

# Return and risk

**Government Pension Fund Global** 



No. 05



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

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Factor and risk-adjusted return (available on www.nbim.no)



# A year of records

2019 was a year of records. On 25 October, the fund's market value passed 10 trillion kroner. Amazingly, this milestone came 50 years to the day since Norway found oil in the North Sea. The absolute return for the fund was a record 1,692 billion kroner, equivalent to more than half of the Norwegian mainland economy's GDP. The percentage return of 19.95 percent was surpassed only by that in 2009.

The fund's equity share has risen over the years, and we exceeded an equity allocation of 70 percent for the first time in 2019. The fund is now largely, in terms of both return and risk, an equity investor. With a high allocation to equities, we must, as current times show, be prepared for large fluctuations in the fund's value. The return on the fund of an incredible 4,875 billion kroner in the past decade has to a large extent come from our equity investments. It is also in the equity market where we will see the greatest risk show up in variations in the value of the fund in the years to come. As a long-term investor with limited liabilities, we are well-positioned for periods with dislocations in global financial markets.

The fund outperformed the benchmark index by 0.23 percentage point in 2019. The annual excess return since we started out more than 20 years ago is now at 0.25 percentage point, exactly where we set the target at inception in 1998. The relative return over these years has come from a number of diverse and complementary investment strategies. These have all been adapted to changing markets and contributed at different times to our returns. The majority of the excess return has come from the equity asset class, with a relative return of 0.44 percentage point. This report outlines the relative return and the relative risk of our investment strategies, which have delivered a consistent return with limited risk.

We hope that this report gives you a broad and detailed picture of our absolute and relative return and risk. Financial markets reflect an uncertain and complex world, and we remain humble towards the immense task entrusted to us. At the end of 2019, the fund was valued at more than three times Norway's mainland GDP and, remarkably, exceeded the combined value of all of the government's oil revenue over the past 50 years. We manage the fund for future generations. Our investment strategies seek to safeguard financial wealth for our grandchildren and their grandchildren in turn.

Oslo, 26 March 2020

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**Yngve Slyngstad** Chief Executive Officer, Norges Bank Investment Management



# Firing on all cylinders

The return on the fund in 2019 was 19.9 percent, the second-highest annual return since inception and the highest measured in Norwegian kroner.

After starting out with an impressive first quarter, equity markets across the world continued to rally throughout 2019, with US tech stocks leading the way. Fixed-income markets also saw strong returns as interest rates dropped significantly during the first three quarters, before rising towards the end of the year.

Equity investments returned 26.0 percent, fixed income 7.6 percent and unlisted real estate 6.8 percent. The fund's relative return was 0.23 percentage point, with an average expected relative volatility of 0.32 percentage point for the year.

The strong financial returns were accompanied by modest volatility throughout the year. Despite the strong sentiment in financial markets, potential disruptions from geopolitical events across the Americas, Europe and Asia were looming. Manufacturing indices contracted, and falling long-term rates led to inverted yield curves, which historically have been an indicator of an impending recession. Globally, synchronised monetary easing and resolution of the uncertainty around Brexit and the China-US trade war served to alleviate these concerns.

This report presents our main investment strategies and includes return and risk estimates as well as cost data for each of them. The content of the report is largely unchanged from last year, although we have provided additional information on the real estate portfolio. Integrating unlisted real estate into the return and risk measurement of listed securities is an ongoing challenge. Infrequent price data, lower liquidity and high transaction costs mean that long sample periods should be used when evaluating unlisted assets.

During 2019, the transition to the new equity weight of 70 percent in the Ministry of Finance's strategic benchmark was completed. Looking forward, a high equity weight combined with the volatility of equities being higher than that of bonds, plus historically low interest rates, will mean that the fund's long-term performance should largely be dictated by the performance of the equity markets.

While we publish the fund's key return and risk figures in our Annual Report, the Return and Risk Report supplements these with additional information. It provides analysis of performance as well as forward-looking risks as seen from multiple angles, and we hope it will enable readers to thoroughly evaluate the fund's investments and results in the context of its long-term investment horizon.

Oslo, 26 March 2020

Dag Huse

Chief Risk Officer, Norges Bank Investment Management

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# Investments

The fund's investments are diversified across asset classes, regions and sectors. The goal is to have a welldiversified portfolio that spreads risk and generates a high long-term return. The fund is invested in three major asset classes: equities, fixed income and unlisted real estate. At the end of 2019, the fund's asset allocation was 70.8 percent equity investments, 26.5 percent fixed-income investments and 2.7 percent unlisted real estate investments.

#### **Equity investments**

The fund had equity investments in 71 countries at the end of 2019. 42.0 percent of the equity portfolio was invested in North America, 33.5 percent in Europe and 22.2 percent in Asia and Oceania. 88.8 percent of our equity investments were in developed markets and 11.3 percent in emerging markets, including frontier markets.

The fund's largest equity sector is financials, accounting for 23.6 percent of the fund's equity holdings at the end of 2019. The technology and industrials sectors were the second- and thirdlargest sectors at 14.6 percent and 13.4 percent respectively, with the technology sector overtaking industrials during 2019.

The three largest equity holdings at year-end were all companies in the technology sector in the US. Apple Inc was the largest holding by market value, with Microsoft Corp and Alphabet Inc in second and third position.

The fund's average ownership stake in the world's listed companies, measured as its share of the benchmark index for equities, was 1.5 percent at the end of 2019. In Europe, the fund's average share of the benchmark index was 2.6 percent.

### **Fixed-income investments**

The fund's bond holdings were denominated in 26 different currencies at the end of 2019, unchanged from a year earlier. Bonds denominated in the G4 currencies together made up 87.3 percent of the fund's fixed-income investments, with 45.6 percent denominated in US dollars, 27.5 percent in euros, 9.8 percent in Japanese yen and 4.4 percent in British pounds. Fixed-income bond holdings in emerging-market currencies accounted for 8.9 percent of fixedincome investments.

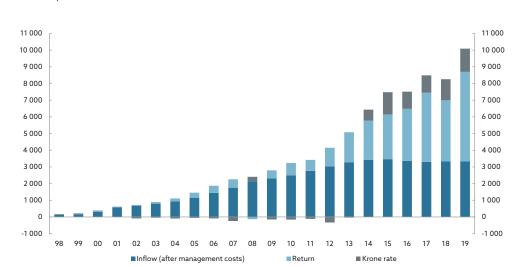
Government bonds constituted 57.2 percent of the fund's fixed-income investments, government-related bonds 11.9 percent, and inflation-linked bonds 6.5 percent. The allocation to the corporate bond sector was 23.6 percent, while securitised bonds, consisting primarily of European covered bonds, represented 5.6 percent of the fund's fixed-income investments at the end of 2019.

The fixed-income portfolio's average yield fell to 1.7 percent at the end of the year, down from 2.4

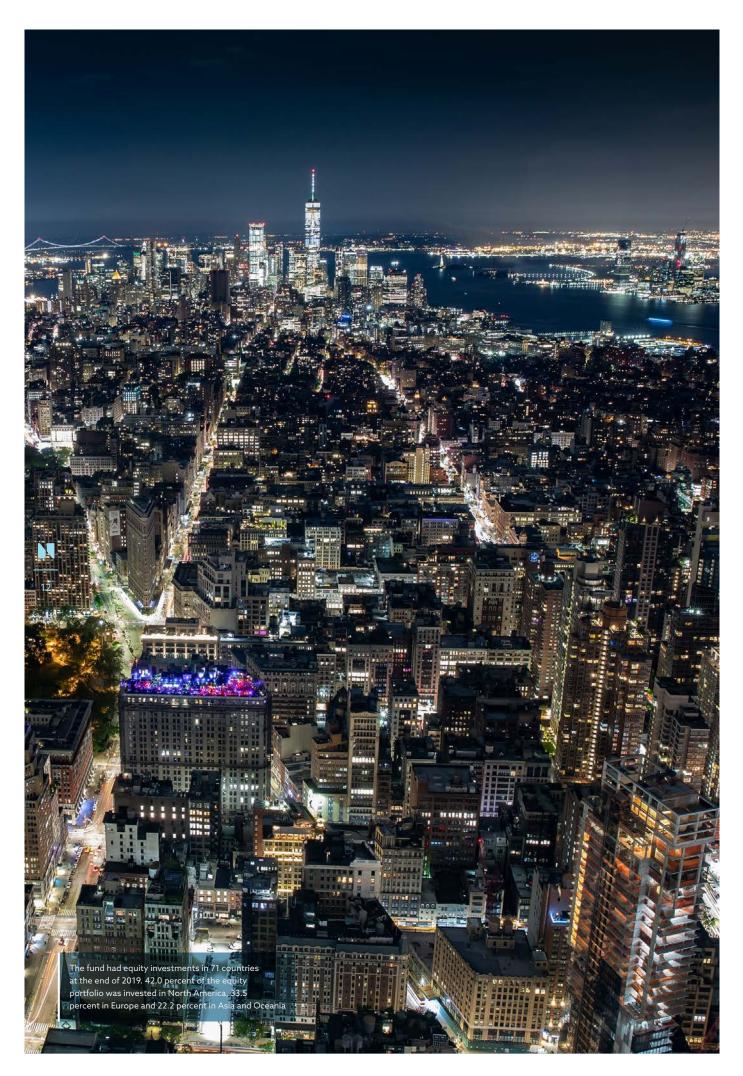
percent at the end of 2018. The portfolio's average duration was 7.1 at the end of 2019, compared with 6.3 a year ago. The fund's average ownership stake in fixed-income markets, measured as its share of the benchmark index for bonds, was 0.7 percent.

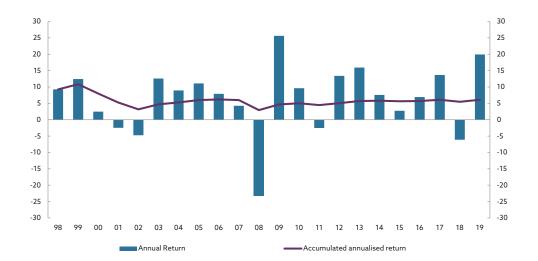
#### Unlisted real estate investments

The regional composition of the fund's unlisted real estate investments was 49.7 percent in Europe, 45.8 percent in the US and 1.4 percent in Japan. The fund's unlisted real estate investments had a vacancy rate of 4.4 percent and 6.5 percent leverage. 56.5 percent of the unlisted investments were in offices, 21.9 percent in logistics and 18.2 percent in retail. The largest city exposures in the unlisted portfolio were London at 16.8 percent, Paris at 16.5 percent and New York at 15.1 percent.



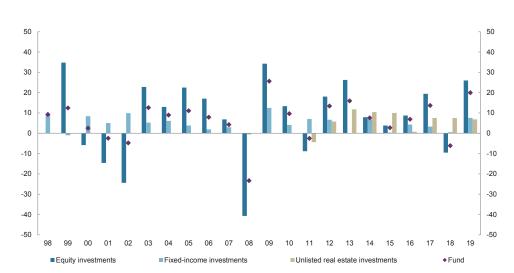
#### Chart 1 Decomposition of the fund's market value. Billions of kroner





### Chart 2 The fund's annual return and accumulated annualised return. Percent

Chart 3 Annual return on the fund's asset classes. Percent



North America         2,998,236         42.0           US         2,841,769         39.8           Canada         156,467         2.2           Europe         2,390,433         33.5           UK         626,496         8.8           France         368,537         5.2           Germany         343,344         4.8           Switzerland         332,986         4.7           Netherlands         136,913         1.9           Spain         117,220         1.6           Sweden         115,277         1.6           Italy         97,247         1.4           Denmark         70,954         1.0           Finland         46,236         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         155,127         2.2           Australia         47,151		he fund's equity	sition and largest cou / holdings	
US         2,841,769         39.8           Canada         156,467         2.2           Europe         2,390,433         33.5           UK         626,496         8.8           France         368,537         5.2           Germany         343,344         4.8           Switzerland         332,986         4.7           Netherlands         136,913         1.9           Spain         117,220         1.6           Sweden         115,277         1.6           Italy         97,247         1.4           Denmark         70,954         1.0           Finland         46,236         0.6           Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         145,151         2.0           Australia         145,151         2.	Region/co	untry		Percent
Canada       156,467       2.2         Europe       2,390,433       33.5         UK       626,496       8.8         France       368,537       5.2         Germany       343,344       4.8         Switzerland       332,986       4.7         Netherlands       136,913       1.9         Spain       117,220       1.6         Sweden       115,277       1.6         Italy       97,247       1.4         Denmark       70,954       1.0         Finland       46,236       0.6         Belgium       43,605       0.6         Asia       1,429,821       20.0         Japan       605,095       8.5         China       308,738       4.3         Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Australia       145,151       2.0         Latin America       99,637       1.4         Brazil       67,242       0.9         Africa       50,424       0.7         South Africa       43,003       0.6	North Am	erica	2,998,236	42.0
Europe         2,390,433         33.5           UK         626,496         8.8           France         368,537         5.2           Germany         343,344         4.8           Switzerland         332,986         4.7           Netherlands         136,913         1.9           Spain         117,220         1.6           Sweden         115,277         1.6           Italy         97,247         1.4           Denmark         70,954         1.0           Finland         46,236         0.6           Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424	US		2,841,769	39.8
UK       626,496       8.8         France       368,537       5.2         Germany       343,344       4.8         Switzerland       332,986       4.7         Netherlands       136,913       1.9         Spain       117,220       1.6         Sweden       115,277       1.6         Italy       97,247       1.4         Denmark       70,954       1.0         Finland       46,236       0.6         Belgium       43,605       0.6         Asia       1,429,821       20.0         Japan       605,095       8.5         China       308,738       4.3         Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Hong Kong       81,731       1.1         Oceania       155,127       2.2         Australia       145,151       2.00         Latin America       99,637       1.4         Brazil       67,242       0.9         Africa       50,424       0.7         South Africa       43,003       0.6 <td>Canada</td> <td></td> <td>156,467</td> <td>2.2</td>	Canada		156,467	2.2
France       368,537       5.2         Germany       343,344       4.8         Switzerland       332,986       4.7         Netherlands       136,913       1.9         Spain       117,220       1.6         Sweden       115,277       1.6         Italy       97,247       1.4         Denmark       70,954       1.0         Finland       46,236       0.6         Belgium       43,605       0.6         Asia       1,429,821       20.0         Japan       605,095       8.5         China       308,738       4.3         Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Hong Kong       81,731       1.1         Oceania       145,151       2.0         Latin America       99,637       1.4         Brazil       67,242       0.9         Africa       50,424       0.7         South Africa       43,003       0.6	Europe		2,390,433	33.5
Germany         343,344         4.8           Switzerland         332,986         4.7           Netherlands         136,913         1.9           Spain         117,220         1.6           Sweden         115,277         1.6           Italy         97,247         1.4           Denmark         70,954         1.0           Finland         46,236         0.6           Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	UK		626,496	8.8
Switzerland         332,986         4.7           Netherlands         136,913         1.9           Spain         117,220         1.6           Sweden         115,277         1.6           Italy         97,247         1.4           Denmark         70,954         1.0           Finland         46,236         0.6           Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         145,151         2.0           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	France		368,537	5.2
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Spain         117,220         1.6           Sweden         115,277         1.6           Italy         97,247         1.4           Denmark         70,954         1.0           Finland         46,236         0.6           Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,978         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	Switzerla	and	332,986	4.7
Sweden         115,277         1.6           Italy         97,247         1.4           Denmark         70,954         1.0           Finland         46,236         0.6           Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         145,151         2.0           Australia         145,151         2.0           Katin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7      South Africa         43,003         0.6	Netherla	inds	136,913	1.9
Italy       97,247       1.4         Denmark       70,954       1.0         Finland       46,236       0.6         Belgium       43,605       0.6         Asia       1,429,821       20.0         Japan       605,095       8.5         China       308,738       4.3         Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Hong Kong       81,731       1.1         Oceania       155,127       2.2         Australia       145,151       2.00         Latin America       99,637       1.4         Brazil       67,242       0.9         Africa       50,424       0.7         South Africa       43,003       0.6	Spain		117,220	1.6
Denmark         70,954         1.0           Finland         46,236         0.6           Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         155,127         2.2           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	Sweden		115,277	1.6
Finland       46,236       0.6         Belgium       43,605       0.6         Asia       1,429,821       20.0         Japan       605,095       8.5         China       308,738       4.3         Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Hong Kong       81,731       1.1         Oceania       155,127       2.2         Australia       145,151       2.0         Frica       99,637       1.4         South Africa       43,003       0.6	Italy		97,247	1.4
Belgium         43,605         0.6           Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         155,127         2.2           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	Denmar	k	70,954	1.0
Asia         1,429,821         20.0           Japan         605,095         8.5           China         308,738         4.3           Taiwan         125,998         1.8           South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         155,127         2.2           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         30,003         0.6	Finland		46,236	0.6
Japan       605,095       8.5         China       308,738       4.3         Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Hong Kong       81,731       1.1         Oceania       155,127       2.2         Australia       145,151       2.0         Latin America       99,637       1.4         Brazil       67,242       0.9         Africa       50,424       0.7         South Africa       43,003       0.6	Belgium		43,605	0.6
China       308,738       4.3         Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Hong Kong       81,731       1.1         Oceania       155,127       2.2         Australia       145,151       2.0         Latin America       99,637       1.4         Brazil       67,242       0.9         Africa       50,424       0.7         South Africa       43,003       0.6	Asia		1,429,821	20.0
Taiwan       125,998       1.8         South Korea       112,811       1.6         India       82,730       1.2         Hong Kong       81,731       1.1         Oceania       155,127       2.2         Australia       145,151       2.0         Latin America       99,637       1.4         Brazil       67,242       0.9         Africa       50,424       0.7         South Africa       43,003       0.6	Japan		605,095	8.5
South Korea         112,811         1.6           India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         155,127         2.2           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	China		308,738	4.3
India         82,730         1.2           Hong Kong         81,731         1.1           Oceania         155,127         2.2           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	Taiwan		125,998	1.8
Hong Kong         81,731         1.1           Oceania         155,127         2.2           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	South K	orea	112,811	1.6
Oceania         155,127         2.2           Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	India		82,730	1.2
Australia         145,151         2.0           Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	Hong Ko	ong	81,731	1.1
Latin America         99,637         1.4           Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	Oceania		155,127	2.2
Brazil         67,242         0.9           Africa         50,424         0.7           South Africa         43,003         0.6	Australia	1	145,151	2.0
Africa         50,424         0.7           South Africa         43,003         0.6	Latin Ame	rica	99,637	1.4
South Africa 43,003 0.6	Brazil		67,242	0.9
	Africa		50,424	0.7
Middle East 29,273 0.4	South A	frica	43,003	0.6
	Middle Eas	it	29,273	0.4

 Table 1
 Regional composition and largest countries of

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

 Table 2
 Sector composition of the fund's equity holdings

	Millions of	
Sector	kroner <sup>1</sup>	Percent
Financials	1,688,039	23.6
Banks	624,705	8.7
Real estate	421,296	5.9
Insurance	336,522	4.7
Financial services	305,515	4.3
Technology	1,040,121	14.6
Technology	1,040,121	14.6
Industrials	957,011	13.4
Industrial goods and services	806,613	11.3
Construction and materials	150,398	2.1
Consumer goods	822,711	11.5
Personal and household goods	358,902	5.0
Food and beverage	301,818	4.2
Automobiles and parts	161,991	2.3
Health care	808,672	11.3
Health care	808,672	11.3
Consumer services	763,653	10.7
Retail	430,248	6.0
Travel and leisure	186,705	2.6
Media	146,700	2.1
Oil and gas	357,473	5.0
Oil and gas	357,473	5.0
Basic materials	317,600	4.4
Chemicals	166,355	2.3
Basic resources	151,246	2.1
Utilities	203,296	2.8
Utilities	203,296	2.8
Telecommunications	194,375	2.7
Telecommunications	194,375	2.7

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

Table 3         Currency composition of the fund's bond holdings			
Currenc	у	Millions of kroner <sup>1</sup>	Percent
US do	ollar	1,217,396	45.6
Euro		733,712	27.5
Japar	iese yen	261,578	9.8
Britis	h pound	116,730	4.4
Cana	dian dollar	95,235	3.6
South	n Korean won	57,639	2.2
Austr	alian dollar	57,369	2.1
Mexic	an peso	41,689	1.6
Indor	iesian rupiah	25,263	0.9
Swiss	franc	20,376	0.8
Russi	an rouble	20,238	0.8
Swed	ish krona	20,199	0.8
South	n African rand	19,988	0.7
Indiar	n rupee	18,988	0.7
Brazil	ian real	18,161	0.7
Malay	rsian ringgit	16,984	0.6
Danis	h krone	15,197	0.6
Singa	pore dollar	11,166	0.4
Color	nbian peso	10,387	0.4
New	Zealand dollar	8,999	0.3
Turkis	sh lira	3,570	0.1
Philip	pine peso	3,569	0.1
Israel	i shekel	1,018	0.0
Chile	an peso	1,000	0.0
Czecł	n koruna	135	0.0
Polisł	n zloty	89	0.0

 Table 3
 Currency composition of the fund's bond

 Table 4
 Sector composition of the fund's bond holdings

Sector	Millions of kroner <sup>1</sup>	Percent
Government bonds	1,526,110	57.2
Government bonds	1,526,110	57.2
Government-related bonds	317,155	11.9
Agencies	155,619	5.8
Local authorities	104,104	3.9
Supranationals	49,790	1.9
Sovereign	7,642	0.3
Inflation-linked bonds	174,406	6.5
Inflation-linked bonds	174,406	6.5
Corporate bonds	629,172	23.6
Industrials	325,659	12.2
Financials	253,261	9.5
Utilities	50,253	1.9
Securitised bonds	149,833	5.6
Covered	149,833	5.6

<sup>1</sup> Does not sum up to total market value due to cash and derivates.

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

Name	Sector	Equities	Bonds	Total
Apple Inc	Technology	116,967	7,711	124,677
Microsoft Corp	Technology	104,640	1,258	105,897
Alphabet Inc	Technology	77,831	529	78,360
Nestlé SA	Consumer goods	71,686	1,900	73,585
Amazon.com Inc	Consumer services	68,631	3,716	72,347
Roche Holding AG	Health care	55,297	360	55,657
Alibaba Group Holding Ltd	Consumer services	51,992	1,073	53,065
Royal Dutch Shell Plc	Oil and gas	52,193	496	52,689
Novartis AG	Health care	44,604	3,679	48,283
Facebook Inc	Technology	46,241		46,241
Berkshire Hathaway Inc	Financials	39,717	5,835	45,552
JPMorgan Chase & Co	Financials	33,031	11,272	44,304
Bank of America Corp	Financials	29,377	12,956	42,333
Taiwan Semiconductor Manufacturing Co Ltd	Technology	38,238		38,238
Johnson & Johnson	Health care	35,206	2,466	37,673
Samsung Electronics Co Ltd	Technology	36,257		36,257
AT&T Inc	Telecommunications	24,874	11,288	36,162
HSBC Holdings Plc	Financials	28,355	7,469	35,824
Tencent Holdings Ltd	Technology	34,056	780	34,837
Wells Fargo & Co	Financials	18,335	14,961	33,296
TOTAL SA	Oil and gas	29,464	2,648	32,112
SAP SE	Technology	28,002	2,921	30,923
Verizon Communications Inc	Telecommunications	23,629	7,201	30,831
Kreditanstalt für Wiederaufbau	Government-related		29,123	29,123
BP Plc	Oil and gas	26,110	2,653	28,763
Procter & Gamble Co/The	Consumer goods	28,412		28,412
Citigroup Inc	Financials	18,627	9,668	28,295
Visa Inc	Financials	28,046	108	28,154
Siemens AG	Industrials	22,452	4,669	27,120
Sanofi	Health care	23,266	3,547	26,813
AstraZeneca Plc	Health care	25,833	958	26,791
Canada Mortgage & Housing Corp	Government-related		26,781	26,781
Banco Santander SA	Financials	16,266	10,494	26,760
Allianz SE	Financials	25,533	978	26,511
Exxon Mobil Corp	Oil and gas	25,969	444	26,413
UnitedHealth Group Inc	Health care	23,812	2,556	26,368
Intel Corp	Technology	25,274	445	25,720
GlaxoSmithKline Plc	Health care	25,196	351	25,548
LVMH Moet Hennessy Louis Vuitton SE	Consumer goods	24,922	312	25,234
Linde Plc	Basic materials	25,217		25,217

 Table 5
 Largest holdings of equities and bonds excluding sovereigns as at 31 December 2019. Covered bonds issued by

### Table 6 Regional composition and largest countries of the fund's unlisted real estate holdings

Region/country	Millions of kroner <sup>1</sup>	Percent
North America	124,939	45.8
US	124,939	45.8
Europe	135,817	49.7
UK	56,923	20.8
France	48,961	17.9
Germany	9,236	3.4
Other	20,697	7.6
Asia	3,783	1.4
Japan	3,783	1.4

 $^{\scriptscriptstyle 1}$  Does not sum up to total market value due to cash and receivables being excluded.

Table 7	Sector composition of the fund's unlisted real estate holdings	
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Sector	Millions of kroner <sup>1</sup>	Percent
Office	154,242	56.5
Logistics	59,773	21.9
Retail	49,703	18.2
Other	821	0.3

<sup>1</sup> Does not sum up to total market value due to cash and receivables being excluded.

**Global investment** Number of investments by asset class

### North America

# 2,072 companies

1,951 bonds from 546 issuers

334 properties

### Latin America

0

249

companies 99 bonds from 29 issuers

# International organisations

126 bonds from 16 issuers

# Africa

207

companies

17 bonds from **2** issuers

# Europe

# 1,846 companies

1,709 bonds from 471 issuers

400 properties

# Middle East Asia

163 companies

3 bonds from

1 issuer

73 issuers 5

properties

4,316 companies

bonds from

536

# Oceania

349 companies

167 obligasjoner fra 39 issuers

# **Benchmark index**

The strategic benchmark index is defined in our management mandate from the Ministry of Finance. Over time, the total return on the fund will to a great extent be determined by developments in the markets included in the benchmark index.

The fund's strategic benchmark index is made up of 70 percent listed equities and 30 percent fixed income. The fund may, however, be invested in a wider set of assets, including investments in unlisted real estate, unlisted infrastructure for renewable energy, and the equity of unlisted companies where the board has expressed an intention to seek a public listing.

The benchmark index is constructed on the basis of an externally provided representation of the opportunity set. The external index providers, FTSE Russell and Bloomberg, choose which securities are to be included in their indices, assign constituent weights, and decide how these weights change over time. The equity share in the fund's benchmark index moves in response to market developments. If it moves above 72 percent or below 68 percent, rebalancing will be triggered, and the rule for rebalancing will guide the equity share back to the strategic target. Deviations between the actual portfolio and the benchmark index are contained through a tracking error constraint. Since February 2016, the tracking error limit has been 125 basis points.

The authority to set and change the benchmark index rests with the Ministry of Finance. The composition of the benchmark index has evolved over time. The Ministry has drawn on advice from Norges Bank, as well as independent experts. On questions of strategic importance, national budget documents and periodic white papers have been used to anchor such decisions in the Storting (the Norwegian parliament).

#### Equity benchmark index

The benchmark index for equities is based on the FTSE Global All Cap index. The FTSE Global All Cap is a global market-capitalisation-weighted index comprising 8,872 constituents in 49 countries at the end of 2019. 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 benchmark 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 benchmark 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 on ethical grounds are not included in the benchmark index.

The Ministry of Finance has initiated a review of the fund's benchmark index for equities. The Ministry has decided not to include any new countries in the equity benchmark index until a decision on the future composition of the benchmark has been taken. Norges Bank provided its advice in August 2019 and recommended that the geographical composition of the benchmark should be adjusted in the direction of market weights. The Ministry of Finance is expected to conclude its assessment in the 2020 white paper, due in early April 2020.

### Fixed-income benchmark index

The benchmark 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 benchmark index is rebalanced back to these weights on a monthly basis. The government sub-index is assigned a weight of 70 percent and includes developed-market issuers of government bonds eligible for inclusion in the Bloomberg Barclays Global Aggregate index and the Bloomberg Barclays Global Inflation-Linked index,

· · · · · · · · · · · · · · · · · · ·	Since Last Last Last					
	01.01.1998	15 years	10 years	5 years	2019	
US dollar	6.06	5.54	6.21	6.02	20.01	
Euro <sup>1</sup>	5.96	6.90	8.85	7.63	22.22	
British pound	7.15	8.18	8.34	9.54	15.37	
Norwegian kroner	6.95	8.19	10.76	9.44	21.78	
Currency basket	5.84	6.31	7.59	6.82	19.72	

 Table 8
 The fund's benchmark return, key figures, measured in various currencies. Annualised. Percent

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

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 Table 9
 The fund's benchmark return, 5-year buckets, measured in various currencies. Annualised. Percent

	1998- 2002	2003- 2007	2008- 2012	2013- 2017	2018- 2019
US dollar	2.86	12.67	2.50	6.96	4.99
Euro <sup>1</sup>	3.82	5.44	4.64	8.98	8.59
British pound	3.46	7.99	6.74	10.96	6.09
Norwegian kroner	1.74	7.32	3.00	15.52	8.82
Currency basket	2.78	8.52	3.14	8.96	6.19

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

12 currencies in total. The corporate sub-index is assigned a weight of 30 percent and comprises all securities issued in seven developed-market currencies and included in the corporate sector and the covered bond sub-sector of the Bloomberg Barclays Global Aggregate index.

The Bloomberg Barclays Global Aggregate is a global market-capitalisation-weighted index of investment-grade debt from 25 local currency markets, including government, governmentrelated, corporate and securitised bonds. Bloomberg Barclays Indices evaluates the fixedincome 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 most significant difference between the fixed-income benchmark index and the Bloomberg Barclays Global Aggregate is the weighting principle for government bonds. While the Global Aggregate Index is marketweighted, government bonds in the fund's benchmark index are weighted according to the size of the respective issuing countries' GDP, albeit capped at two times market weight. Another difference is that agencies, local authorities, sovereigns, MBS pass-through bonds, ABSs and CMBSs are not included in the benchmark, while inflation-linked bonds are. The benchmark index also has a higher weight of covered bonds than the Bloomberg Barclays Global Aggregate. After the Ministry of Finance decided in 2019 to remove emerging, market issuers from the benchmark index, the fund's benchmark index also includes fewer currencies. The transition towards this developed-marketonly index started in 2019 and will continue for a while.

### **Ethical exclusions**

The Ministry of Finance has issued ethically motivated guidelines for observation and exclusion of companies from the fund, and set up an independent Council on Ethics to make ethical assessments of companies. When companies are excluded from the fund, they are also removed from the benchmark index.

Two types of criteria are set out in the guidelines. The first is product-based exclusions. The fund must not be invested in companies that produce certain types of weapons, base their operations on coal, or produce tobacco. Product-based exclusions have reduced the cumulative return on the equity benchmark index by around 2.1 percentage points, or 0.07 percentage point annually. The exclusion of some weapons manufacturers is the primary reason for the reduction in returns, but the exclusion of tobacco producers has contributed as well.

A second type of ethical exclusions is conductbased. Companies may be excluded if there is an unacceptable risk of conduct considered to constitute a particularly serious violation of fundamental ethical norms. Conduct-based exclusions have increased the cumulative return on the equity benchmark index by around 0.8 percentage point, or 0.03 percentage point annually.

In total, the equity benchmark index has returned 1.3 percentage points less than it would have done without any ethical exclusions since 2006. On an annualised basis, the return has been 0.04 percentage point lower.

		Ľ	Deviation from FTS	E GEISAC index
Country	Share of equity benchmark Percent	Share of FTSE GEISAC index Percent	Percentage points	Millions of kroner
UK	8.8	5.1	3.7	256,720
Switzerland	4.8	2.6	2.2	157,023
France	5.2	3.0	2.2	151,061
Germany	4.6	2.5	2.1	147,577
Netherlands	2.0	1.1	0.9	66,224
Czech Republic	0.0	0.0	0.0	-394
Saudi Arabia	-	0.2	-0.2	-16,751
Norway	-	0.3	-0.3	-17,697
Canada	2.2	3.0	-0.8	-57,772
US	39.4	54.9	-15.5	-1,082,829

Table 10	The fund's equity benchmark versus the FTSE Global All Cap Index (GEISAC) by country as at 31 December 2019
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Table 11         The fund's equity benchmark versus the FTSE Global All Cap Index (GEISAC) by sector as at 31 December 2019						
			Deviation from FT	SE GEISAC index		
Sector	Share of equity benchmark Percent	Share of FTSE GEISAC index Percent	Percentage points	Millions of kroner		
Consumer goods	11.8	10.6	1.1	77,770		
Financials	22.4	21.5	0.9	64,754		
Health care	11.5	10.9	0.6	39,910		
Oil and gas	5.4	5.1	0.4	25,440		
Telecommunications	2.7	2.5	0.2	14,797		
Basic materials	4.4	4.3	0.1	8,170		
Industrials	13.6	13.8	-0.2	-15,010		
Utilities	2.8	3.2	-0.4	-29,710		
Consumer services	10.7	11.5	-0.8	-53,885		
Technology	14.6	16.5	-1.9	-132,236		

Table 12	The fund's fixed-income benchmark versus the Bloomberg Barclays Global Aggregate index by currency as at	
	31 December 2019	

	Share of	Share of Bloomberg	Deviation from Bloomberg Barclays Global Aggregate index	
Currency	fixed-income benchmark Percent	Barclays Global <sup>–</sup> Aggregate index Percent	Percentage points	Millions of kroner
Euro	27.6	23.4	4.2	119,004
Mexican peso	1.5	0.3	1.2	34,977
US dollar	45.9	44.8	1.1	30,105
South Korean won	1.9	1.2	0.8	21,963
British pound	5.5	4.7	0.8	21,607
Hong Kong dollar	0.0	0.0	0.0	342
Norwegian krone	-	0.1	-0.1	-3,014
Indonesian rupiah	-	0.3	-0.3	-9,329
Chinese yuan	-	3.1	-3.1	-89,005
Japanese yen	7.0	15.3	-8.3	-236,466

Table 13The fund's fixed-income benchmark versus the Bloomberg Barclays Global Aggregate index by sector as at<br/>31 December 2019

	Share of fixed-	Share of Bloom- berg Barclays	Deviation from Blo Global Aggre	<i>.</i> ,
Sector	income bench- mark Percent	Global Aggregate index Percent	Percentage points	Millions of kroner
Treasuries	60.8	53.6	7.2	204,064
Inflation-linked bonds	6.5	-	6.5	185,247
Industrial	14.4	10.4	4.0	113,318
Financial institutions	10.2	7.1	3.1	88,717
Covered	3.6	2.5	1.1	31,975
Supranational	2.7	2.0	0.7	19,144
Utility	1.8	1.5	0.3	9,209
ABS	-	0.2	-0.2	-6,437
CMBS	-	0.9	-0.9	-24,933
Sovereign	-	1.3	-1.3	-36,791
Local authorities	-	2.9	-2.9	-83,137
Agencies	-	6.7	-6.7	-188,450
MBS Passthrough	-	11.0	-11.0	-311,925

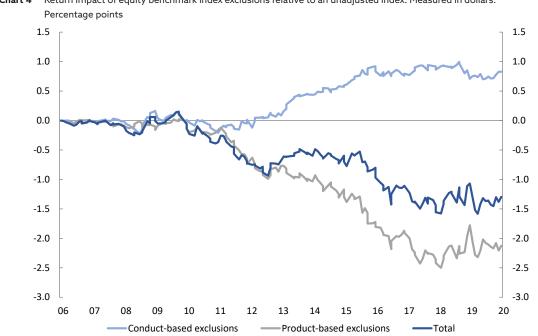


Chart 4 Return impact of equity benchmark index exclusions relative to an unadjusted index. Measured in dollars.

Table 14 Contribution to return impact of equity benchmark index exclusions by exclusion criterion as at 31 December 2019. Market value in billions of kroner. Contribution measured in dollars. Percentage points

Criterion	Number of exclu- ded companies from benchmark <sup>1</sup>	Market value in benchmark if not excluded	2019	2006-2019 annualised
Product-based exclusions	104	198	0.06	-0.07
Production of specific weapon types	18	81	-0.07	-0.05
Production of tobacco	17	57	0.04	-0.01
Thermal coal mining or coal-based power production	69	60	0.08	0.00
Conduct-based exclusions	30	45	-0.03	0.03
Human rights violations	5	21	-0.01	-0.01
Serious violations of the rights of individuals in situations of war or conflict	2	0	0.00	0.00
Severe environmental damage	15	23	-0.02	0.03
Gross corruption	2	1	-0.01	0.00
Other particularly serious violations of fundamental ethical norms	2	0	0.00	0.00
Severe environmental damage and human rights violations	4	0	0.00	0.00
Total	134	243	0.03	-0.04

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

# **Reference portfolio**

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 measured against a benchmark index that is based on publicly available equity and fixed-income indices from external providers. Characteristics of the fund such as its large size, long investment horizon and low liquidity requirements may mean that some deviations from this benchmark index are appropriate. In addition, the management mandate from the Ministry of Finance contains certain requirements which are not reflected in the benchmark index and which require adjustments to be made. The reference portfolio is the result of these adjustments to the benchmark index. The reference portfolio was established in 2011 and has evolved in subsequent years.

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 costefficient manner.

### Universe expansion

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

The benchmark index is based on publicly available indices. These indices are designed to cater to a wide variety of investors, and many of these 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, and should not necessarily exclude markets in the same way as the index provider.

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

In general, the additions of equity markets in the reference portfolio are modest in size. The additional countries and market segments receive weights in line with the principles followed by the Ministry of Finance's benchmark index. For equities, the reference portfolio uses adjusted market capitalisation to weight its constituents. In 2019, based on advice from Norges Bank, the Ministry of Finance decided to remove emergingmarket bonds from the benchmark index. One of the main issues highlighted in the advice and in the government's decision is that emergingmarket currencies can frequently move in and out of the index. This presents operational challenges, as it is difficult to implement large and frequent index changes in a cost-efficient manner. The Ministry of Finance also decided that the fund should still be allowed to invest in emerging-market bonds within a limit of 5 percent of the bond portfolio. There will be a transition period during which emerging-market fixed income will be reduced and ultimately removed from the benchmark index. Following this, the reference portfolio will target a balanced exposure to selected emerging fixed-income markets.

Adjustments to expand the universe contributed -5 basis points to the return difference between the reference portfolio and the benchmark index over the period 2013-2019. Most of this return difference comes from the inclusion of additional emerging markets in the fixedincome part of the reference portfolio.

Iable 15         Additional markets included in the reference portfolio. From inception in 2011 to December 2019					
Equiti	ies	Fixed in	come <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			

 Table 15
 Additional markets included in the reference portfolio. From inception in 2011 to December 2019

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

#### Systematic factors

The management mandate from the Ministry of Finance includes several requirements that are not reflected in the benchmark 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.

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, which provides evidence that these systematic 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 benchmark index over the period 2013-2019.

### Mandate requirements

The management mandate includes additional requirements that are not reflected in the benchmark index. One such requirement is to take differences in countries' fiscal strength into account in government bond investments.

The reference portfolio incorporates fiscal strength considerations when setting country weights for 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.

These mandated allocations contributed roughly 0 basis points to the return difference between the reference portfolio and the benchmark index over the period 2013-2019.

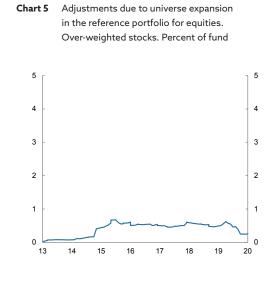
#### Universe adjustments and transitions

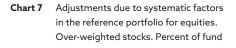
The reference portfolio also includes a range of additional adjustments to the composition of the benchmark index. Several of these adjustments aim to improve the cost efficiency of the benchmark index and the rebalancing rules that it follows. One set of adjustments in the reference portfolio targets the rebalancing rules that are in place for the benchmark index.

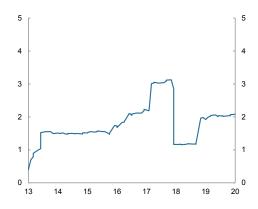
To improve cost efficiency, the reference portfolio applies customised rebalancing rules. For example, until December 2019, the fixedincome benchmark index followed a GDP weighting methodology. The weights in the benchmark index were set according to GDP values on an annual basis, and rebalancing back to these weights occurred at the end of each month over the following year. In order to reduce the turnover that results from this rebalancing, the reference portfolio followed a more gradual and nuanced rebalancing regime. From December 2019, based on advice from Norges Bank, the benchmark index rule has been changed to rebalance fixed-income weights on an annual basis.

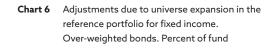
The reference portfolio also includes adjustments that attempt to mitigate other sources of turnover. One example is the turnover that arises from changes in free float in the equity benchmark index. Equity index providers typically adjust the market capitalisation weights of index constituents to ensure that the shares that are included in the index are available for trading, known as free-float adjustment. These adjustments vary over time and generate higher turnover relative to weights based purely on market capitalisation. The reference portfolio tilts security weights towards full market capitalisation weights. In addition, the reference portfolio 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 benchmark index. The reference portfolio is also used to implement changes to the benchmark index at a different, often slower, pace. For example, the fund reduced its strategic allocation to European equities in 2013. The reference portfolio implemented this transition over a longer horizon than the benchmark 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 benchmark index and contributed to a meaningful increase in the fund's tracking error.

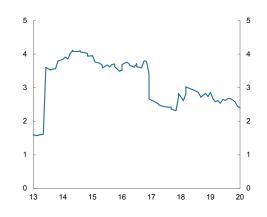
Universe adjustments and transitions contributed -5 basis points to the return difference between the reference portfolio and the benchmark index over the period 2013-2019. Most of this return difference came from the transition to new regional equity weights in 2013.

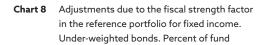


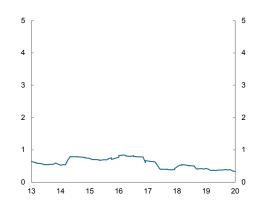












Percentage points	nce portfolio and the	Denchmark Index	for 2019.
	E an citar	Fixed	Total
	Equity	income	Total
Universe expansion	0.04	0.07	0.10
Systematic factors	-0.11		-0.11
Mandate allocations		-0.02	-0.02
Universe adjustments	0.00	-0.06	-0.05
Reference portfolio versus the benchmark index	-0.07	-0.01	-0.08

Table 16 Contribution to relative return differences between the fund's reference portfolio and the benchmark index for 2019.

Table 17 Contribution to relative return differences between the fund's reference portfolio and the benchmark index for 2013-2019. Annualised. Percentage points

		Fixed	
	Equity	income	Total
Universe expansion	0.00	-0.04	-0.05
Systematic factors	-0.01		-0.01
Mandate allocations	0.01	-0.01	0.00
Universe adjustments	-0.02	-0.03	-0.05
Reference portfolio versus the benchmark index	-0.02	-0.08	-0.10

### 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.

From January 2017, the allocation to real estate is no longer defined by the fund's benchmark index. Authority has been delegated to Norges Bank to decide the allocation to real estate and how it should be funded. Listed and unlisted real estate is managed under a combined strategy expected to approach 5 percent of the fund during the 2020-2022 strategy period. The combined real estate strategy is reported as real estate management. 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.



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#### **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 increased the cumulative return on the equity reference portfolio by around 0.27 percentage point, or 0.02 percentage point annually. Divestments linked to climate change and human rights have increased the cumulative return on the equity reference portfolio by 0.21 and 0.06 percentage point respectively. Divestments linked to anti-corruption have decreased the cumulative return on the equity reference portfolio by 0.04 percentage point, while divestments linked to water management have had a negligible impact on the return.

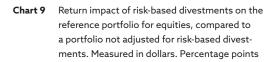




 Table 18
 Contribution to relative return differences between the fund's reference portfolio and the benchmark index for 2012-2019. Annualised. Percentage points

Expectation	Number of companies divested 1	Market value in the reference portfolio if not sold	2019	2012 - 2019 annualised
Climate change	170	12.5	0.02	0.01
Water management	46	5.1	0.01	0.00
Anti-corruption	23	7.7	0.01	0.00
Human rights	29	5.1	0.01	0.00
Other	14	1.4	0.03	0.00
Total	282	31.8	0.09	0.02

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

# 2 | Return

Return	36
Relative return	48
Return and costs	62

### Return

The fund's investment return was 19.95 percent in 2019 and has been 6.09 percent on an annualised basis since inception.

The fund's total market value increased by 1,832 billion kroner to 10,088 billion kroner in 2019. The investment return for the year was 1,692 billion kroner. The krone weakened against the main currencies the fund invests in, increasing the fund's net asset value by 127 billion kroner. Net inflow of capital amounted to 13 billion kroner.

The fund has received a total of 3,341 billion kroner, net of management costs, since the first inflow of capital in May 1996. The cumulative investment return since inception has been 5,358 billion kroner. Changes in the value of the krone against the currencies we invest in account for the remaining 1,390 billion kroner of the fund's market value.

#### Fund return

In 2019, the fund returned 19.95 percent. Equity investments returned 26.02 percent, fixed- income investments 7.56 percent, and unlisted real estate investments 6.84 percent.

Over the past five years, the fund's annualised return has been 7.05 percent. Equity investments have returned 8.99 percent, fixed-income investments 3.18 percent, and unlisted real estate investments 6.49 percent.

Since inception, the fund's annualised investment return has been 6.09 percent. The return on equity investments has been 6.21 percent, and the return on fixed-income investments 4.69 percent.

The fund has had positive annual returns in 17 out of 22 years since inception.

Investments | Return and risk 2019 | Government Pension Fund Global

Equity investments have had a positive return in 15 out of 21 years, and fixed-income investments in 20 out of 22 years. The return on unlisted real estate has been positive in eight out of nine years.

#### Benchmark return

The fund's benchmark returned 19.72 percent in 2019.

The fund's equity benchmark returned 25.65 percent in 2019. North American stocks returned 31.14 percent, European stocks 24.66 percent, and Asian stocks 18.01 percent.

North American stocks have also performed the best over the past five years with an 11.67 percent annualised return, contributing the most to the equity benchmark's 8.75 percent return. Asian and European stocks have trailed with returns of 7.77 percent and 6.68 percent respectively.

Benchmark returns are shown in both the fund's currency basket and in local currency in order to show the impact of exchange rate movements on investment returns. Despite lower local returns in Asian markets than European markets over the past five years, a strengthening of the main Asian currencies and a weakening of key European currencies have resulted in a relative outperformance of Asian stocks over European stocks during the five-year period.

All of the benchmark's equity sectors produced positive investment returns in 2019. Technology stocks performed the best with a return of 42.02 percent, while oil and gas returned the least at 12.61 percent. Over the past five years, the technology sector has outperformed the other sectors by a large margin with an annualised return of 17.44 percent. The health care sector

sector has had the lowest at 2.57 percent. The return on the fixed-income benchmark was strong in 2019 at 7.35 percent, compared with a five-year annualised return of 3.07 percent. The largest contribution, due to their large weight in the benchmark and strong performance, was from US dollar bonds with a return of 9.39 percent. The highest returns were achieved in

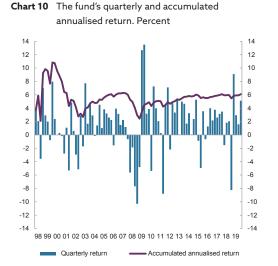
some of the benchmark's emerging markets,

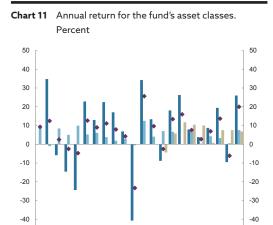
has had the second-best return over the period

at 9.68 percent, while the telecommunications

with Russian rouble-denominated government bonds returning the most at 33.73 percent. Key underperforming segments of the benchmark in 2019 were bonds denominated in Japanese yen and euros with respective returns of 2.42 percent and 3.46 percent.

Corporate bonds (including covered bonds) in the benchmark returned 9.98 percent in 2019, while government bonds (including supranationals) returned 6.23 percent. Industrial corporate bonds produced the highest return at 12.09 percent, while covered bonds had the lowest at 0.79 percent. These have also been the strongest- and weakest-performing sectors respectively over the past five years.





98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19

Unlisted real estate

Fixed income

-50

Fund

-50

Equity



Table 19	Absolute return per year	, measured in the fund	s currency basket. Percer	nt	
			Equity	Fixed-income	Unlisted real estate
Year		Fund	investments	investments	investments <sup>1</sup>
2019		19.95	26.02	7.56	6.84
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 01.11.2014 to the end of 2016.

<sup>2</sup>Unlisted real estate investments from 01.04.2011.

#### Table 20 Absolute return key figures, measured in the fund's currency basket. Annualised. Percent

	Since inception <sup>1</sup>	Last 15 years	Last 10 years	Last 5 years	2019
Return on equity investments <sup>1</sup>	6.21	7.87	9.84	8.99	26.02
Return on fixed-income investments	4.69	4.05	4.05	3.18	7.56
Return on unlisted real estate investments <sup>2</sup>	6.32	-	-	6.49	6.84
Return on fund	6.09	6.46	7.83	7.05	19.95

<sup>1</sup> Fund and fixed-income investments since 01.01.1998, equity investments since 01.01.1999 and real estate investments since 01.04.2011.

 $^{\rm 2}$  Includes listed real estate investments from 01.11.2014 to the end of 2016.

Table 21         Absolute return, 5-year buckets, measured in the fund's currency basket. Annualised. Percent	t
---	---

	1998- 2002	2003- 2007	2008- 2012	2013- 2017	2018- 2019
Return on equity investments <sup>1</sup>	-4.85	16.28	-0.59	12.94	6.80
Return on fixed-income investments	6.26	4.00	5.87	2.96	4.00
Return on unlisted real estate investments <sup>2</sup>	-	-	-	8.03	7.18
Return on fund	3.19	8.92	3.14	9.26	6.12

<sup>1</sup> Since 01.01.1999.

 $^{\rm 2}$  Includes listed real estate investments from 01.11.2014 to the end of 2016.

Table 22         The fund's real return, measured in the fund's currency basket. Annualised. Percent							
	Since 01.01.1998	Last 15 years	Last 10 years	Last 5 years	2019		
Fund return (nominal)	6.09	6.46	7.83	7.05	19.95		
Annual inflation	1.77	1.84	1.68	1.54	1.80		
Annual management fees	0.08	0.08	0.06	0.05	0.05		
Real return	4.17	4.46	5.98	5.38	17.78		

	Since	Last	Last	Last	
	01.01.1998	15 years	10 years	5 years	2019
US dollar	6.31	5.69	6.45	6.26	20.24
Euro <sup>1</sup>	6.21	7.05	9.10	7.86	22.45
British pound	7.40	8.34	8.58	9.78	15.59
Norwegian kroner	7.20	8.35	11.01	9.68	22.01
Currency basket	6.09	6.46	7.83	7.05	19.95

<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 24         Fund return, 5-year buckets, measured in various currencies. Annualised. Percent						
	1998- 2002	2003- 2007	2008- 2012	2013- 2017	2018- 2019	
US dollar	3.27	13.09	2.50	7.26	4.92	
Euro <sup>1</sup>	4.23	5.84	4.65	9.28	8.52	
British pound	3.87	8.39	6.74	11.27	6.02	
Norwegian kroner	2.15	7.71	3.01	15.84	8.75	
Currency basket	3.19	8.92	3.14	9.26	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.

	The fund's cu	rrency basket	Local curren	cy <sup>1</sup>
	2019	5-Year	2019	5-Yea
Equity benchmark	25.65	8.75	25.59	8.82
North America	31.14	11.67	31.10	10.99
United States	31.30	12.13	31.62	11.2
Canada	28.41	4.46	22.21	6.0
Europe	24.66	6.68	24.78	7.9
United Kingdom	22.81	4.85	18.35	7.5
France	25.81	9.41	28.43	10.2
Germany	21.87	5.77	24.41	6.5
Switzerland	33.34	9.11	31.29	7.7
Netherlands	28.87	10.20	31.56	11.0
Spain	12.36	0.76	14.70	1.5
Sweden	26.09	6.83	33.45	9.8
Italy	27.28	6.35	29.93	7.1
Denmark	26.48	10.75	29.29	11.6
Finland	12.15	7.01	14.49	7.8
Belgium	23.58	3.89	26.16	4.6
Russia	50.12	21.82	34.82	21.6
Poland	-2.93	1.58	-1.90	2.1
Austria	18.45	9.68	20.92	10.5
Ireland	16.29	7.77	18.72	8.5
Portugal	18.42	7.09	20.89	7.9
Turkey	16.47	-8.95	30.60	8.9
Greece	54.06	-6.98	57.27	-6.2
Hungary	17.40	23.17	23.55	25.2
Czech Republic	12.15	3.58	13.05	2.5

#### Table 25 Equity benchmark return by region and country. Annualised. Percent

able 25 cont. Equity benchmark re	eturn by region and country. Annualisec	l. Percent		
	The fund's cur	rency basket	Local curren	cy 1
	2019	5-Year	2019	5-Yea
Asia	18.01	7.77	17.54	6.1
Japan	19.05	9.05	18.21	6.1
China	22.54	7.16	22.40	6.4
Taiwan	34.44	11.22	31.43	9.2
South Korea	10.23	6.12	14.53	6.4
India	5.56	6.40	8.19	8.2
Hong Kong	11.26	6.31	11.01	5.6
Singapore	16.27	4.55	15.00	4.0
Thailand	11.43	6.24	2.76	3.4
Malaysia	0.20	-0.22	-0.57	2.1
Indonesia	9.83	3.78	6.29	5.3
Philippines	10.64	0.85	6.82	2.6
Pakistan	1.99	-5.89	14.06	1.8
Oceania	23.27	6.87	23.72	9.3
Australia	22.87	6.54	23.36	9.0
New Zealand	30.77	14.06	30.29	16.5
atin America	20.24	5.37	23.15	<b>12</b> .1
Brazil	28.33	9.90	33.52	18.5
Mexico	12.61	-3.01	8.24	1.1
Chile	-16.76	-0.23	-9.60	3.3
Colombia	37.15	1.30	38.92	7.2
Peru	-6.52	8.65	-6.29	7.8
Africa	11.62	0.88	8.32	4.3
South Africa	11.17	1.12	8.18	4.2
Egypt	25.91	-5.09	13.72	10.6
1iddle East	14.25	2.06	11.30	0.1
Israel	18.50	0.31	9.80	-2.7
Qatar <sup>2</sup>	4.03	-	4.27	
Kuwait <sup>3</sup>	33.42	-	33.58	
United Arab Emirates	4.66	0.23	4.91	-0.5

<sup>1</sup> Local currency returns are based on instrument currency.

 $^{\rm 2}$  Qatar was introduced to the benchmark index on 19 September 2016.

 $^{\scriptscriptstyle 3}$  Kuwait was introduced to the benchmark index on 24 September 2018.

	The fund's cur	rency basket	Local curren	cy <sup>1</sup>
	2019	5-Year	2019	5-Year
Equity benchmark	25.65	8.75	25.59	8.82
Financials	23.08	6.89	22.92	7.22
Banks	17.48	3.66	17.12	4.20
Real estate investment and services	21.43	8.48	21.43	8.18
Real estate investment trusts	26.71	7.80	26.55	7.98
Nonlife insurance	24.31	11.10	24.89	11.03
Life insurance	23.77	6.31	22.36	6.96
Financial services	34.38	11.84	34.64	12.02
Technology	42.02	17.44	42.58	16.81
Software and computer services	34.34	18.70	34.93	18.25
Technology hardware and equipment	52.08	16.69	52.62	15.86
Industrials	30.23	9.30	30.34	9.2
Aerospace and defense	29.68	8.74	29.88	9.5
General industrials	20.50	3.86	20.77	4.0
Electronic and electrical equipment	38.69	11.67	38.53	10.56
Industrial engineering	28.35	9.06	29.29	8.64
Industrial transportation	27.04	7.61	26.96	7.68
Support services	35.13	13.86	34.45	13.90
Construction and materials	29.59	8.66	29.94	8.94
Consumer goods	22.89	8.39	23.04	8.3
Personal goods	26.82	12.27	27.72	12.54
Household goods and home construction	26.40	7.82	25.97	8.29
Leisure goods	31.04	16.01	31.04	14.4
Food producers	25.11	8.03	24.26	7.5
Beverages	20.89	8.49	20.97	9.63
Automobiles and parts	14.52	2.74	15.26	2.00
Health care	24.44	9.68	24.39	9.4
Health care equipment and services	27.65	15.44	28.04	15.01
Pharmaceuticals and biotechnology	23.08	7.70	22.83	7.48

 Table 26
 Equity benchmark return by sector. Annualised. Percent

Table 26 cont.	Equity benchmark return by sector. Annualised. Percent					
		The fund's curr	ency basket	Local curren	icy <sup>1</sup>	
		2019	5-Year	2019	5-Year	
Consumer service	es	25.27	9.18	24.99	9.24	
Food and drug	retailers	16.09	3.25	15.52	3.66	
General retailer	'S	31.50	13.12	31.70	12.88	
Travel and leisu	ire	19.76	9.07	19.03	8.93	
Media		24.34	6.76	23.90	7.27	
Oil and gas		12.61	3.16	11.40	3.78	
Oil and gas pro	ducers	10.70	4.56	9.43	5.35	
Oil equipment,	services and distribution	21.51	-5.12	20.24	-5.21	
Alternative ene	rgy	38.53	6.77	40.38	6.71	
Basic materials		17.58	6.82	17.23	7.15	
Chemicals		17.33	7.11	17.83	6.91	
Forestry and pa	aper	17.62	10.51	18.49	11.79	
Industrial meta	ls and mining	6.16	1.98	7.03	2.59	
Mining		25.62	8.01	22.79	10.06	
Utilities		23.84	7.71	24.41	8.29	
Electricity		25.37	9.47	26.20	9.66	
Gas, water and	multiutilities	21.67	5.36	21.83	6.44	
Telecommunicati	ons	13.84	2.57	13.58	3.03	
Fixed line teleco	ommunications	16.14	3.12	16.38	3.44	
Mobile telecom	imunications	11.42	1.92	10.64	2.52	

<sup>1</sup> Local currency returns are based on instrument currency.

	The fund's cu	irrency basket	Local curren	cy <sup>1</sup>
	2019	5-Year	2019	5-Year
Fixed-income benchmark	7.35	3.07	7.57	3.07
North America	9.48	3.81	9.38	3.21
US dollar	9.39	4.04	9.66	3.27
Canadian dollar	10.75	0.89	5.41	2.43
Europe	4.84	1.79	5.91	2.81
Euro	3.46	1.43	5.61	2.20
British pound	11.94	2.16	7.88	4.76
Swiss franc	5.42	2.82	3.80	1.53
Swedish krona	-3.93	-1.32	1.68	1.51
Polish zloty	3.17	2.59	4.26	3.14
Russian rouble	33.73	16.03	20.02	15.97
Danish krone	1.62	1.46	3.88	2.30
Czech koruna	3.24	1.34	4.07	0.36
Hungarian forint <sup>2</sup>	1.71	-	7.03	-
Asia	3.64	4.28	3.31	2.26
Japanese yen	2.42	4.21	1.69	1.42
South Korean won	0.02	3.07	3.92	3.35
Thai baht	24.85	8.61	15.13	5.74
Malaysian ringgit	9.93	2.69	9.08	5.17
Singapore dollar	5.79	3.50	4.61	3.03
Hong Kong dollar	2.53	2.03	2.28	1.37
Oceania	7.50	2.09	7.82	4.41
Australian dollar	7.55	1.92	7.97	4.28
New Zealand dollar	7.08	3.15	6.69	5.44
Latin America	21.88	1.62	17.90	5.92
Mexican peso	23.46	1.64	18.67	6.01
Chilean peso	-3.29	0.63	5.03	4.26
Middle East	19.51	6.90	10.73	3.60
Israeli shekel	19.51	6.90	10.73	3.60

#### Table 27 Fixed-income benchmark return by region and currency. Annualised. Percent

<sup>1</sup> Local currency returns are based on instrument currency.

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

	The fund's cu	The fund's currency basket		Local currency <sup>1</sup>	
	2019	5-Year	2019	5-Year	
Fixed-income benchmark	7.35	3.07	7.57	3.07	
Government (including supranationals)	6.23	2.82	6.32	2.81	
Treasuries	6.19	2.86	6.28	2.79	
Inflation-linked bonds	7.58	2.82	7.27	3.26	
Supranationals	4.00	1.83	4.99	2.17	
Corporate (including covered bonds)	9.98	3.65	10.51	3.68	
Financials	10.19	3.86	10.43	3.85	
Industrials	12.09	4.36	12.51	4.13	
Utilities	11.89	3.84	11.77	4.08	
Covered	0.79	0.59	2.68	1.31	

 Table 28
 Fixed-income benchmark return by sector. Annualised. Percent

<sup>1</sup> Local currency returns are based on instrument currency.

### **Relative return**

The return on the fund was 23 basis points higher than the return on the fund's benchmark index in 2019. Since the fund's inception, the annualised return on the fund has been 25 basis points higher than the return on the benchmark.

Investment returns on all of the fund's investments, including real estate investments, are measured against the fund's benchmark index comprising 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.

The return on the fund was 23 basis points higher than the return on the fund's benchmark index in 2019. Since the fund's inception, the annualised return has been 25 basis points higher than the return on the benchmark.

The fund has outperformed its benchmark index in 17 out of 22 years since 1 January 1998, equity management in 16 out of 21 years, fixed-income management in 16 out of 22 years, and real estate management in two out of three years.

Equity management had a relative return of 51 basis points in 2019, 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 fixedincome management was 11 basis points in 2019, measured against its funding, and has been 14 basis points, on an annualised basis, since 1 January 1998.

From 2017, all real estate investments are included in the fund's relative return. Real estate management, consisting of both unlisted and listed real estate investments, returned 10.36 percent in 2019. The return on the equities and bonds sold to finance these real estate investments was 14.25 percent. The relative return for the fund's real estate management

#### Table 29 Relative return. Percentage points

	2019
Fund	0.23
Equity investments	0.37
Equity management	0.51
Fixed-income investments	0.21
Fixed-income management	0.11

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was therefore -3.89 percentage points. Since 2017, the annualised relative return on real estate management has been 0.95 percentage point.

#### The use of benchmarks

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

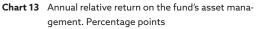
While the total return on the fund is largely determined by the fund's benchmark index, the reference portfolio is tailored to fit the characteristics of the fund better by improving geographical diversification, gaining exposure to additional sources of systematic risk, reducing turnover, and funding the fund's real estate portfolios. The reference portfolio is rule-based and serves as a starting point for our other investment strategies. The rules governing the reference portfolio are based on a tradeoff between ensuring appropriate aggregate exposures while keeping the complexity low.

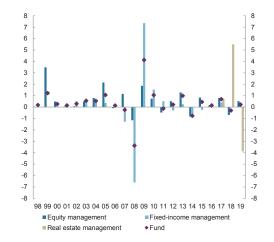
In addition to the reference portfolio, we use funding benchmarks and performance benchmarks to implement the fund's investment strategies. These two types of benchmarks serve different purposes in implementing and measuring the fund's investment strategies.

We typically sell assets to fund 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. The mix of assets we sell does not therefore necessarily match the assets in the performance benchmark.



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





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 measure the relative performance accurately.

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

The reference portfolio is measured relative to the fund's benchmark index, and the layered benchmark structure ensures that the relative performance of fund allocation, security selection and asset management equals the investment portfolio's performance relative to the Ministry of Finance benchmark. In combination, this means that the security selection strategies are measured relative to performance benchmarks, while the asset management strategy is measured relative to the reference portfolio after taking out the effect of the corresponding funding benchmarks.

#### The funding of real estate

Investments in unlisted real estate were funded by an equivalent reduction in the fixed-income allocation from 2011 to 2016 and can therefore be measured against the fund's global fixedincome benchmark in that period. The return difference for unlisted real estate measured against this funding includes currency effects, since the funding was done as a slice of a global benchmark and not linked to the actual real estate currency composition. Unlisted real estate investments were also not part of the mandate restriction for tracking error in the same period.

From 2017, investments in unlisted and listed real estate have been funded to replicate the risk profile and align with the currency composition of the investments, using a combination of equity and fixed-income securities. Real estate also became part of the mandate restriction for tracking error in the same period. From 2017, the relative return for real estate management has been measured against this funding.

We target a diversified country and sector composition for the combined real estate portfolio, but the allocation of countries and sectors can vary between the listed and unlisted portfolios depending on the availability of relevant investments.

#### Table 30 Regional composition and largest countries of real estate management

Region/country	Millions of kroner <sup>1</sup>	Percent
North America	199,509	48.1
US	199,509	48.1
Europe	199,506	48.1
UK	78,408	18.9
France	60,012	14.5
Germany	33,528	8.1
Other	27,559	6.7
Asia	3,783	0.9
Japan	3,783	0.9

<sup>1</sup> Does not sum up to total market value due to cash and receivables being excluded.

#### Table 31 Sector composition of real estate management

Sector	Millions of kroner <sup>1</sup>	Percent
Office	199,723	48.2
Retail	77,908	18.8
Logistics	59,773	14.4
Other	65,394	15.8

<sup>1</sup> Does not sum up to total market value due to cash and receivables being excluded.

#### Table 32 Return on real estate management. Measured in the fund's currency basket. Annualised

	Since inception <sup>1</sup>	2011 <sup>1</sup> -2016	2017-2019	2019
Return on unlisted real estate investments (percent)	6.43	5.98	7.30	6.84
Return on listed real estate investments (percent)	6.43	5.17	7.35	20.88
Return on real estate management (percent)	6.33	5.81	7.33	10.36
Return on real estate management funding benchmark <sup>2</sup> (percent)	5.05	4.37	6.38	14.25
Return difference on real estate management (percentage points)	1.28	1.44	0.95	-3.89

<sup>1</sup> From 01.04.2011 except for listed real estate investments. which is from 01.11.2014.

<sup>2</sup> The funding benchmark for real estate management was the fixed-income benchmark in the period 01.04.2011.

to the end of 2016, while it has been a combination of equity and fixed-income securities since 01.01.2017.

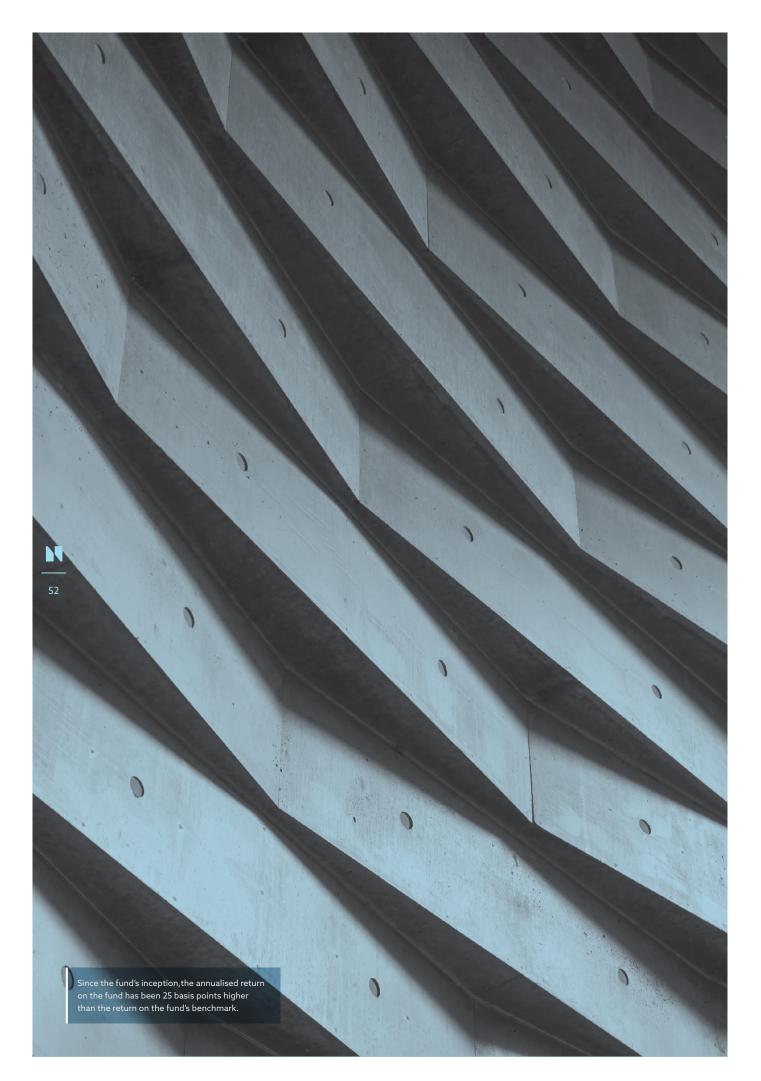


Table 33	Relative return on the fund's asset management. Measured in the fund's currency basket. Percentage points					
		Equity	Fixed-income	Real estate		
Year	Fund <sup>1</sup>	management <sup>2</sup>	management <sup>2</sup>	management <sup>2</sup>		
2019	0.23	0.51	0.11	-3.89		
2018	-0.30	-0.69	-0.01	5.49		
2017	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. The fund's relative return prior to 2017 is calculated on equity and fixedincome management only.

<sup>2</sup> Measured against actual funding from 01.01.2017. The relative return on equity and fixed-income management before 2017 is measured against the respective Ministry of Finance asset class indices.

Table 34         Relative return. Measured in the fund's c	urrency basket. An	inualised			
	Since inception <sup>1</sup>	Last 15 years	Last 10 years	Last 5 years	2019
Return on fund (percent) <sup>2</sup>	6.09	6.46	7.83	7.05	19.95
Return on fund benchmark (percent) <sup>2</sup>	5.84	6.31	7.59	6.82	19.72
Relative return on fund (percentage points) <sup>2</sup>	0.25	0.15	0.24	0.23	0.23
Return on equity management (percent)	6.22	7.88	9.85	9.02	26.13
Return on equity management benchmark (percent)	5.78	7.57	9.63	8.75	25.62
Relative return on equity management (percentage points)	0.44	0.31	0.23	0.27	0.51
Return on fixed-income management (percent)	4.69	4.05	4.05	3.18	7.56
Return on fixed-income management benchmark (percent)	4.55	3.95	3.87	3.10	7.45
Relative return on fixed-income management (percentage points)	0.14	0.10	0.17	0.08	0.11
Return on real estate management (percent)	7.33	-	-	-	10.36
Return on real estate management benchmark (percent)	6.38	-	-	-	14.25
Relative return on real estate management (percentage points)	0.95	-	-	-	-3.89

<sup>1</sup> Fund and fixed-income management since 01.01.1998. equity management since 01.01.1999 and real estate management since 01.01.2017.

<sup>2</sup> Includes real estate management from 01.01.2017. The fund's relative return prior to 2017 is calculated on equity and fixed-income management only.

Table 35         Relative return. 5-year buckets. Measured in the fund's currency basket. Annualised					
	1998- 2002	2003- 2007	2008- 2012	2013- 2017	2018- 2019
Return on fund (percent) <sup>1</sup>	3.19	8.92	3.15	9.25	6.12
Return on fund benchmark (percent) <sup>1</sup>	2.78	8.52	3.14	8.96	6.19
Relative return on fund (percentage points) <sup>1</sup>	0.41	0.40	0.01	0.29	-0.07
Return on equity management (percent) <sup>2</sup>	-4.85	16.28	-0.59	12.95	6.84
Return on equity management benchmark (percent) <sup>2</sup>	-5.63	15.37	-0.59	12.52	7.04
Relative return on equity management (percentage points) <sup>2</sup>	0.78	0.90	0.01	0.42	-0.19
Return on fixed-income management (percent)	6.26	4.00	5.87	2.96	4.00
Return on fixed-income management benchmark (percent)	6.09	3.97	5.44	2.98	3.95
Relative return on fixed-income management (percentage points)	0.17	0.03	0.43	-0.02	0.05
Return on real estate management (percent)	-	-	-	-	6.49
Return on real estate management benchmark (percent)	-	-	-	-	5.42
Relative return on real estate management (percentage points)	-	-	-	-	1.08

 Table 35
 Relative return. 5-year buckets. Measured in the fund's currency basket. Annualised

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

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

	Equity management	Fixed-income management	Real estate management	Allocation	Total
Fund allocation	0.02	0.00	-0.16	0.02	-0.12
Reference portfolio	-0.07	-0.01		0.01	-0.08
of which systematic factors	-0.11				-0.11
Real estate			-0.16		-0.16
Unlisted real estate			-0.19		-0.19
Listed real estate			0.04		0.04
Allocations	0.09	0.01	0.00	0.01	0.11
of which environment-related mandates	0.08	0.00			0.08
Security selection	0.19	-0.03			0.16
Internal security selection	0.16	-0.03			0.13
External security selection	0.03				0.03
Asset management	0.13	0.06		0.00	0.19
Asset positioning	0.08	0.05		0.00	0.13
Systematic factors	0.00				0.00
Securities lending	0.05	0.01			0.06
Total	0.33	0.03	-0.16	0.02	0.23

#### Table 36 Contributions to fund relative return from investment strategies in 2019. Percentage points

	Equity management	Fixed-income management	Real estate management	Allocation	Total
Fund allocation	-0.06	-0.08	0.01	0.02	-0.10
Reference portfolio	-0.02	-0.08		0.00	-0.10
of which systematic factors	-0.01				-0.01
Real estate			0.01		0.01
Unlisted real estate			0.02		0.02
Listed real estate			0.00		0.00
Allocations	-0.04	0.00	0.00	0.02	-0.01
of which environment-related mandates	0.01	0.00			0.01
Security selection	0.11	0.00			0.11
Internal security selection	0.02	0.00			0.02
External security selection	0.09				0.09
Asset management	0.10	0.07		0.00	0.18
Asset positioning	0.06	0.07		0.00	0.13
Systematic factors	-0.01	0.00			-0.01
Securities lending	0.05	0.01			0.06
Total	0.15	-0.01	0.01	0.03	0.19

 Table 37
 Contributions to fund relative return from investment strategies for 2013-2019. Annualised. Percentage points

#### Investment strategies 2013-2019

The fund's annualised relative return of 19 basis points over the past seven years can be broken into contributions from the main investment strategies employed in the management of the fund, as well as into asset classes. Asset management strategies have contributed 18 basis points to the fund's annualised relative return in the period, while the security selection and fund allocation strategies have contributed 11 basis points and -10 basis points respectively.

#### **Fund allocation**

Fund allocation represents a group of strategies where a significant portion of the exposure is in allocation effects. This includes the reference portfolio and the real estate strategy as well as the allocation component of delegated investment mandates. Their composition and scaling have changed over time, and so has their placement within fund allocation as the fund's delegation structure has evolved.

Since 2013, the annualised performance contribution from fund allocation has been -10 basis points, of which the reference portfolio has contributed -10 basis points, real estate 1 basis point, and allocations -1 basis point.

#### **Reference portfolio**

We have developed a reference portfolio to improve the fund's long-term risk-return characteristics. The reference portfolio expresses the allocation to equity and fixed-income markets and segments, sets the exposure to systematic risk factors and manages the allocation to real estate. We also use the reference portfolio to facilitate cost-efficient transitions and to fulfil specific requirements in the management mandate. Most of these decisions represent large, strategic exposures that are not wellsuited for delegated management, and the reference portfolio is therefore anchored at the highest level in the fund. The reference portfolio serves as the starting point for our investment strategies.

Since 2013, the annualised contribution from the reference portfolio strategies has been -10 basis points, of which -1 basis point stems from systematic risk factors and -5 basis points from emerging-market debt.

#### 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 benchmark 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 has contributed 1 basis point to the fund's relative return over the period 2013-2019. Unlisted real estate has contributed 2 basis points, while listed real estate's contribution has been negligible.

#### Allocations

Allocations includes strategies with allocation features where the investment decision is delegated through a mandate. For example, parts of the rebalancing of the reference portfolio have been delegated historically and included under allocations. Some of our strategies, such as external managers in emerging markets and environmental mandates, have both allocation and selection features. In some cases, we can separate these effects in performance measurement and report the allocation component under fund allocation.

For example, we use tailored benchmarks for our external emerging-market managers. The difference between the funding and the tailored benchmark is included under allocations. For environmental mandates, it is challenging to separate the two components, and we therefore include the combined strategy under fund allocation.

Allocation also captures the transition to a 70 percent equity share, which was finalised this year. The transition was specified in a plan from the Ministry of Finance designed to balance cost-effective execution with prudent risk management.

Since 2013, allocations have contributed -1 basis point to the fund's relative return, of which the environment-related mandates have contributed 1 basis point.

#### Security selection

The security selection strategies seek to generate excess return over benchmarks tailored to the designated investment universe, and include both internal and external selection strategies. Together, the security selection strategies have contributed 11 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 2 basis points to the fund's annualised relative return over the past seven years. The equity portfolios within internal security selection have contributed 2 basis points, while the fixed-income portfolios have had an immaterial impact on the fund's relative return. 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 a positive contribution of 3 basis points in the period 2013-2019. The single largest positive impact has come from selection within the financial sector, which contributed 3 basis points to the fund's relative return. Selection within basic materials has contributed 2 basis points, while selection within consumer services has made a negative contribution of 3 basis points.

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

As regards to the impact of to changing the fund's equity investments within countries, the largest impacts have come from investments in the US and Germany, which have both contributed 2 basis points to the fund's relative return. The contribution from changing the fund's investments in Switzerland has been -2 basis points. The combined impact on the fund's relative return from changing the geographical distribution across regions has been immaterial. The fixed-income portfolios within internal security selection invest in corporate bonds. The contribution to the fund's relative return over the past seven years has been immaterial.

#### External security selection

Norges Bank Investment Management utilises external portfolio managers in equity markets and segments where local specialist knowledge is particularly relevant. Local equity managers invest in specific countries in emerging and frontier markets, and small-capitalisation companies in selected countries in developed markets. On average, 4.1 percent of the fund was managed by external equity managers in the period.

The external security selection strategy has contributed 9 basis points to the fund's annualised relative return over the past seven years. Each of the mandates in emerging markets and smallcapitalisation 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 smallcapitalisation 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 and relative value strategies for both equities and fixed income. In the period 2013-2019, 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 past seven years, asset positioning has contributed 13 basis points to the fund's annualised relative return.

The investment strategy's equity investments have contributed 6 basis points over the sevenyear period. European equities have contributed the most, followed closely by Asian equities. Broken down into market segments, the largest contribution has come from emerging-market companies, followed by large-capitalisation companies and then small-capitalisation companies in developed markets.

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, currency and country exposure, and relative value 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 3 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 3 basis points to the fund's relative return. The contribution 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 have contributed 1 basis point to the fund's relative return measured over the past seven years. Balanced duration positions across countries have contributed most.

#### Systematic factors

In addition to the risk factors inherent in the reference portfolio, 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. Since then, the fund's exposure to these risk factors has been reincluded into the reference portfolio. Following a transition, the asset management strategy is now focused on cost-efficient implementation of the reference portfolio's exposure. Asset management's exposure to risk factors has made a marginally negative contribution over the seven-year period, where the value factor has been the biggest detractor from performance.

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 contribution of -1 basis point over the past seven years, with positioning towards value detracting the most at -2 basis points.

#### Securities lending

Securities lending is an integrated part of our asset management strategies. We use both direct internal lending and external agency lending through our custodian Citibank. The fund's securities lending activities has contributed 6 basis points to the fund's relative return over the period 2013-2019. Lending of equity investments has contributed 5 basis points during the period. Europe has accounted for 39 percent of revenues from equity lending, while the Asia and Oceania region and the Americas have contributed 38 percent and 24 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 has increased its fixed-income lending by structuring balance-sheet-efficient funding trades with its counterparties. As a result, fixed-income lending has contributed 1 basis point to the fund's return over the seven-year period.

## **Return and costs**

We maintain a high level of cost awareness in our management of the fund. Total management costs as a share of assets under management have fallen in recent years, despite the build-up of a portfolio of unlisted real estate investments and increased expectations and requirements related to responsible investment and reporting.

The scope of the management mandate has increased over time, with a higher allocation to equities and investments in more markets and currencies.

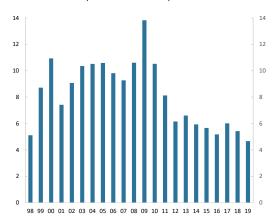
The fund's objective as set out in the management mandate from the Ministry of Finance is to achieve the highest possible return after costs within the management framework.

The Ministry of Finance has delegated responsibility for the management of the fund to Norges Bank. The Ministry of Finance reimburses Norges Bank for costs incurred in connection with 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 at 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.

#### 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. We allocate costs to the different strategies in line with actual costs or using allocation keys based on factors such as number of employees or volumes. 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.

Chart 14 Total management costs as a share of assets under management. Costs reimbursed by the Ministry of Finance. Basis points



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### Table 38Management costs per investment strategy in<br/>2019. Costs reimbursed by the Ministry of<br/>Finance. Basis points

	Contribution to the fund's management costs	Management costs based on assets under management
Fund allocation	0.7	
of which unlisted real estate	0.4	15.3
Security selection	1.8	10.2
Internal security selection	0.7	5.2
External security selection <sup>1</sup>	1.1	29.3
Asset management	2.2	2.8
Total	4.7	

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

Table 39	Management costs per investment strategy		
	2013-2019. Costs reimbursed by the Ministry of		
	Finance. Basis points		

	Contribution to the fund's management costs	Management costs based on assets under management
Fund allocation	0.3	
Security selection	2.5	15.7
Internal security selection	0.7	5.9
External security selection <sup>1</sup>	1.8	44.0
Asset management	2.3	2.9
Unlisted real estate <sup>2</sup>	0.5	23.1
Total	5.6	

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

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

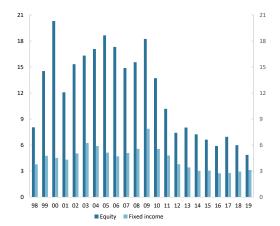
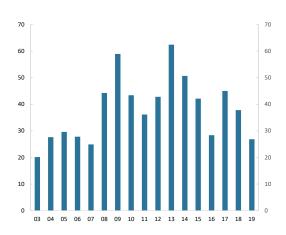


Chart 15 Management costs per asset class. Costs reimbursed by the Ministry of Finance. Basis points





#### 63

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 adjustments made are management costs of a passive strategy, revenues from securities lending, transaction costs related to replication of the benchmark index, and transaction costs related to inflows and extraordinary benchmark changes.

#### Management costs of a passive strategy

The estimated management costs for a passive management strategy are based on the fund's actual management costs for each year, where costs related to active management strategies have been subtracted.

#### **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 benchmark index

Changes in the equity and bond indices, such as company inclusions and periodic index re-weightings, 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 in nature.

### 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 of 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 in nature.

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 past five years, the estimated difference is 17 basis points.

#### Table 40 The fund's relative return after management costs. Annualised. Basis points

	Last 5 years	Since inception
The fund's relative return before management costs	23	25
The fund's management costs <sup>1</sup>	-5	-8
The fund's relative return after management costs	18	17

 $^{\scriptscriptstyle 1}$  The fund's management costs exlude costs related to unlisted real estate prior to 2017.

#### Table 41 Estimated relative return of a passive strategy. Annualised. Basis points

	Last 5 years	Since inception
Management costs of a passive strategy	-3	-4
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	-4
Estimated relative return of a passive strategy	0	-7

#### Table 42 Cost-adjusted relative return comparison. Annualised. Basis points

	Last 5 years	Since inception
The fund's relative return after management costs	18	17
Estimated relative return of a passive strategy	0	-7
Estimated relative return difference	17	23

# 3 | Risk

Risk	68
Relative risk	
Risk adjustments	82

## Risk

The fund's risk is primarily driven by its asset allocation. The expected volatility of the fund was 7.7 percent at the end of 2019.

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 benchmark 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.

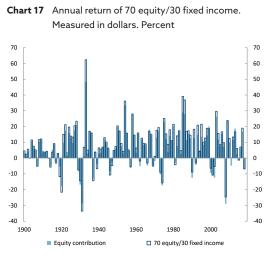
#### Absolute equity exposure

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 benchmark index. In 2019, the Ministry of Finance's plan to increase the strategic equity share to 70 percent was completed. The actual equity exposure at the end of 2019 was 70.7 percent.

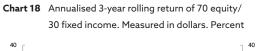
#### Asset class correlations

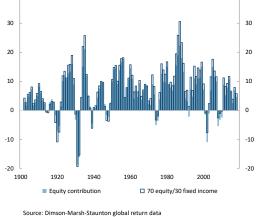
In addition to asset class weights, the fund's total risk is determined by how the individual asset classes co-move over time, which can be expressed through their correlation coefficients. A high correlation leads to low diversification gains, and vice versa. Historically, these correlations have changed and even switched sign. For 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 the krone and equity markets, whereas historically their correlation has shifted between positive and negative.

Risk | Return and risk 2019 | Government Pension Fund Global



Source: Dimson-Marsh-Staunton global return data





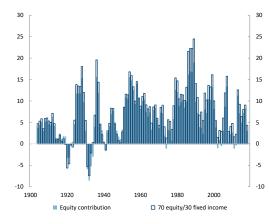
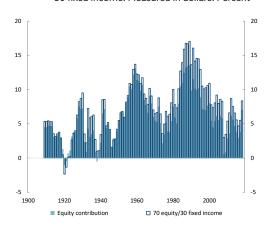


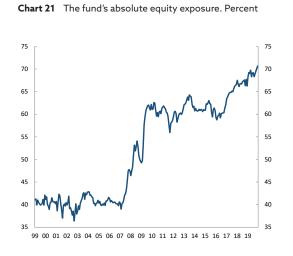
Chart 19 Annualised 5-year rolling return of 70 equity/ 30 fixed income. Measured in dollars. Percent

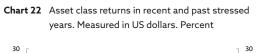
Chart 20 Annualised 10-year rolling return of 70 equity/ 30 fixed income. Measured in dollars. Percent

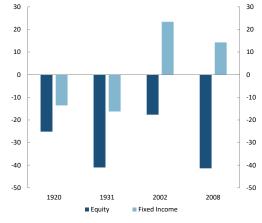


Source: Dimson-Marsh-Staunton global return data

Source: Dimson-Marsh-Staunton global return data







Source: Dimson-Marsh-Staunton global return data

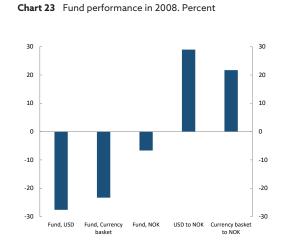
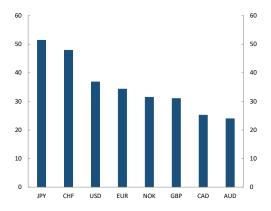


Chart 24 Expected shortfall of a 70 equity/30 fixedincome benchmark. Percent



Risk | Return and risk 2019 | Government Pension Fund Global

Looking at two of the recent crises - the dotcom 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 krone exchange rate. In that year, the krone depreciated, leading to better performance measured in kroner 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 krone 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 kroner. Scaled to the fund's size at the end of 2019, this would amount to a loss of more than 4,000 billion kroner.

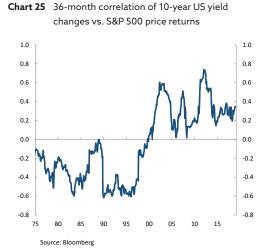
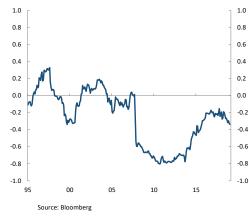


Chart 26 36-month correlation of USD-to-NOK percent changes vs. S&P 500 price returns



#### 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. For 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.

#### Expected absolute volatility

The fund's expected absolute volatility, calculated using the statistical measure 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 2019, expected absolute volatility was 7.7 percent using a three-year price history, a decrease of 0.8 percentage point from the end of 2018. This means that annual value fluctuations of approximately 780 billion kroner can be expected for the portfolio. The expected absolute volatility of the equity portfolio was 9.9 percent at the end of 2019, compared to 11.6 percent at the end of 2018, while the volatility of the fixed-income portfolio was unchanged at 7.0 percent. The decrease in expected volatility is primarily due to smaller price fluctuations in the equity markets over the past three years than was the case at the end of 2018.

The absolute volatility of the fund at the end of 2019 was lower than the average for the past 15 years, which was 9.5 percent at the fund level at year-end. The average absolute volatility of the equity and fixed-income asset classes was 14.2 percent and 9.3 percent respectively.

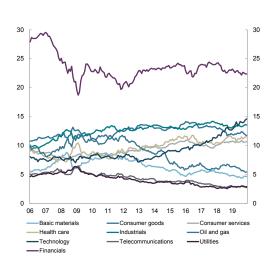
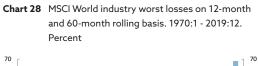
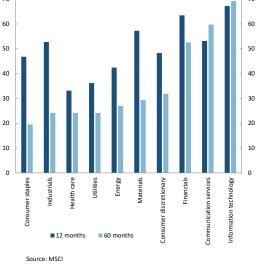


Chart 27 The fund's equity benchmark industry weights.

Percent





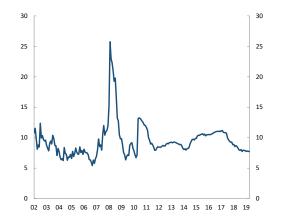
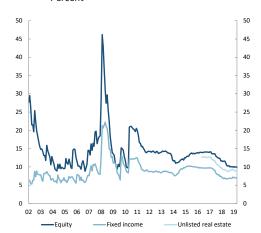
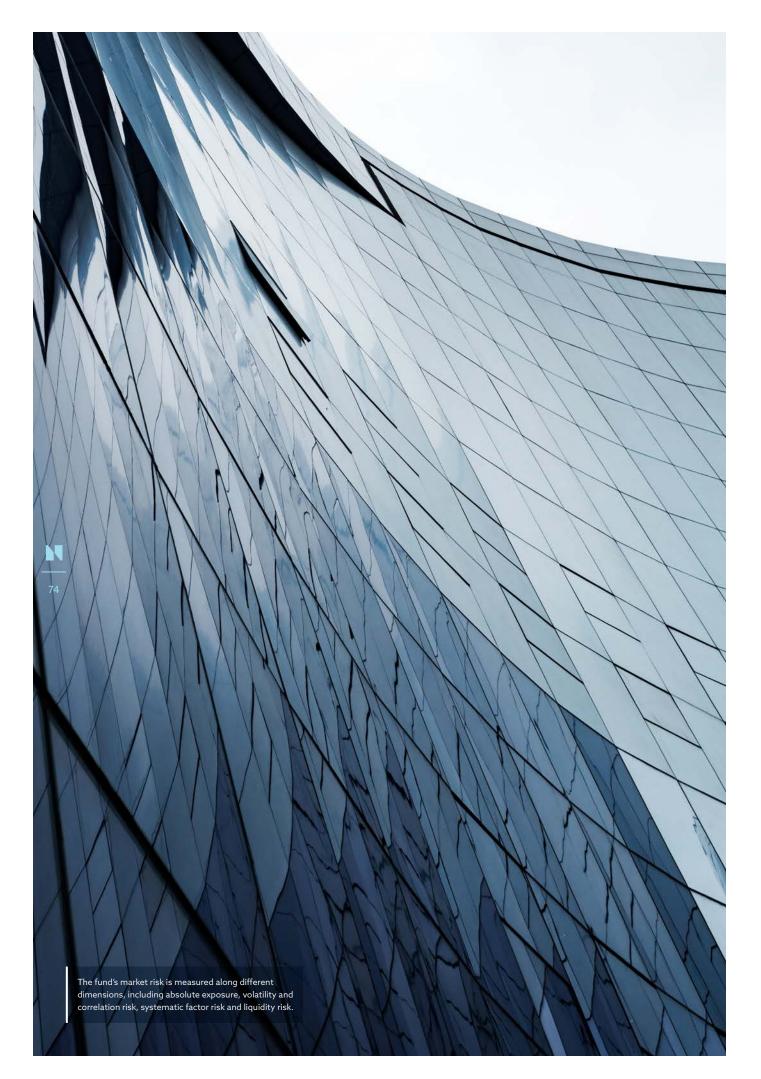


Chart 29 The fund's expected absolute volatility. Percent

Chart 30 Expected absolute volatility per asset class. Percent





Estimated by means of historical simulations of the current portfolio, expected volatility was 11.1 percent in the period from January 2007 to the end of 2019. Within this period, the highest expected volatility of a consecutive three-year period was 15.1 percent, and the lowest 7.7 percent.

#### Breakdown of expected absolute volatility

The expected volatility of equity investments was 9.9 percent at the end of 2019. A decomposition of the portfolio by industry shows that investments in financials contributed the most to the volatility in the portfolio at 2.2 percentage points. This was, however, also the largest sector, representing 23.6 percent of equity investments at the end of 2019. Measured in the fund's currency basket, the expected volatility of equity investments was 10.2 percent at the end of the year.

The expected volatility of the fund's fixedincome investments was 7.0 percent at the end of 2019. Government bonds were the largest sector and contributed 4.1 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 2019.

### Table 43Risk contribution to equity investments as<br/>at 31 December 2019. Volatility measured<br/>in kroner. Percent

Sector	Weight	Absolute volatility contribution
Financials	23.6	2.2
Technology	14.6	2.0
Industrials	13.4	1.5
Consumer services	10.7	1.2
Health care	11.3	1.1
Consumer goods	11.5	0.9
Oil and gas	5.0	0.4
Basic materials	4.4	0.4
Telecommunications	2.7	0.1
Utilities	2.8	0.1
Cash and derivatives	-0.1	0.0
Total equities	100.0	9.9

### Table 44Risk contribution to fixed-income investments<br/>as at 31 December 2019. Volatility measured in<br/>kroner. Percent

		Absolute volatility
Sector	Weight	contribution
Government bonds	57.2	4.1
Corporate bonds	23.6	1.7
Government-related bonds	11.9	0.7
Inflation-linked bonds	6.5	0.5
Securitised bonds	5.6	0.3
Cash and derivatives	-4.8	-0.3
Total fixed income	100.0	7.0

# **Relative risk**

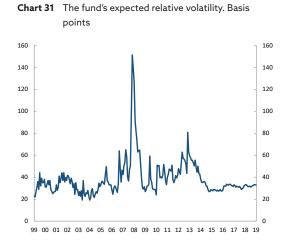
Deviations from the benchmark index are sources of relative risk. There are various approaches to measuring relative risk in the fund.

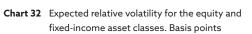
The composition of the fund differs from its benchmark index along several dimensions, including currencies, sectors, countries, regions, individual stocks and bond issuers, as well as having investments in unlisted real estate. These deviations from the benchmark index are sources of relative risk.

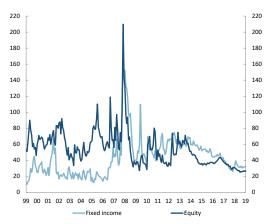
All of the fund's investments are included in the calculation of expected relative volatility and measured against the fund's benchmark index, which comprises global equity and bond indices. The scope for deviation from the benchmark index is regulated by the Ministry of Finance and Norges Bank's Executive 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 benchmark 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 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 2019. Based on monthly values over the past 15 years, the fund's expected relative volatility has averaged 41 basis points. Using historical simulations of the current portfolio and a price history from January 2007 to the end of 2019, the fund's expected relative volatility was 48 basis points. Within the 2007-2019 period, the highest expected relative volatility of a consecutive three-year period was 75 basis points, and the lowest 30 basis points.







### Table 45Expected relative volatility of investment strategies as at 31 December 2019. Each strategy measured stand-alone with<br/>the other strategies positioned in-line with the benchmarks. All figures measured at fund level. Basis points

	Equity	Fixed-income	Real estate		
	management	management	management	Allocation	Total
Fund allocation	10	7	27	0	31
Reference portfolio	9	7		0	12
of which systematic factors	9				9
Real estate			27		27
Unlisted real estate			17		17
Listed real estate			13		13
Allocations	3	0		0	3
of which environment-related mandates	2	0			2
Security selection	9	2			9
Internal security selection	7	2			7
External security selection	5				5
Asset management	5	2		0	6
Asset positioning	5	2		0	6
Systematic factors	1				1
Total	16	8	27	0	33

77

Table 46Relative risk contribution to equity management<br/>as at 31 December 2019. Basis points

Sector	Relative volatility contribution
Consumer goods	5
Financials	3
Technology	3
Industrials	3
Basic materials	3
Consumer services	3
Health care	2
Telecommunications	0
Utilities	0
Oil and gas	0
Cash and derivatives	0
Total equity management	23

 
 Table 47
 Relative risk contribution to fixed-income management as at 31 December 2019. Basis points

Sector	Relative volatility contribution
Government bonds	30
Government-related bonds	-6
Inflation-linked bonds	0
Corporate bonds	6
Securitised bonds	-2
Cash and derivatives	3
Total fixed-income management	30

Relative risk can be decomposed and calculated separately for equity management and fixedincome management. The expected relative volatility of portfolios under equity management was 23 basis points at the end of 2019, while that of portfolios under fixed-income management was 30 basis points.

Relative volatility can also be estimated for the fund's 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 benefits.

#### **Expected shortfall**

Expected relative volatility is an estimate of what can happen under normal market conditions, but it 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 benchmark index of 1.50 percentage points. The calculations are based on simulated relative returns in the currency basket of the current portfolio and benchmark index on a weekly basis from January 2007 until the end of 2019. The Executive Board has set a limit for expected shortfall between the return on the fund and the benchmark 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 2019 when measured at the fund level, and 8 basis points measured at the fixedincome management level. The expected shortfall was estimated to be 6 basis points at the fund level, and 22 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 30-120 billion kroner, which also covers investments in unlisted renewable energy infrastructure, although the fund had no such investments at the end of 2019. The expected relative volatility of this requirement was estimated to be 2 basis points at the end of 2019 when measured at the fund level, and 3 basis points measured at the equity management level. The expected shortfall was estimated to be 8 basis points at the fund level, and 11 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 benchmark 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 benchmark indices of 60 percent. At the end of 2019, the benchmark overlap was 85.9 percent at the security level for equities, and 72.1 percent at the issuer level for fixed income. Over the past ten years, the equity benchmark overlap has been relatively stable

Table 48	Expected relative volatility and expected shortfall of equity management and fixed-income management versus
	benchmark indices as at 31 December 2019. Equity and fixed-income management measured versus market value
	of each entity. 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
Fund	33	48	150
Equity management	23	28	77
Fixed-income management	30	39	101

Table 49Expected relative volatility and expected shortfall relative to benchmark of investment strategies as at 31 December2019. Each strategy measured stand-alone with the other strategies positioned in-line with the benchmarks. Measuredin 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
Fund allocation	31	43	137
Reference portfolio	12	12	31
of which systematic factors	9	7	18
Real estate	27	40	130
Unlisted real estate	17	24	73
Listed real estate	13	22	73
Allocations	3	3	8
of which environment- related mandates	2	3	8
Security selection	9	12	30
Internal security selection	7	9	25
External security selection	5	7	18
Asset management	6	11	26
Asset positioning	6	10	25
Systematic factors	1	1	4
Total	33	48	150

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 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 past five years. This value is smaller than when looking at longer sample periods, in particular when looking at the five-year period which included the financial crisis of 2008-2009. The fund's relative return has been less skewed over the past two years than in previous periods. Excess kurtosis was negative in the most recent two-year period, with fewer instances of very large monthly relative return figures than in previous periods.

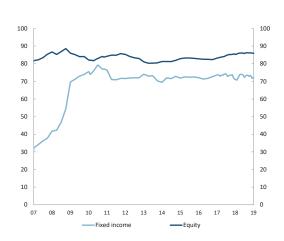


Chart 33 The fund's benchmark overlap. Percent

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

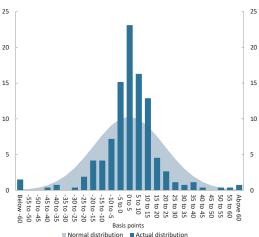




Table 50         Characteristics of the distribution for realise	a monthly relative return.	rieasured in the ru	ind s currency basi	Ket
	Since 01.01.1998 <sup>1</sup>	Last 10 years	Last 5 years	Last 3 years
Fund <sup>2</sup>				
Standard deviation relative return (percent)	0.19	0.11	0.10	0.09
Skewness relative return	-2.29	-0.20	-0.40	-0.01
Excess kurtosis relative return	18.27	0.14	0.02	-0.37
Equity management				
Standard deviation relative return (percent)	0.22	0.12	0.12	0.10
Skewness relative return	-0.66	-0.77	-0.72	-0.48
Excess kurtosis relative return	9.50	0.84	0.68	-0.49
Fixed-income management				
Standard deviation relative return (percent)	0.29	0.13	0.11	0.09
Skewness relative return	-0.59	0.17	-0.19	-0.34
Excess kurtosis relative return	18.40	0.86	0.72	2.62

 Table 50
 Characteristics of the distribution for realised monthly relative return. Measured in the fund's currency basket

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

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

 Table 51
 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- 2019
Fund <sup>2</sup>					
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	0.03
Excess kurtosis relative return	2.44	4.47	6.18	0.75	-0.81
Equity management					
Standard deviation relative return (percent)	0.29	0.22	0.24	0.13	0.11
Skewness relative return	0.88	-0.23	-3.62	-0.99	-0.22
Excess kurtosis relative return	2.71	0.54	20.37	1.54	-1.05
Fixed-income management					
Standard deviation relative return (percent)	0.09	0.11	0.57	0.14	0.10
Skewness relative return	-0.55	-3.48	-0.45	-0.07	-0.18
Excess kurtosis relative return	11.49	13.73	3.56	-0.12	3.00

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

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

## **Risk adjustments**

This section looks at various riskadjusted 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 benchmark index. Since inception, the fund has been constrained by an official tracking error limit versus its benchmark. When using tracking error as the risk measure, the information ratio therefore serves as a natural starting point for risk-adjusted return analysis. One drawback of using tracking error for risk adjustments is that it tends to punish investments which have low correlation with the benchmark index, although such investments can provide diversification gains from a total portfolio perspective.

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 past ten years is higher than the value since inception, which in part is due to the volatile months in 2008 not being included in the ten-year sample. The information ratio of fixed-income management 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 management, 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

0.09

0.07

0.13

	Since 01.01.1998 <sup>1</sup>	Last 10 years	Last 5 years	Last 3 years
Fund <sup>2</sup>				
Information ratio	0.39	0.64	0.66	0.53
Jensen's alpha (percent)	0.07	0.10	0.15	0.10
Appraisal ratio	0.12	0.31	0.46	0.33
Sharpe ratio difference	0.01	0.01	0.02	0.01
Equity management				
Information ratio	0.62	0.55	0.67	0.34
Jensen's alpha (percent)	0.36	0.05	0.12	-0.04
Appraisal ratio	0.52	0.14	0.34	-0.13
Sharpe ratio difference	0.02	0.00	0.01	0.00
Fixed-income management				
Information ratio	0.14	0.36	0.20	0.48
Jensen's alpha (percent)	0.16	0.38	0.20	0.25
Appraisal ratio	0.16	0.92	0.62	0.80

0.01

 Table 52
 Relative risk-adjusted measures. Before management costs. Annualised

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

Sharpe ratio difference

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

Table 53	Relative risk-adjusted measures	. Before management costs. Annualised

	1998- 2002 ¹	2003- 2007	2008- 2012	2013- 2017	2018- 2019
Fund <sup>2</sup>					
Information ratio	0.96	0.91	0.09	0.73	-0.17
Jensen's alpha (percent)	0.43	0.16	-0.15	0.13	-0.10
Appraisal ratio	1.03	0.41	-0.17	0.36	-0.32
Sharpe ratio difference	0.07	0.03	-0.01	0.02	-0.01
Equity management					
Information ratio	0.87	1.07	0.13	0.88	-0.39
Jensen's alpha (percent)	1.03	0.53	0.09	0.14	-0.25
Appraisal ratio	1.06	0.72	0.13	0.35	-0.78
Sharpe ratio difference	0.06	0.05	0.00	0.01	-0.02
Fixed-income management					
Information ratio	0.52	0.08	0.22	-0.06	0.12
Jensen's alpha (percent)	0.16	0.05	0.15	0.23	0.13
Appraisal ratio	0.52	0.13	0.08	0.59	0.38
Sharpe ratio difference	0.05	0.02	-0.11	0.08	0.04

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

 $^{\rm 2}$  Based on aggregated equity and fixed-income investments until the end of 2016.

return after correcting for the portfolio's beta. Compared to the information ratio, Jensen's alpha rewards investments with low benchmark correlation by adjusting for beta rather than tracking error. Compared to the Sharpe ratio, Jensen's alpha assumes that the only relevant risk is the risk that cannot be 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 full 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 benchmark 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 are 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 benchmark index.

	Since 01.01.1998 <sup>1</sup>	Last 10 years	Last 5 years	Last 3 years
Fund <sup>2</sup>				
Standard deviation of investments (percent)	7.43	7.18	7.15	6.94
Standard deviation of benchmark (percent)	7.07	7.04	7.06	6.87
Sharpe ratio of investments	0.58	1.02	0.85	1.00
Sharpe ratio of benchmark	0.57	1.00	0.83	0.98
Equity management				
Standard deviation of investments (percent)	14.08	11.55	10.97	10.39
Standard deviation of benchmark (percent)	13.76	11.32	10.77	10.21
Sharpe ratio of investments	0.38	0.83	0.75	0.90
Sharpe ratio of benchmark	0.35	0.83	0.74	0.91
Fixed-income management				
Standard deviation of investments (percent)	3.28	2.74	2.83	2.56
Standard deviation of benchmark (percent)	3.16	2.90	2.99	2.66
Sharpe ratio of investments	0.84	1.28	0.77	0.85
Sharpe ratio of benchmark	0.83	1.15	0.71	0.76

 Table 54
 Absolute risk-adjusted measures. Before management costs. Annualised

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

Table 55	Absolute risk-adjusted measures	. Before management costs. Annualised
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	1998- 2002 <sup>1</sup>	2003- 2007	2008- 2012	2013- 2017	2018- 2019
Fund <sup>2</sup>					
Standard deviation of investments (percent)	6.13	3.82	11.31	6.00	8.37
Standard deviation of benchmark (percent)	6.02	3.66	10.46	5.89	8.28
Sharpe ratio of investments	-0.12	1.51	0.30	1.48	0.52
Sharpe ratio of benchmark	-0.19	1.47	0.31	1.46	0.53
Equity management					
Standard deviation of investments (percent)	16.88	9.24	19.11	9.26	12.51
Standard deviation of benchmark (percent)	16.55	9.00	18.60	9.06	12.29
Sharpe ratio of investments	-0.44	1.38	0.05	1.35	0.43
Sharpe ratio of benchmark	-0.50	1.32	0.04	1.33	0.46
Fixed-income management					
Standard deviation of investments (percent)	3.06	3.04	4.27	2.67	2.93
Standard deviation of benchmark (percent)	3.05	3.10	3.62	2.92	3.04
Sharpe ratio of investments	0.67	0.36	1.27	1.03	0.69
Sharpe ratio of benchmark	0.62	0.34	1.38	0.95	0.65

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

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

The Sharpe ratio for equity management has also been close to the Sharpe ratio for the benchmark 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.

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 some 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 2.7 percent of the fund. The fund's real estate strategy also includes listed holdings amounting to 1.4 percent of the fund at the end of 2019.

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 2019. 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 56         Unlisted real estate impact on return and risk measures. Before	pre management costs. Quarterly returns. An	nualised
	2011 - 2019 <sup>1</sup>	2017 - 2019
Fund		
Mean	7.68	8.62
Volatility	7.53	8.22
Sharpe ratio	0.94	0.86
Fund excl. unlisted real estate incl. funding		
Mean	7.64	8.59
Volatility	7.56	8.32
Sharpe ratio	0.93	0.84
Difference <sup>2</sup>		
Mean	0.04	0.03
Variance ratio	0.99	0.98
Sharpe ratio	0.01	0.01

<sup>1</sup> Return series start in second quarter 2011.

 $^{\rm 2}\,$  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 the 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.

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 40 and 55 percent of the variability in the relative returns of equity investments for the three periods: since inception, past ten years and past 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) for all three periods, and to the value factor (HML) for the past five years. For the past five years and the full sample period, negative active exposures to the investment factor (CMA) are estimated.

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 shortmaturity indices. This is discussed in more detail in the appendix. In the fixed-income regressions, factors explain between 18 and 25 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. Over the past ten year and five-year periods, 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 50 to 58 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 the full sample period. Finally, the coefficient for the market factor (MKT) is insignificant over the past five years.

#### Table 57 Equity management. Regression analysis of relative return in dollars before management costs

		Regre	ssion coe	fficients			
Sample period	Intercept, bps annualised	Market (MKT)	Small vs large (SMB)	Cheap vs expensive (HML)	Profitable vs unprofitable (RMW)	Conservative vs aggressive investment (CMA)	Variance explained in percent (R squared)
Since 01.01.1999	31	0.02	0.05	-0.01	0.01	-0.02	45
Last 10 years	16	0.01	0.03	0.01	-0.01	-0.02	40
Last 5 years	21	0.01	0.03	0.03	0.00	-0.05	55

Source: Kenneth French, Norges Bank Investment Management.

Note: Bold indicates significant at 5 percent confidence level. After management cost regressions are available in the appendix.

# Table 58 Fixed-income management. Regression analysis of relative return in dollars before management costs Regression coefficients Image: I

Sample period	Interce annua	Defaul (durati adjust	Term	Varian explair percer (R squ
Since 01.01.1998	10	0.07	-0.01	25
Last 10 years	33	0.00	-0.03	18
Last 5 years	18	0.00	-0.03	24

Source: Bloomberg Barclays Indices, Norges Bank Investment Management.

Note: Bold indicates significant at 5 percent confidence level. After management cost regressions are available in the appendix.

			Regression coefficients						
Sample period	Intercept, bps annualised	Market (MKT)	Small vs large (SMB)	Cheap vs expensive (HML)	Profitable vs unprofitable (RMW)	Conservative vs aggressive investment (CMA)	Default (duration adjusted)	Term	Variance explained in percent (R squared)
Since 01.01.1998	7	0.02	0.03	0.01	0.02	-0.03	0.03	-0.01	54
Last 10 years	23	0.01	0.03	0.00	0.01	0.00	0.00	-0.02	50
Last 5 years	27	0.01	0.03	0.01	0.00	-0.01	0.00	-0.02	58

#### Table 59 Fund. Regression analysis of relative return in dollars before management costs.

Source: Kenneth French, Bloomberg Barclays Indices, Norges Bank Investment Management.

Note: Bold indicates significant at 5 percent confidence level. After management cost regressions are available in the appendix.

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