit which is set annually. Performance-based fees to external managers are reimbursed in addition to this limit. Management costs are also incurred by subsidiaries of Norges Bank that have been established as part of the fund's investments in unlisted real estate. These costs are also measured against the upper limit, but they are not reimbursed through the management fee, since they are expensed directly in the investment portfolio.

**Chart 14** Total management costs versus total market value of fund. Costs reimbursed by the Ministry of Finance. Basis points



**Table 34** Management costs per investment strategy in 2018. Costs as reimbursed by the Ministry of Finance. Basis points

	Contribution to the fund's management costs	Management costs based on assets under management
Fund allocation	0.9	
of which unlisted real estate	0.5	19.4
Security selection	2.4	12.5
Internal security selection	0.7	4.5
External security selection <sup>1</sup>	1.8	39.8
Asset management	2.1	2.9
<b>Total</b>	<b>5.4</b>	

<sup>1</sup> Includes all externally managed capital.

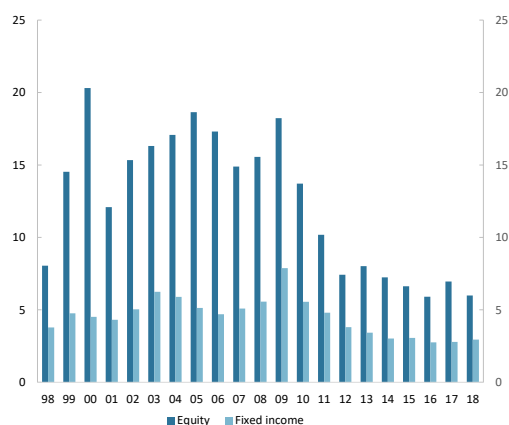
**Table 35** Management costs per investment strategy 2013–2018. Costs as reimbursed by the Ministry of Finance. Basis points

	Contribution to the fund's management costs	Management costs based on assets under management
Fund allocation	0.4	
Security selection	2.7	16.6
Internal security selection	0.7	6.0
External security selection <sup>1</sup>	1.9	46.4
Asset management	2.3	2.9
Unlisted real estate <sup>2</sup>	0.5	24.3
<b>Total</b>	<b>5.8</b>	

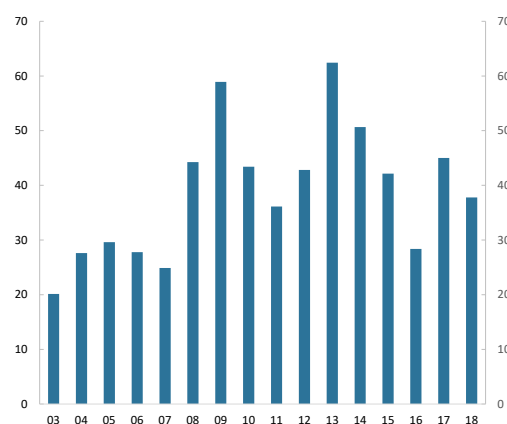
<sup>1</sup> Includes all externally managed capital.

<sup>2</sup> Unlisted real estate is part of the fund allocation strategy from 2017.

**Chart 15** Management costs per asset class. Costs reimbursed by the Ministry of Finance. Basis points



**Chart 16** Fees to external equity managers. Basis points



Custody costs consist of safekeeping and transaction costs. Safekeeping costs are allocated to asset management, while transaction costs are split between the relevant strategies based on transaction volumes. Costs related to ownership strategies are allocated to internal security selection.

#### **Cost-adjusted relative return**

The fund's relative return after management costs can be compared with the investment performance that could theoretically be expected to be achieved with a passive index management strategy.

A passive investment strategy would aim at replicating a benchmark following set rules. The estimated relative return of a passive strategy is dependent on various estimated cost components. The return is adjusted for the management costs of a passive strategy, revenues from securities lending, transaction costs related to replication of the reference index, and transaction costs related to inflows and extraordinary benchmark changes.

#### **Management costs of a passive strategy**

The estimated management costs of a passive management strategy are based on the fund's actual management costs for each year, less costs related to both internal and external active management strategies.

#### **Revenues from securities lending**

Unlike a theoretical index, but similar to an actively managed portfolio, a passive index portfolio would also be expected to generate income from securities-lending activities. In this analysis, actual revenues from securities lending have been used, consistent with the financial reporting for the fund.

#### **Transaction costs related to replication of the reference index**

Changes in the equity and bond indices, such as company inclusions and periodic index reweightings, would trigger transactions in the portfolio and subsequent costs. These index replication costs are estimates based on models and not on realised costs, and are therefore uncertain.

#### **Transaction costs related to inflows and extraordinary benchmark changes**

These costs are estimated costs related to the phasing-in of new capital into the fund, costs related to the set rules for rebalancing the asset allocation in the benchmark, and transition costs related to rule changes for the benchmark. The broad benchmark indices for equity and fixed-income investments set by the Ministry of Finance are used as the underlying indices. The costs related to inflows, rebalancing and index transition costs are estimates based on standard market assumptions about trading costs and not actual realised costs, and are therefore uncertain.

The estimated relative return of a passive strategy since inception is -7 basis points. Comparing the fund's relative return after management costs with the estimated relative return of a passive strategy, the estimated relative return difference since inception is 23 basis points. Measured over the last five years, the estimated difference is -2 basis points.

**Table 36** The fund's relative return after management costs. Annualised. Basis points

	5 years	Since inception
The fund's relative return before management costs	3	25
The fund's management costs <sup>1</sup>	-5	-8
<b>The fund's relative return after management costs</b>	<b>-2</b>	<b>16</b>

<sup>1</sup> The fund's management costs is excluding costs related to unlisted real estate prior to 2017.

**Table 37** Estimated relative return of a passive strategy. Annualised. Basis points

	5 years	Since inception
Management costs of a passive strategy	-3	-5
Revenues from securities lending	6	6
Transaction costs related to replication of the benchmark index	-2	-4
Transaction costs related to inflows and extraordinary benchmark changes	-1	-5
<b>Estimated relative return of a passive strategy</b>	<b>0</b>	<b>-7</b>

**Table 38** Cost-adjusted relative return comparison. Annualised. Basis points

	5 years	Since inception
The fund's relative return after management costs	-2	16
Estimated relative return of a passive strategy	0	-7
<b>Estimated relative return difference</b>	<b>-2</b>	<b>23</b>



3

Risk

# Risk

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**The fund's risk is primarily driven by its asset allocation. The expected volatility of the fund was 8.6 percent at the end of 2018.**

Market risk is defined as the risk of a decrease in the market value of the portfolio as a result of changes in financial market variables such as equity prices, exchange rates, interest rates, credit spreads and real estate prices. As no single measure or analysis can fully capture the fund's overall market risk, Norges Bank Investment Management uses a variety of measures and analyses. The fund's market risk is measured along different dimensions, including absolute exposure, volatility and correlation risk, systematic factor risk and liquidity risk.

## **Asset class allocation**

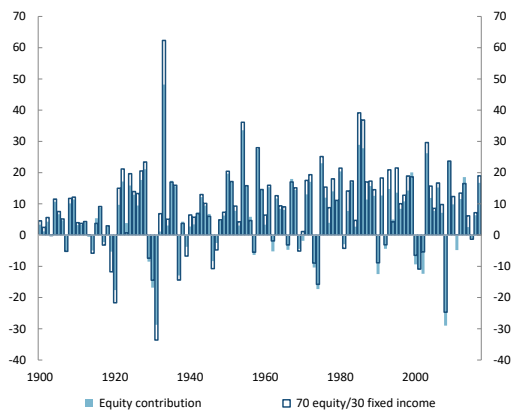
The strategic reference index in the management mandate laid down by the Ministry of Finance largely dictates the fund's asset class allocation, which is the main driver of the fund's overall risk. This can be demonstrated by plotting the returns of a hypothetical portfolio made up of a fixed allocation of 70 percent equities and 30 percent fixed income. The data set is measured in US dollars and goes back to 1900, giving more than 100 annual asset class returns. Across this sample, the maximum loss on the portfolio in a single year has been around 34 percent. The analysis shows that the majority of the return fluctuations in the portfolio have been driven by equity returns. If the returns are viewed over periods of three, five and ten years, a large majority of these periods have had positive returns. However, this asset allocation also results in three-, five- and ten-year periods with negative returns.

## **Absolute equity exposure**

The management mandate requires the fund's equity portfolio to make up 50-80 percent of the total investment portfolio. From 2007 to 2009, the fund's equity exposure increased gradually from 40 to 60 percent, mirroring the increase in the equity allocation in the strategic reference index. The Ministry of Finance has established a plan to increase the strategic equity share to 70 percent. The actual equity exposure at the end of 2018 was 66.2 percent.

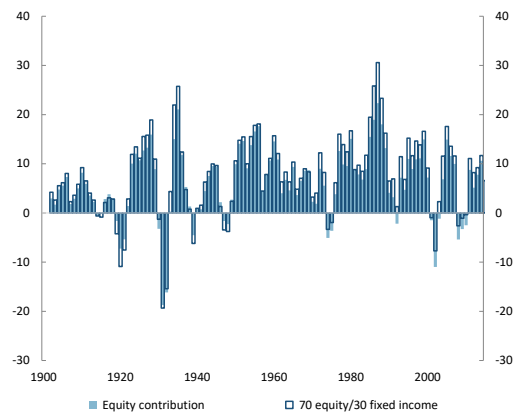


**Chart 17** Annual return of 70 equity/30 fixed income. Measured in dollars. Percent



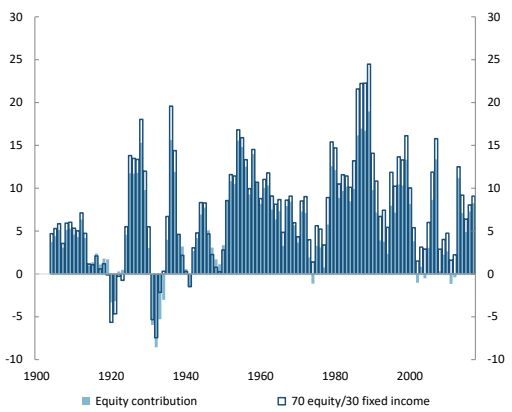
Source: Dimson-Marsh-Staunton Global Return Data

**Chart 18** Annualised 3-year rolling return of 70 equity/30 fixed income. Measured in dollars. Percent



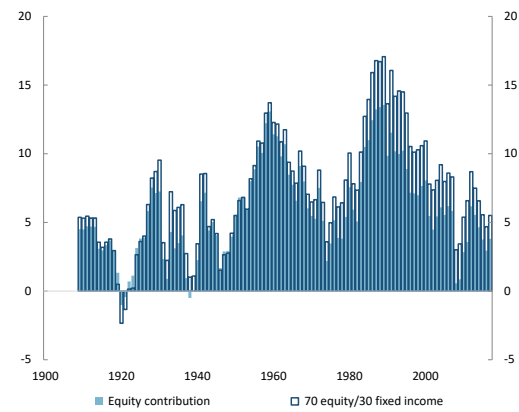
Source: Dimson-Marsh-Staunton Global Return Data

**Chart 19** Annualised 5-year rolling return of 70 equity/30 fixed income. Measured in dollars. Percent



Source: Dimson-Marsh-Staunton Global Return Data

**Chart 20** Annualised 10-year rolling return of 70 equity/30 fixed income. Measured in dollars. Percent

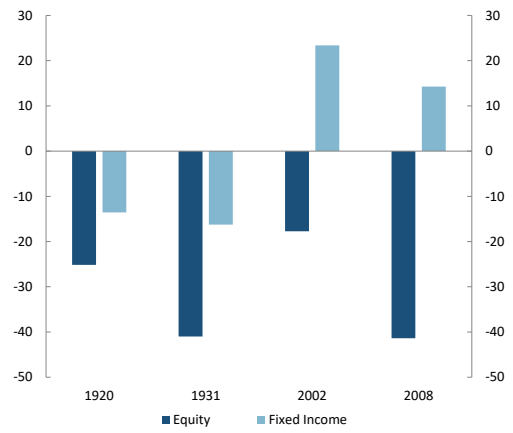


Source: Dimson-Marsh-Staunton Global Return Data

**Chart 21** The fund's absolute equity exposure. Percent

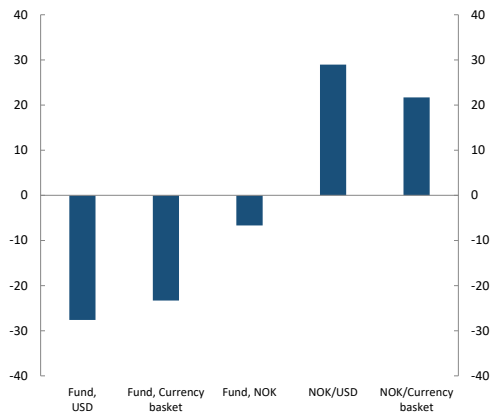


**Chart 22** Asset class returns in recent and past stressed years. Measured in dollars. Percent

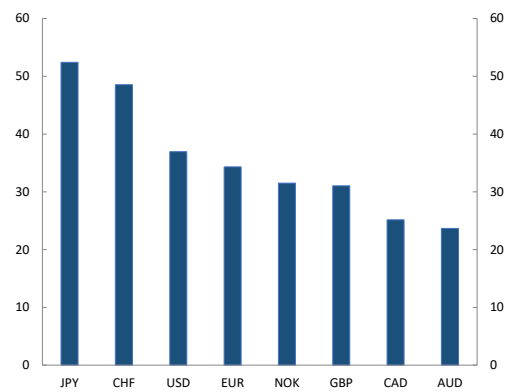


Source: Dimson-Marsh-Staunton Global Return Data

**Chart 23** Fund performance in 2008. Percent



**Chart 24** Expected shortfall of a 70 equity/30 fixed-income benchmark. Percent



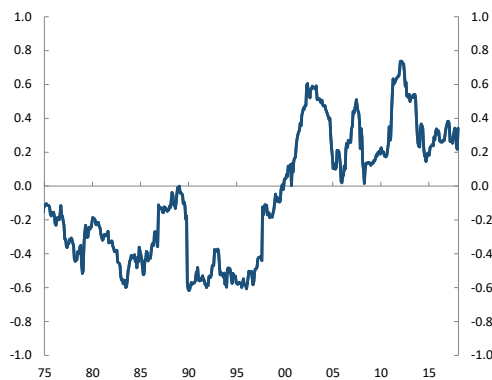
**Asset class correlations**

In addition to asset class weights, the fund's total risk is determined by how the individual asset classes co-move over time, which can be expressed through their correlation coefficients. A high correlation leads to low diversification gains and vice versa. Historically, these correlations have changed and even switched sign. As an example, over the last 20 years, movements in equity prices have been positively correlated with movements in bond yields, leading to a negative correlation between equity and bond returns. For several decades before that, however, the correlation between bond and equity returns was positive. In addition to local equity and bond returns, the fund's value measured in Norwegian kroner fluctuates further due to exchange rate changes. The most recent crisis saw a strong negative relationship

between Norwegian krone and equity markets, whereas historically their correlation has shifted between positive and negative.

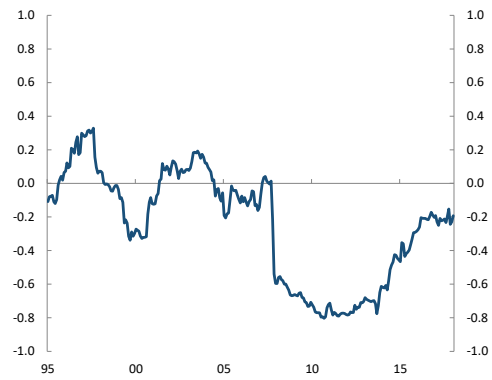
Looking at two of the recent crises – the dot-com crash and the global financial crisis – government bonds performed well, acting as a buffer to equity drawdowns. Historically, bonds have not always provided such diversification benefits. One example is the Great Depression of the 1930s, arguably the last financial crisis comparable in severity to the most recent one in 2008. In 1931, when equity markets lost more than 40 percent, bonds also lost 16 percent. In 2008, the positive returns on government bonds were accompanied by a positive contribution from movements in the Norwegian krone exchange rate. In that year, the krone depreciated, leading to better performance

**Chart 25** 36-month correlation of 10-year US yield changes vs. S&P 500 price returns



Source: Bloomberg

**Chart 26** 36-month correlation of NOK/USD percent changes vs. S&P 500 price returns



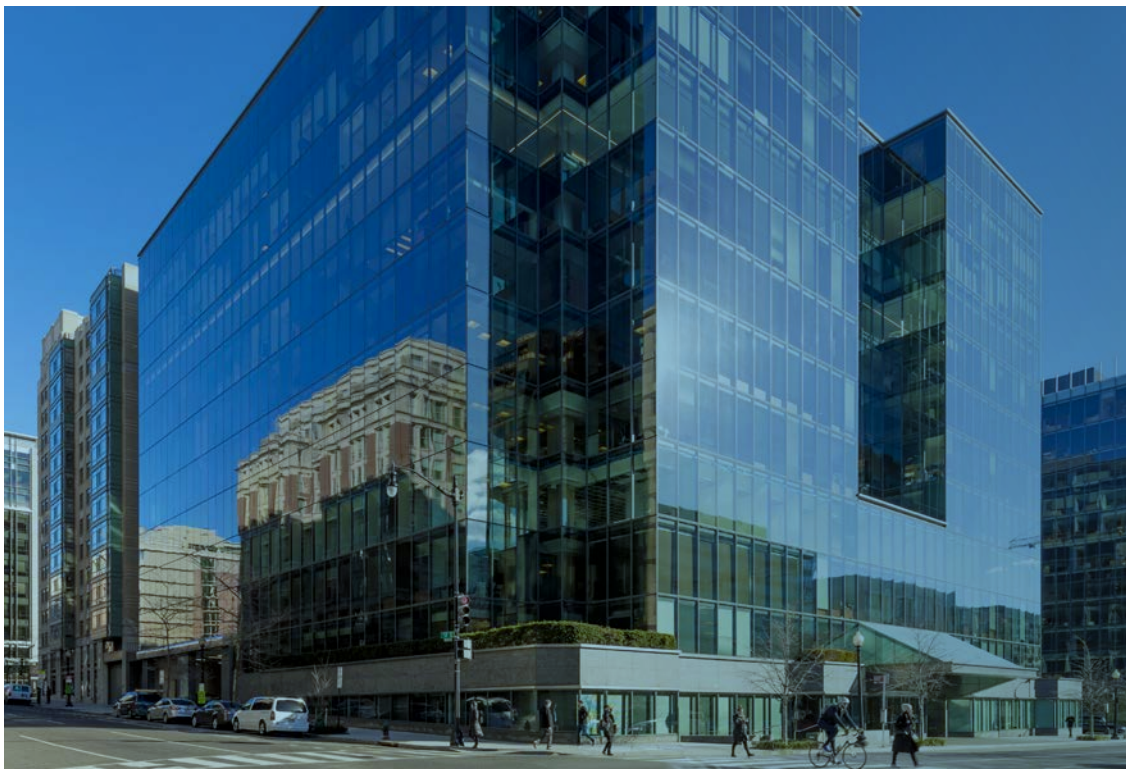
Source: Bloomberg

measured in krone than in US dollars or the fund's currency basket. Future crises could be different.

To illustrate the effect of different exchange rate correlation regimes, we can consider the variation in expected shortfall of an international 70 percent equity, 30 percent fixed-income benchmark, when measuring the returns in seven of the most traded currencies: US dollars, euros, Japanese yen, British pounds, Swiss francs, Canadian dollars and Australian dollars. The statistics are based on weekly historical simulations using current benchmark holdings. These currencies behaved very differently when international equity prices dropped during the financial crisis, impacting unhedged

international equity returns denominated in these currencies. This behaviour led to higher tail risk measured in some currencies than in others. If, in the next crisis, the krone is not among the currencies that depreciate, potential krone losses could be worse than historical data indicate.

In summary, correlations change over time and the past may not fully reflect future risks. In a scenario where both bond values and the Norwegian kroner drop at the same time as equities, this could lead to losses of more than 40 percent of the fund's value in a single year measured in Norwegian kroner.



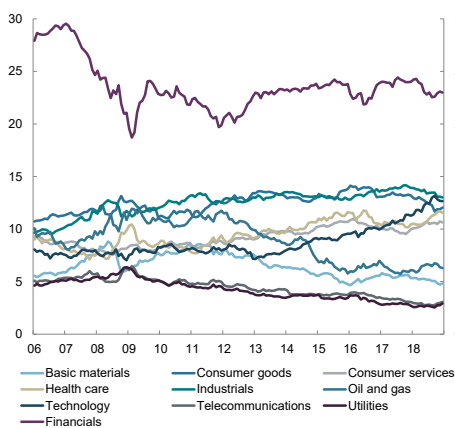
**Industry weights**

Apart from changing asset class weights and correlations, the fund's risk profile is also potentially affected by the industry composition of the chosen equity benchmark. The industry composition changes over time for several reasons, including performance and new issues. As an example, the financial crisis dramatically reduced the weight of financial stocks, whereas the technology industry's weight has increased in recent years.

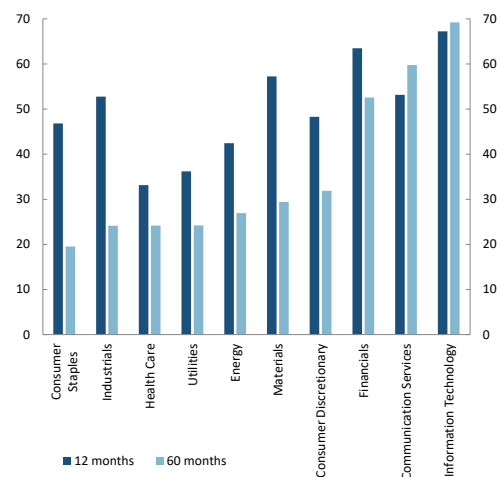
Different industries have different risk profiles, for example through their sensitivity to economic shocks. As an illustration of these differences, we can consider the dispersion in worst loss across industries since 1970. Due to data availability, this analysis uses a monthly

data set of MSCI World industries, with returns compounded over one- and five-year horizons on a rolling basis. First, there is great variation in worst loss across the industries. Second, there is great variation in the difference between long-horizon and short-horizon worst loss across the industries. Different portfolio mixes of industries could lead to different portfolio level risk characteristics. Of course, these results should be interpreted with caution. One reason is that there are relatively few non-overlapping periods underlying the longer-term metrics. A second reason is that the size and composition of industries have changed dramatically over the years, including the country distribution within each industry. Finally, a different industry may be the focal point of the next downturn.

**Chart 27** The fund's equity benchmark industry weights. Percent



**Chart 28** MSCI World industry worst losses on 12-month and 60-month rolling basis. 1970:1–2018:12. Percent



Source: MSCI

### Expected absolute volatility

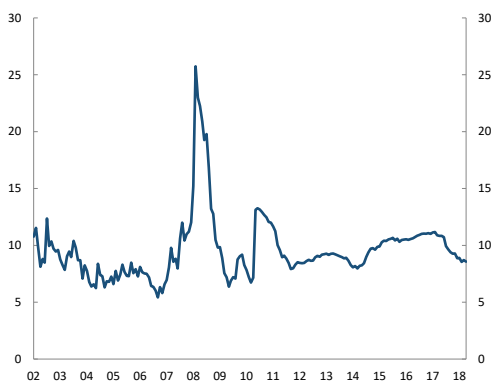
The fund's expected absolute volatility, calculated using the statistical measure of standard deviation, shows how much the annual return on the fund's investments can be expected to fluctuate and takes the correlation between different investments in the portfolio into account. Volatility is annualised using the square-root-of-time rule, which assumes that returns are independent and have constant properties over time.

The method for calculating expected volatility, both absolute and relative, was revised in January 2011 to make it more appropriate for the fund's long-term investment horizon. Until the end of 2010, expected volatility had been calculated based on daily price observations, with recent days data having greater weight than observations further back in time. This meant that short-term changes in market conditions had a rapid and marked effect on expected volatility. The current method calculates

volatility based on weekly prices using an equal-weighted three-year price history, making the measure less sensitive to short-term market turbulence and more linked to changes in the fund's investments.

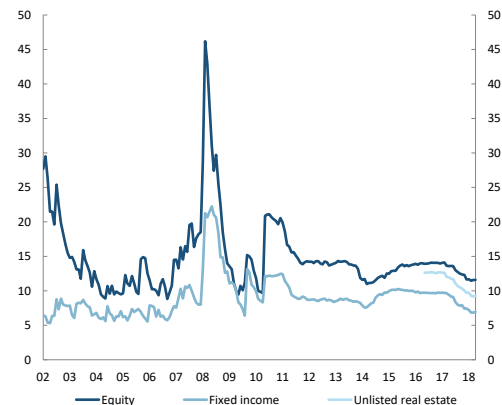
At the end of 2018, expected absolute volatility was 8.6 percent using a three-year price history, a decrease of 2.3 percentage points from the end of 2017. This means that annual value fluctuations of approximately 710 billion kroner can be expected for the portfolio. The expected absolute volatility of the equity portfolio was 11.6 percent at the end of 2018, compared to 13.6 percent at the end of 2017, while the volatility of the fixed-income portfolio was 7.0 percent, compared to 9.4 percent at the end of 2017. The decrease in expected volatility is primarily due to smaller price fluctuations in the markets over the last three years than was the case at the end of 2017.

**Chart 29** The fund's expected absolute volatility. Percent



Source: Norges Bank Investment Management

**Chart 30** Expected absolute volatility per asset class. Percent



Source: Norges Bank Investment Management

The absolute volatility of the fund at the end of 2018 was lower than the average for the last 15 years, which was 9.6 percent at the fund level at year-end. The average absolute volatility of the equity and fixed-income asset classes was 14.3 and 9.3 percent respectively.

Estimated by means of historical simulations of the current portfolio, expected volatility was 10.5 percent in the period from January 2007 to the end of 2018. Within this period, the highest expected volatility of a consecutive three-year period was 15.1 percent, and the lowest 7.1 percent.

#### Breakdown of expected absolute volatility

The expected volatility of equity investments was 11.6 percent at the end of 2018. A decomposition of the portfolio by industry shows that investments in financials contributed

the most to the volatility in the portfolio at 2.9 percentage points. This was, however, also the largest sector, representing 23.7 percent of equity investments at the end of 2018. Measured in the fund's currency basket, the expected volatility of equity investments was 11.4 percent at the end of the year.

The expected volatility of the fund's fixed-income investments was 7.0 percent at the end of 2018. Government bonds were the largest sector and contributed 4.0 percentage points of the total volatility. Volatility in the fixed-income portfolio was mostly due to fluctuations in the value of the krone against the fund's currency basket. Measured in the fund's currency basket, the expected absolute volatility of fixed-income investments was 2.6 percent at the end of 2018.

**Table 39** Risk contribution to equity investments as at 31 December 2018. Volatility measured in Norwegian Kroner. Percent

Sector	Weight	Absolute volatility contribution
Financials	23.7	2.9
Technology	12.6	1.8
Industrials	12.9	1.6
Consumer services	10.8	1.3
Health care	11.4	1.2
Consumer goods	11.9	1.1
Oil and gas	5.9	0.7
Basic materials	5.0	0.6
Telecommunications	3.0	0.2
Utilities	2.8	0.2
Cash and derivatives	0.0	0.0
<b>Total equities</b>	<b>100.0</b>	<b>11.6</b>

**Table 40** Risk contribution to fixed-income investments as at 31 December 2018. Volatility measured in Norwegian Kroner. Percent

Sector	Weight	Absolute volatility contribution
Government bonds	56.6	4.0
Corporate bonds	24.1	1.8
Government-related bonds	13.3	0.8
Inflation-linked bonds	5.5	0.4
Securitised bonds	5.6	0.3
Cash and derivatives	-5.0	-0.3
<b>Total fixed income</b>	<b>100.0</b>	<b>7.0</b>

# Relative risk

**Deviations from the reference index are sources of relative risk. There are various approaches to measuring relative risk in the fund.**

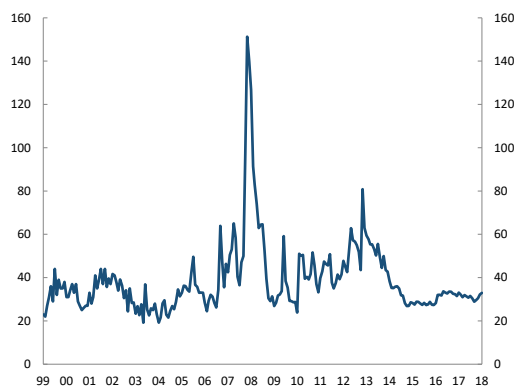
The composition of the fund differs from its reference index along several dimensions, including currencies, sectors, countries, regions, individual stocks and bond issuers, as well as having investments in unlisted real estate. These deviations from the reference index are sources of relative risk.

All of the fund's investments, including unlisted real estate, are included in the calculation of expected relative volatility and measured against the fund's reference index, which comprises global equity and bond indices. The scope for deviation from the reference index is regulated by the Ministry of Finance and Norges Bank's Executive Board.

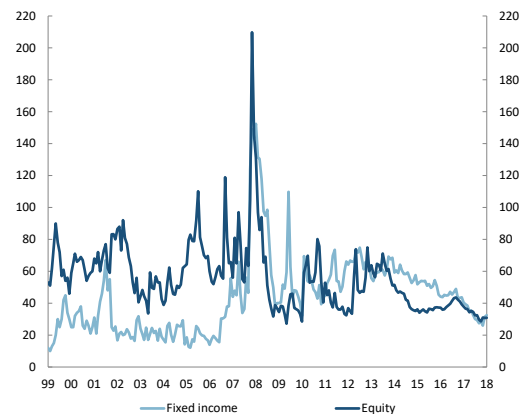
## Expected relative volatility

The limit for expected relative volatility, or tracking error, is a restriction on how much the return on the fund's investments can be expected to deviate from the return on the reference index. This restriction is specified in the management mandate laid down by the Ministry of Finance, where the limit for expected relative volatility for the fund, including unlisted real estate, is set at 1.25 percentage points. The fund's expected relative volatility, using a three-year price history and a parametric model, was 33 basis points at the end of 2018. Based on monthly values over the last 15 years, the fund's expected relative volatility has averaged 40 basis points. Using historical simulations of the current portfolio and a price history from January 2007 to the end of 2018, the fund's expected relative volatility was 43 basis points. Within the 2007–2018 period, the highest expected relative volatility of a consecutive three-year period was 64 basis points, and the lowest 29 basis points.

**Chart 31** The fund's expected relative volatility. Basis points



**Chart 32** Expected relative volatility for the fixed-income and equity asset classes. Basis points





**Table 41** Expected relative volatility of investment strategies as at 31 December 2018. Each strategy measured stand-alone with the other strategies positioned in-line with the benchmarks. All numbers measured at fund level. Basis points

	Equity management	Fixed-income management	Real estate management	Allocation	Total
Fund allocation	11	9	26	5	30
Reference portfolios	9	9			12
of which systematic factors	7				7
Allocations	5	3	0	5	8
Real estate			26		26
Unlisted real estate			19		19
Listed real estate			9		9
Security selection	12	2			12
Internal security selection	10	2			10
External security selection	5				5
Asset management	6	2			7
Asset positioning	5	2			7
Systematic factors	3				3
Total	20	9	26	5	33

**Table 42** Relative risk contribution to equity management as at 31 December 2018. Basis points

Sector	Relative volatility contribution
Financials	7
Consumer goods	5
Industrials	4
Health care	4
Basic materials	4
Consumer services	4
Technology	2
Oil and gas	1
Telecommunications	1
Utilities	0
Other	-1
Total equity management	31

**Table 43** Relative risk contribution to fixed-income management as at 31 December 2018. Basis points

Sector	Relative volatility contribution
Government bonds	31
Government-related bonds	-2
Inflation-linked bonds	0
Corporate bonds	3
Securitised bonds	-1
Cash and derivatives	-1
Total fixed-income management	30

Relative risk can be decomposed and calculated separately for equity management and fixed-income management. The expected relative volatility of portfolios under equity management was 31 basis points at the end of 2018, while that of portfolios under fixed-income management was 30 basis points.

Relative volatility can also be estimated for the fund's established investment strategies. These calculations are performed for one strategy at a time, assuming that the rest of the fund is invested in line with the respective benchmarks. The fund's expected relative volatility is lower than the sum of the relative volatilities of the investment strategies, reflecting diversification effects.

#### **Expected shortfall**

Expected relative volatility is an estimate of what happens under normal market conditions, but provides no information about the distribution and magnitude of less probable outcomes (tail risk). Expected shortfall, also called conditional value at risk, is a widely used tail risk measure. It shows the average loss in the worst q percent of observations, where q is the tail probability and equivalent to one minus the specified confidence level. The expected shortfall for the fund's portfolio at a 97.5 percent confidence level shows an expected annual negative deviation from the reference index of 1.37 percentage points. The calculations are based on simulated relative returns in the currency basket of the current portfolio and reference index on a weekly basis from January 2007 until the end of 2018. The Executive Board has set a limit for expected shortfall between the return on the fund, including investments in unlisted real estate, and the reference index. The fund is to be managed in such a way that the expected negative relative return in extreme situations does not exceed 3.75 percentage points.

#### **Fiscal strength and environment-related mandates**

The mandate from the Ministry of Finance requires Norges Bank to take fiscal strength into account in its government bond investments. The expected relative volatility of this requirement was estimated to be 2 basis points at the end of 2018 when measured at the fund level, and 7 basis points measured at the fixed-income management level. The expected shortfall was estimated to be 7 basis points at the fund level, and 24 basis points at the fixed-income management level.

The mandate also requires Norges Bank to establish environment-related mandates with a market value that is normally in the range of 30-60 billion kroner. The expected relative volatility of this requirement was estimated to be 2 basis points at the end of 2018 when measured at the fund level, and 3 basis points measured at the equity management level. The expected shortfall was estimated to be 6 basis points at the fund level, and 10 basis points at the equity management level.

#### **Benchmark overlap**

Benchmark overlap is an alternative relative risk measure that shows how closely the portfolios match the reference index. In line with the management mandate from the Ministry of Finance, Norges Bank's Executive Board has set a limit for minimum overlap between the equity and fixed-income portfolios and their corresponding reference indices of 60 percent. At the end of 2018, the benchmark overlap was 85.2 percent at the security level for equities, and 71.1 percent at the issuer level for fixed income. Over the last ten years, the equity benchmark overlap has been relatively stable in the 80-90 percent range. The fixed-income overlap started at a low level before the financial crisis, but increased sharply after 2008 as a

**Table 44** Expected relative volatility and expected shortfall of equity investments and fixed-income investments versus benchmark indices as at 31 December 2018. Equity and fixed-income investments measured versus market value of each asset class. Measured in the fund's currency basket. Basis points

	Expected relative volatility 3-years price history	Expected relative volatility since 01.01.2007	Expected shortfall since 01.01.2007
Fund	33	43	137
Equity management	31	30	80
Fixed-income management	30	37	97

**Table 45** Expected relative volatility and expected shortfall relative to benchmark of investment strategies as at 31 December 2018. Each strategy measured stand-alone with the other strategies positioned in-line with the benchmarks. Measured in the fund's currency basket. Basis points

	Expected relative volatility 3-years price history	Expected relative volatility price history since 01.01.2007	Expected shortfall price history since 01.01.2007
<b>Fund allocation</b>	<b>30</b>	<b>38</b>	<b>116</b>
Reference portfolios	12	13	32
of which systematic factors	7	5	14
Allocations	8	9	22
Real estate	26	38	123
Unlisted real estate	19	27	83
Listed real estate	9	17	55
<b>Security selection</b>	<b>12</b>	<b>12</b>	<b>34</b>
Internal security selection	10	11	28
External security selection	5	6	15
<b>Asset management</b>	<b>7</b>	<b>9</b>	<b>26</b>
Asset positioning	7	8	22
Systematic factors	3	3	7
<b>Total</b>	<b>33</b>	<b>43</b>	<b>137</b>

result of portfolio restructuring and new mandate requirements for minimum benchmark overlap. In recent years, it has been in the 70-80 percent range.

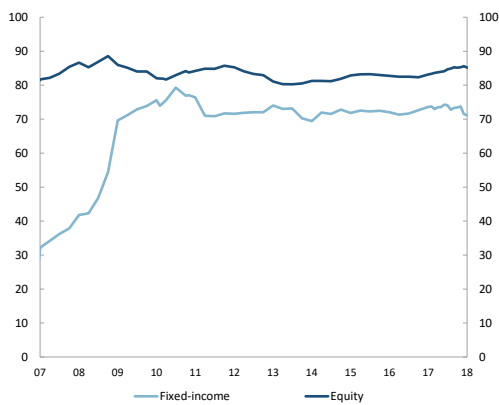
**Distribution of realised relative return**

Another approach to relative risk is to analyse the characteristics of the distribution of the fund's realised relative return. The standard deviation of the fund's realised monthly relative returns, measured in the fund's currency basket, has been 10 basis points over the last five years. This value is smaller than when looking at longer

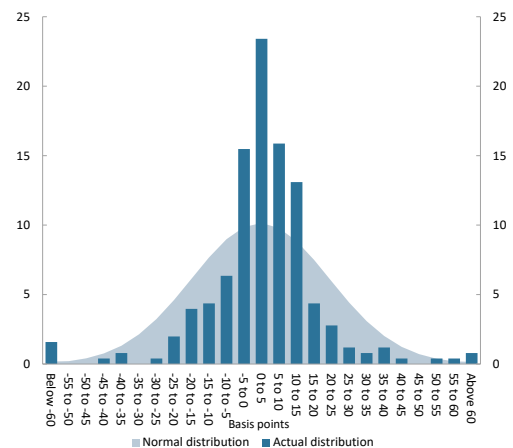
sample periods, and, in particular, when looking at the previous five-year period, which included the financial crisis of 2008-2009. The fund's relative return has been less skewed over the last five years than in previous periods. Excess kurtosis has also been lower in the most recent five-year period, with fewer instances of very large monthly relative return figures than in previous periods.



**Chart 33** The fund's benchmark overlap. Percent



**Chart 34** The fund's monthly relative return distribution. Percent



**Table 46** Characteristics of the distribution for realised monthly relative return. Measured in the fund's currency basket

	Since 01.01.1998 <sup>1</sup>	Last 10 years	Last 5 years	Last 3 years
<b>Fund<sup>2</sup></b>				
Standard deviation relative return (percent)	0.20	0.16	0.10	0.10
Skewness relative return	-2.28	1.53	-0.44	-0.45
Excess kurtosis relative return	17.80	5.29	-0.02	0.38
<b>Equity management</b>				
Standard deviation relative return (percent)	0.22	0.13	0.13	0.12
Skewness relative return	-0.65	-0.68	-0.73	-0.80
Excess kurtosis relative return	9.16	0.86	0.46	0.62
<b>Fixed-income management</b>				
Standard deviation relative return (percent)	0.29	0.30	0.12	0.11
Skewness relative return	-0.58	2.68	-0.23	0.07
Excess kurtosis relative return	17.55	10.24	0.24	1.02

<sup>1</sup> Equity management start in 1999.<sup>2</sup> Based on aggregated equity and fixed-income management until end of 2016.**Table 47** Characteristics of the distribution for realised monthly relative return. 5-year buckets. Measured in the fund's currency basket

	1998-2002 <sup>1</sup>	2003-2007	2008-2012	2013-2017	2018
<b>Fund<sup>2</sup></b>					
Standard deviation relative return (percent)	0.12	0.12	0.35	0.11	0.09
Skewness relative return	0.79	-1.44	-1.68	-0.23	0.17
Excess kurtosis relative return	2.44	4.47	6.18	0.75	-0.23
<b>Equity Management<sup>1</sup></b>					
Standard deviation relative return (percent)	0.29	0.22	0.24	0.13	0.10
Skewness relative return	1.03	-0.23	-3.62	-0.99	0.13
Excess kurtosis relative return	3.10	0.54	20.37	1.54	-0.93
<b>Fixed-income Management</b>					
Standard deviation relative return (percent)	0.09	0.11	0.57	0.14	0.13
Skewness relative return	-0.55	-3.48	-0.45	-0.07	0.15
Excess kurtosis relative return	11.49	13.73	3.56	-0.12	2.31

<sup>1</sup> Equity management start in 1999.<sup>2</sup> Based on aggregated equity and fixed-income management until end of 2016.

# Risk adjustments

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**This section looks at various risk-adjusted performance measures, the impact of real estate investments, and factor-adjusted regression analysis of returns.**

## **Risk-adjusted return**

The returns discussed in the previous sections of this report are useful for assessing the fund's achievements against its long-term targets. However, it is not appropriate to rely only on the figures presented so far when evaluating the fund's achievements as an asset manager or when comparing performance with other institutions in the industry. It is important to recognise that these figures depend on a number of guidelines and restrictions in the fund's investment mandate, which to a large extent govern the fund's exposure to risk and consequently the potential for higher returns. Risk-adjusted performance measures aim to standardise performance results by accounting for the risks taken when obtaining these returns. Even when using risk-adjusted performance measures to compare asset managers, the differences in their investment mandates should be kept in mind.

## **Relative risk adjustments**

When performing relative risk adjustments, the fund's benchmark serves as a reference point. This is a natural approach given the central role of the benchmark in the fund's investment mandate.

## **Information ratio**

The information ratio divides the mean of the portfolio return relative to the benchmark by the standard deviation of the relative return (tracking error). The information ratio measures both return and risk in terms of deviations from

the reference index. Since inception, the fund has been constrained by an official tracking error limit versus its benchmark. By using tracking error as the risk measure, the information ratio therefore serves as a natural starting point for risk-adjusted return analysis.

The information ratio displays great variation across evaluation periods, reflecting the significant statistical uncertainty in risk-adjusted measures. This uncertainty is amplified when using short samples. The fund's information ratio for the last ten years is higher than the value since inception, which in part is due to the volatile months in 2008 no longer being included in the ten-year sample at the end of 2018. The fixed-income information ratio was higher in the 2008–2012 period containing the financial crisis than in the five-year periods before and after, as the large negative relative returns during the crisis were offset by strong performance in the period that followed. The opposite pattern holds for equity investments, with a lower information ratio in the period 2008–2012 than in 2003–2007 and 2013–2017. The other risk-adjusted measures – Jensen's alpha, the appraisal ratio and the Sharpe ratio difference – also do not show the same pattern for fixed-income management, as they indicate improved performance from 2008–2012 to 2013–2017.

## **Jensen's alpha**

Under the assumptions of the Capital Asset Pricing Model (CAPM), all differences in expected return are explained by beta. Beta measures systematic risk and is estimated using a regression of the portfolio returns in excess of the risk-free rate on the benchmark's excess returns. Jensen's alpha is the residual average return after correcting for the portfolio's beta. Again, the benchmark is used for risk adjustment. Jensen's alpha assumes that the only relevant risk is the risk that cannot be

**Table 48** Relative risk-adjusted measures. Before management costs. Annualised

	Since 01.01.1998 <sup>1</sup>	Last 10 years	Last 5 years	Last 3 years
<b>Fund<sup>2</sup></b>				
Information ratio	0.39	1.00	0.11	0.45
Jensen's alpha (percent)	0.09	0.30	-0.01	0.12
Appraisal ratio	0.16	0.60	-0.02	0.34
Sharpe ratio difference	0.01	0.04	0.00	0.02
<b>Equity management</b>				
Information ratio	0.61	0.76	0.07	0.07
Jensen's alpha (percent)	0.38	0.16	-0.06	-0.06
Appraisal ratio	0.54	0.43	-0.13	-0.15
Sharpe ratio difference	0.03	0.01	-0.01	-0.01
<b>Fixed-income management</b>				
Information ratio	0.14	0.81	-0.18	0.47
Jensen's alpha (percent)	0.15	0.89	0.14	0.28
Appraisal ratio	0.15	0.85	0.37	0.86
Sharpe ratio difference	0.01	0.22	0.04	0.10

<sup>1</sup> Equity management start in 1999.

<sup>2</sup> Based on aggregated equity and fixed-income investments until the end of 2016.

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**Table 49** Relative risk-adjusted measures. Before management costs. Annualised

	1998–2002 <sup>1</sup>	2003–2007	2008–2012	2013–2017	2018
<b>Fund<sup>2</sup></b>					
Information ratio	0.96	0.91	0.09	0.73	-1.06
Jensen's alpha (percent)	0.43	0.16	-0.15	0.13	-0.35
Appraisal ratio	1.03	0.41	-0.17	0.36	-1.11
Sharpe ratio difference	0.07	0.03	-0.01	0.02	-0.04
<b>Equity management</b>					
Information ratio	0.87	1.07	0.13	0.88	-2.19
Jensen's alpha (percent)	1.03	0.53	0.09	0.14	-0.72
Appraisal ratio	1.06	0.72	0.13	0.35	-2.01
Sharpe ratio difference	0.06	0.05	0.00	0.01	-0.06
<b>Fixed-income management</b>					
Information ratio	0.52	0.08	0.22	-0.06	-0.03
Jensen's alpha (percent)	0.16	0.05	0.15	0.23	-0.10
Appraisal ratio	0.52	0.13	0.08	0.59	-0.23
Sharpe ratio difference	0.05	0.02	-0.11	0.08	-0.04

<sup>1</sup> Equity management start in 1999.

<sup>2</sup> Based on aggregated equity and fixed-income investments until the end of 2016.

diversified away, whereas the Sharpe ratio assumes that total risk is the relevant measure.

While the CAPM theoretically should be able to price all assets, it should be noted that it is most commonly applied to equities. Considering equity and fixed-income management separately, Jensen's alpha has been positive for all five-year periods. For the fund, the 2008–2012 period containing the financial crisis saw a negative Jensen's alpha, although both equity and fixed-income management showed positive values.

#### Appraisal ratio

The appraisal ratio is similar to the Sharpe ratio, but instead of measuring the total risk/return trade-off, it is computed after removing systematic risk. For the fund, this corresponds to adjusting risk and return for variability explained by the benchmark. The appraisal ratio is estimated by dividing Jensen's alpha by the standard deviation of the residuals from the CAPM regression.

The sign of the appraisal ratio is naturally the same as the sign of Jensen's alpha. In early periods, the appraisal ratio was higher for equity management than for fixed-income management, while the reverse is true for the most recent periods. However, as indicated above, care should be taken when evaluating risk using the CAPM for fixed-income investments.

#### Absolute risk adjustments

When performing absolute risk adjustments, the fund's benchmark and risk restrictions play no role. The performance measures are therefore reported separately for the portfolio and the benchmark, and the levels can then be compared.

#### Sharpe ratio

The Sharpe ratio is a widely used risk-adjusted performance measure. The Sharpe ratio is computed by dividing the average portfolio return in excess of the risk-free rate by the standard deviation of portfolio returns. A higher Sharpe ratio indicates a higher expected reward per unit of total risk. The Sharpe ratio measures absolute risk-adjusted performance and ranks portfolios based on the estimated trade-off between total risk and return. The Sharpe ratio difference reflects this ranking and captures the change in performance relative to the benchmark.

Across all periods, the Sharpe ratio for the fund has been similar to the benchmark's Sharpe ratio. This is a consequence of the fund having limited scope to deviate from the reference index. While the fund has had a higher volatility of returns than the benchmark, the average fund return has also tended to be higher, resulting in similar reward-to-variability ratios and consequently small differences in the Sharpe ratio.

Since periods that include the financial turmoil of 2008–2009 were characterised by both lower average returns and a higher volatility of returns, the Sharpe ratios for both the fund and the benchmark in these periods are lower than for other periods. The negative Sharpe ratios in the period 1998–2002 reflect the relatively high risk-free rate compared to the average returns of the fund's investments and the reference index.

The Sharpe ratio for equity management has also been close to the Sharpe ratio for the reference index for all periods, with both ratios displaying significant variation across time. For both equity management and the benchmark, the Sharpe ratios have generally been lower than for the fund.



**Table 50** Absolute risk-adjusted measures. Before management costs. Annualised

	Since 01.01.1998 <sup>1</sup>	Last 10 years	Last 5 years	Last 3 years
<b>Fund<sup>2</sup></b>				
Standard deviation of investments (percent)	7.39	7.87	6.47	6.22
Standard deviation of benchmark (percent)	7.02	7.59	6.39	6.15
Sharpe ratio of investments	0.50	1.02	0.66	0.60
Sharpe ratio of benchmark	0.49	0.98	0.66	0.58
<b>Equity management</b>				
Standard deviation of investments (percent)	14.18	12.81	10.04	9.75
Standard deviation of benchmark (percent)	13.85	12.60	9.87	9.56
Sharpe ratio of investments	0.32	0.82	0.54	0.51
Sharpe ratio of benchmark	0.29	0.81	0.55	0.51
<b>Fixed-income management</b>				
Standard deviation of investments (percent)	3.28	3.01	2.51	2.56
Standard deviation of benchmark (percent)	3.15	2.87	2.71	2.73
Sharpe ratio of investments	0.80	1.38	0.99	0.70
Sharpe ratio of benchmark	0.79	1.16	0.94	0.59

<sup>1</sup> Equity management start in 1999.<sup>2</sup> Based on aggregated equity and fixed-income investments until the end of 2016.

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**Table 51** Absolute risk-adjusted measures. Before management costs. Annualised

	1998–2002 <sup>1</sup>	2003–2007	2008–2012	2013–2017	2018
<b>Fund<sup>2</sup></b>					
Standard deviation of investments (percent)	6.13	3.82	11.31	6.00	7.87
Standard deviation of benchmark (percent)	6.02	3.66	10.46	5.89	7.90
Sharpe ratio of investments	-0.12	1.51	0.30	1.48	-0.99
Sharpe ratio of benchmark	-0.19	1.47	0.31	1.46	-0.95
<b>Equity management</b>					
Standard deviation of investments (percent)	16.88	9.24	19.11	9.26	12.05
Standard deviation of benchmark (percent)	16.55	9.00	18.60	9.06	12.01
Sharpe ratio of investments	-0.44	1.38	0.05	1.35	-0.92
Sharpe ratio of benchmark	-0.50	1.32	0.04	1.33	-0.86
<b>Fixed-income management</b>					
Standard deviation of investments (percent)	3.06	3.04	4.27	2.67	2.08
Standard deviation of benchmark (percent)	3.05	3.10	3.62	2.92	2.19
Sharpe ratio of investments	0.67	0.36	1.27	1.03	-0.58
Sharpe ratio of benchmark	0.62	0.34	1.38	0.95	-0.55

<sup>1</sup> Equity management start in 1999.<sup>2</sup> Based on aggregated equity and fixed-income investments until the end of 2016.

Although fixed-income management has often had lower average returns than equity management, the returns have also been less volatile, resulting in higher Sharpe ratios for several sample periods, including since inception. Comparing fixed-income management with the benchmark, the relative performance again depends on the evaluation period, although the Sharpe ratios tend to move closely together.

#### **Real estate**

Relative to a broad portfolio of equities and fixed income, real estate is an additional asset class that could provide new sources of risk and return. The fund invested in its first property in 2011 and has since expanded its portfolio of unlisted real estate to around 3 percent of the fund. The fund's real estate strategy also includes listed holdings amounting to around 1 percent of the fund at year-end 2018.

When deciding to invest in real estate, the fund gives up a return on the basket of listed equities and bonds sold to fund the real estate purchases. Before 2017, only bonds were sold for this purpose. To evaluate the impact of the decision to invest in real estate, we can consider a hypothetical portfolio where the fund's real estate holdings are replaced with their funding mix of equities and bonds. This analysis uses quarterly returns from the second quarter of 2011 to the fourth quarter of 2018.

Evaluating unlisted real estate investments is challenging due to the scarcity of data. Due to illiquidity, large transaction costs and appraisal smoothing, it could be argued that long-term returns should be used to evaluate the fund's real estate investments. However, with the real estate return series starting in April 2011, there are only a few multi-year return observations. At the same time, property prices are generally not

updated at a higher frequency than quarterly, and using quarterly observations still introduces significant statistical uncertainty. Finally, the short sample does not include a full business cycle, affecting both return and risk figures.

With these caveats in mind, the fund has shown a similar volatility to, but slightly higher return than, a hypothetical fund without unlisted real estate but instead including its funding since the second quarter of 2011. Since the first quarter of 2017, which marked the beginning of the new funding scheme with a currency-neutral mixture of bonds and equities, the fund including unlisted real estate has also had slightly lower volatility than a portfolio which instead has the funding. Repeating the exercise but considering both listed and unlisted real estate, the results are similar.

**Table 52** Unlisted real estate impact on return and risk measures. Before management costs. Quarterly returns. Annualised

	2011 <sup>1</sup> -2018	2017-2018
<b>Fund</b>		
Mean	6.25	3.56
Volatility	7.44	8.10
Sharpe ratio	0.79	0.28
<b>Fund excl. unlisted real estate incl. funding</b>		
Mean	6.18	3.43
Volatility	7.46	8.19
Sharpe ratio	0.78	0.26
<b>Difference<sup>2</sup></b>		
Mean	0.07	0.13
Variance ratio	0.99	0.98
Sharpe ratio	0.01	0.02

<sup>1</sup> Return series start in Q2 2011.<sup>2</sup> For volatility the variance ratio is reported instead of the difference.

### Factor-adjusted return

The analyses introduced here involve multivariate regressions of relative returns against sets of historical factor return series. Estimated regression coefficients can be interpreted as exposures to systematic factors over the historical period. Regression intercepts can be interpreted as performance attributable to manager value creation over and above the exposure to the set of factors considered in the regression. All regressions are conducted using relative returns before management costs and with returns in dollars. The regressions for the fund's relative return are based on aggregated equity and fixed-income investments until the end of 2016. From 2017, real estate investments are also included. Additional information and regressions, including analyses based on relative return data after management costs, are available in the appendix published on our website: [www.nbim.no](http://www.nbim.no).

For equity management, the factor set is that of the global Fama-French five-factor model commonly applied in academic research. Global factor return series are obtained from Kenneth French's website. In these regressions, factors explain between 36 and 45 percent of the variability in the relative returns of equity investments for the three periods considered: since inception, last ten years and last five years. The relative returns of equity investments are estimated to have had positive active exposures to the market factor (MKT) and the small firm factor (SMB), and a negative active exposure to the investment factor (CMA), for all three periods.

For fixed-income management, the factor set consists of a default factor and a term factor. The factor return data have been calculated by Norges Bank Investment Management, based on Bloomberg Barclays Indices data. Both have

been constructed as global factors, and the default factor has been adjusted to take duration differences in the credit and government segments of the fixed-income benchmark into account. The construction of global factors introduces sovereign risk into the term factor due to differences in currency composition between global long-maturity and global short-maturity indices. This is discussed in more detail in the appendix. In the fixed-income regressions, factors explain between 17 and 31 percent of the variability in the relative returns. The relative returns of fixed-income investments are estimated to have had exposure to the default premium factor over the full sample period and the last ten-year period. Over the last five-year period, only the regression coefficient for the negative term premium is significant at conventional statistical confidence levels.

For the fund, the factor set is the combination of the factors used for each asset class. In these regressions, factors explain 44 to 53 percent of the variability in relative returns, and the signs of the estimated exposures are qualitatively in line with the results for the asset classes. However, the investment (CMA) coefficient is only significant for the full period, whereas the value (HML) and profitability (RMW) coefficients are positive over both the full sample period and the last ten years. The coefficient for the negative term premium is also significant over the last ten years.

**Table 53** Equity management. Regression analysis of relative return in dollars before management costs

Sample period	Intercept, bps annualised	Regression coefficients					Variance explained in percent (R squared)
		Market (MKT)	Small vs large (SMB)	Cheap vs expensive (HML)	Profitable vs unprofitable (RMW)	Conservative vs aggressive investment (CMA)	
Since 01.01.1999	<b>32</b>	<b>0.02</b>	<b>0.05</b>	-0.01	0.01	<b>-0.02</b>	45
Last 10 years	24	<b>0.01</b>	<b>0.03</b>	0.00	-0.02	<b>-0.02</b>	39
Last 5 years	-1	<b>0.01</b>	<b>0.03</b>	0.02	0.00	<b>-0.04</b>	36

Source: Norges Bank Investment Management, Kenneth French. Bold indicates significance at 5 percent confidence level.

Note: After management cost regressions are available in the appendix

**Table 54** Fixed-income management. Regression analysis of relative return in dollars before management costs

Sample period	Intercept, bps annualised	Regression coefficients		Variance explained in percent (R squared)
		Default (duration adjusted)	Term	
Since 01.01.1998	13	<b>0.07</b>	-0.01	26
Last 10 years	<b>65</b>	<b>0.05</b>	-0.02	17
Last 5 years	12	0.00	<b>-0.04</b>	31

Source: Norges Bank Investment Management, Bloomberg Barclays Indices. Bold indicates significant at 5 percent confidence level.

Note: After management cost regressions are available in the appendix

**Table 55** Fund. Regression analysis of relative return in dollars before management costs

Sample period	Intercept, bps annualised	Regression coefficients							Variance explained in percent (R squared)
		Market (MKT)	Small vs large (SMB)	Cheap vs expensive (HML)	Profitable vs unprofitable (RMW)	Conservative vs aggressive investment (CMA)	Default (duration adjusted)	Term	
Since 01.01.1998	8	<b>0.02</b>	<b>0.03</b>	<b>0.01</b>	<b>0.02</b>	<b>-0.03</b>	<b>0.03</b>	-0.01	53
Last 10 years	26	<b>0.02</b>	<b>0.04</b>	<b>0.02</b>	<b>0.03</b>	-0.01	<b>0.01</b>	<b>-0.02</b>	52
Last 5 years	12	<b>0.01</b>	<b>0.03</b>	0.01	0.02	0.00	0.00	<b>-0.03</b>	44

Source: Norges Bank Investment Management, Kenneth French, Bloomberg Barclays Indices. Bold indicates significant at 5 percent confidence level.

Note: After management cost regressions are available in the appendix



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