



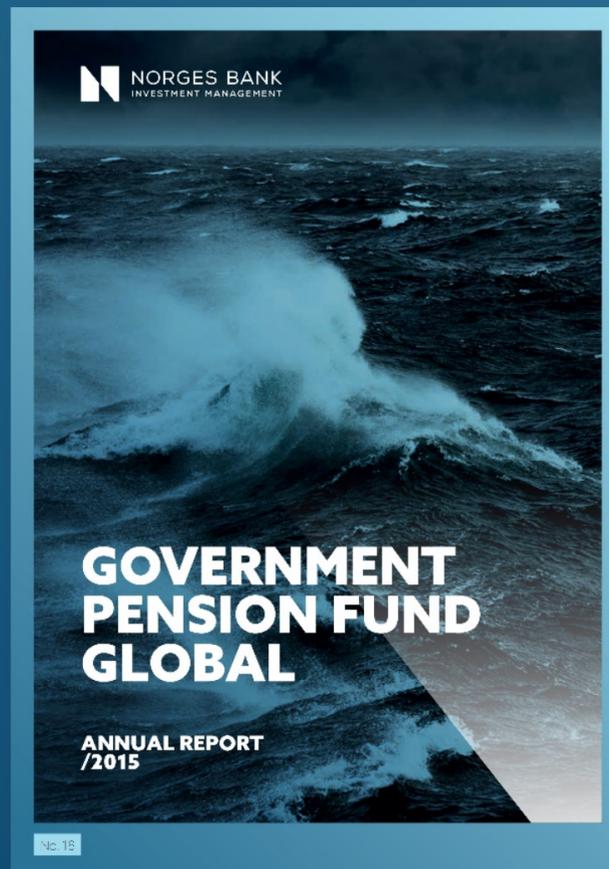
GOVERNMENT PENSION FUND GLOBAL

PERFORMANCE AND RISK

PRESS SEMINAR
OSLO, 16 MARCH 2016



Three specialist reports



Performance and Risk Report

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Historical key figures

Measured in the fund's currency basket. Percent

	2015	Last ten years	Since 1.1.1998
Gross annual return	2.74	5.34	5.64
Annual inflation	0.86	1.84	1.78
Annual management costs	0.06	0.09	0.09
Annual net real return	1.80	3.35	3.70
Annual excess return	0.45	0.06	0.26

Source: Norges Bank Investment Management



Relative return

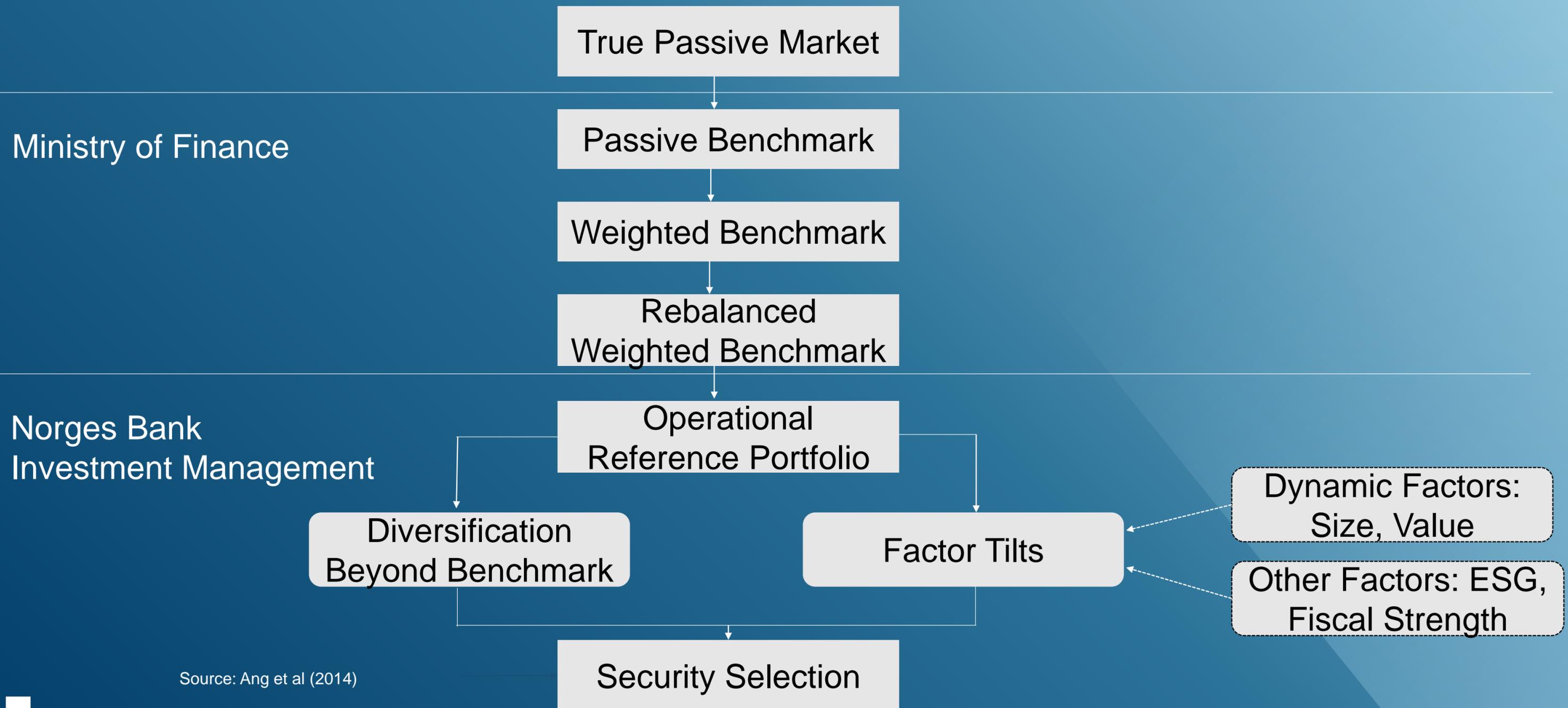
Percentage points



Source: Norges Bank Investment Management



Management of the fund

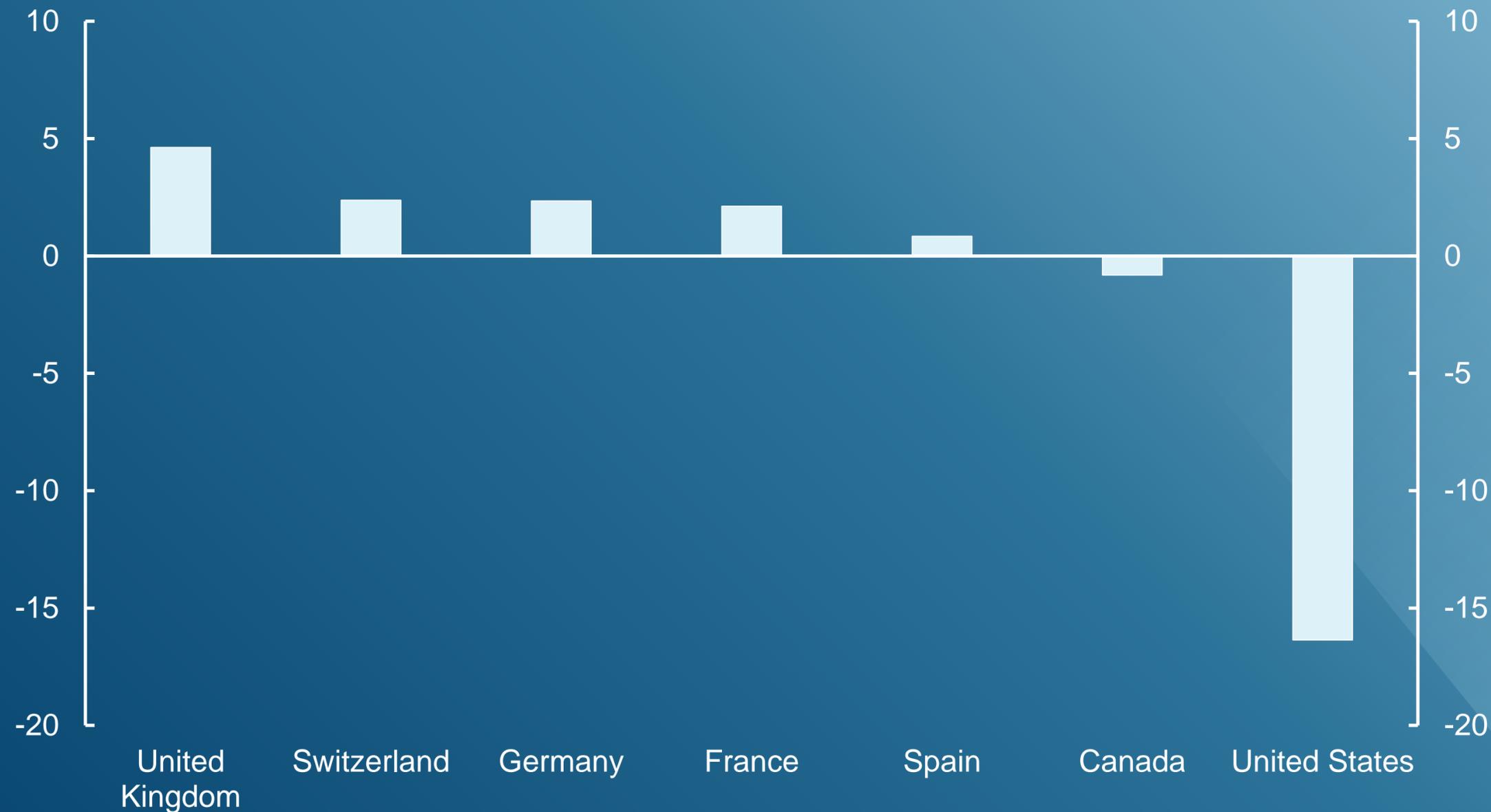


Source: Ang et al (2014)



The fund's equity benchmark versus the FTSE Global All Cap Index by country

31 December 2015. Deviation in percent

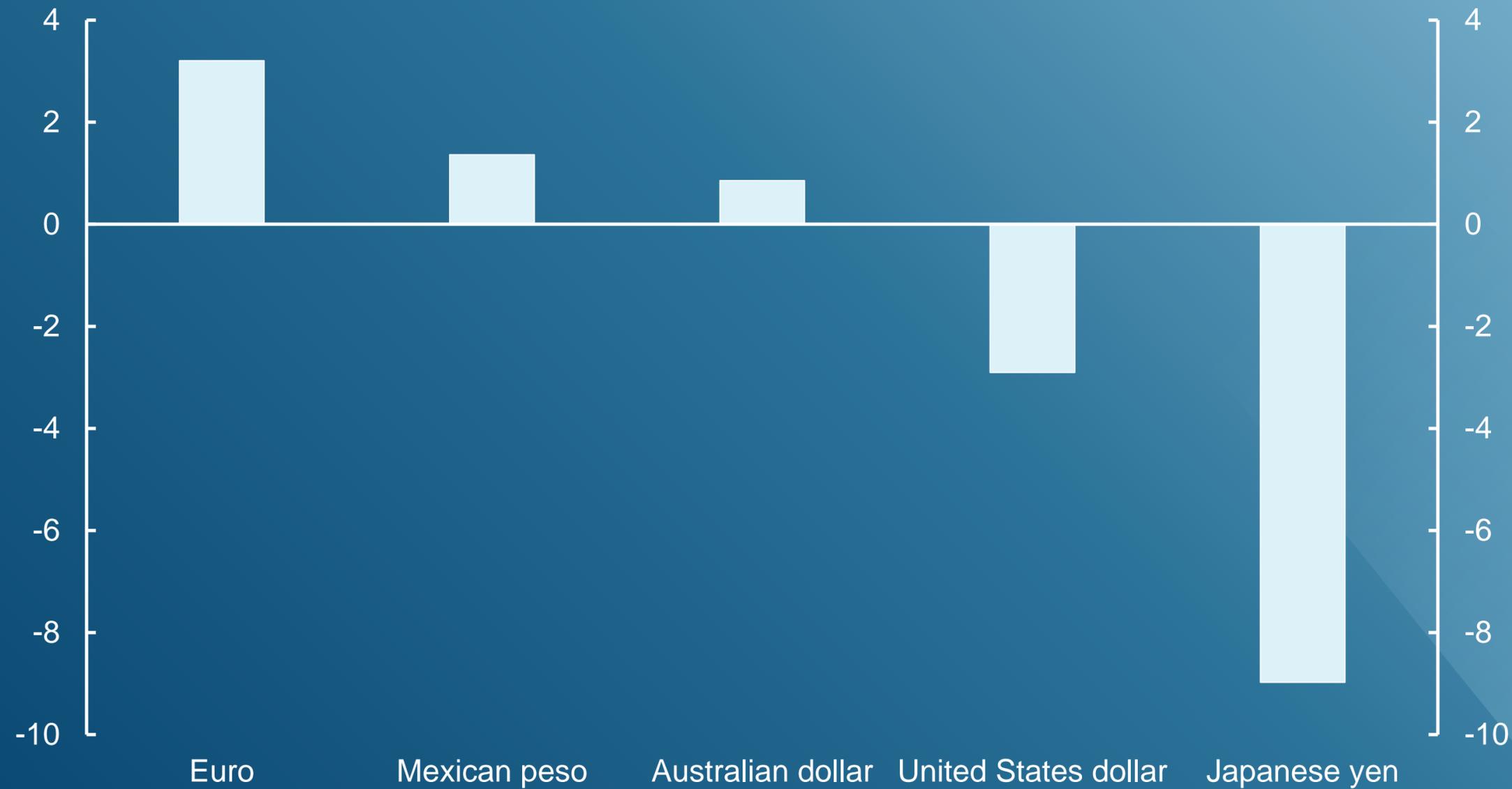


Source: Norges Bank Investment Management, FTSE



The fund's fixed-income benchmark versus the Barclays Global Aggregate Index by currency

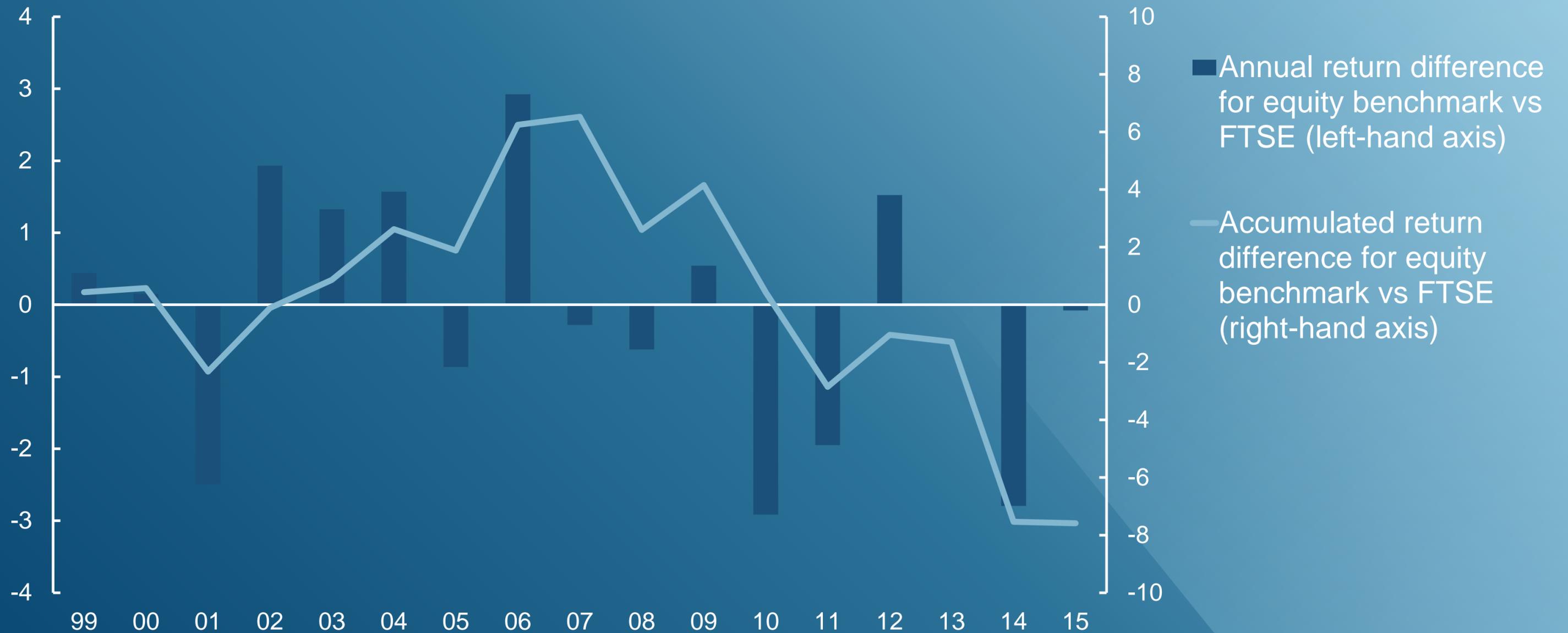
31 December 2015. Deviation in percent



Source: Norges Bank Investment Management, Barclays

Return difference between the fund's equity benchmark and the FTSE Global All Cap Index

Measured in dollar. Deviation in percentage points



Source: Norges Bank Investment Management, FTSE



Return difference between the fund's fixed-income benchmark and the Barclays Global Aggregate Index

Measured in dollar. Deviation in percentage points



Source: Norges Bank Investment Management, Barclays



Cumulative equity return contribution from company exclusions

By sector

Sector	2006-2015	31.12.2015	
	Return Contribution Percentage points	Excluded market value Percent	Excluded market value Millions of kroner
Tobacco	-0.68	1.35	61,809
Aerospace & defence	-0.36	0.75	34,298
Other	-0.14	0.69	31,340
Total	-1.17	2.79	127,447

Source: Norges Bank Investment Management



Investment strategies

Seeks to capitalise on the fund's defining characteristics

Fund
Allocation

Aims to improve the fund's exposure to broad markets and sources of return

Security
Selection

Seeks to generate excess returns making investments based on thorough understanding of individual companies

Asset
Management

Implements the targeted market exposure, balancing transaction costs, risk and return considerations

Contributions to relative return

2015. Percentage points

Strategy	Equity	Fixed income	Cross asset allocation	Total
Fund allocation	0.15	-0.16	0.04	0.02
Internal reference portfolio	0.05	-0.17	0.00	-0.12
of which systematic factors	-0.12			-0.12
of which universe expansion	0.05	-0.18		-0.13
Allocation decisions	0.10	0.01	0.04	0.15
Security selection	0.21	0.03		0.24
Internal security selection	0.13	0.03		0.16
External security selection	0.08			0.08
Asset management	0.17	0.03	-0.01	0.18
Asset positioning	0.12	0.03	-0.01	0.14
Securities lending	0.05	0.00		0.05
Total	0.52	-0.10	0.02	0.45

Source: Norges Bank Investment Management



Management costs per investment strategy

2015. Basis points

Strategy	Contribution to the fund's management costs	Management costs based on assets under management
Fund allocation	0.4	
Asset management	2.2	2.7
Security selection	2.6	16.4
Internal security selection	0.8	7.0
External security selection ¹	1.8	43.2
Real estate	0.5	18.5
Total	5.7	

¹ Includes all externally managed capital

Source: Norges Bank Investment Management



The fund's relative return

After management costs. Annualised. Basis points

	3-years	5-years	01.01.1998
The fund's relative return before management costs	21	14	26
The fund's management costs excluding real estate	-6	-6	-9
The fund's relative return after management costs	15	7	18

Source: Norges Bank Investment Management



Estimated relative return of passive strategy

Annualised. Basis points

	3-years	5-years	01.01.1998
Management costs of a passive strategy	-3	-3	-5
Revenues from securities lending	5	6	6
Transaction costs related to replication of the benchmark index	-3	-4	-4
Transaction costs related to inflows and extraordinary benchmark changes	-2	-4	-6
Estimated relative return of a passive strategy	-3	-6	-10

Source: Norges Bank Investment Management



Cost-adjusted relative return comparison

Annualised. Basis points

	3-years	5-years	01.01.1998
The fund's relative return after management costs	15	7	18
Estimated relative return of a passive strategy	-3	-6	-10
Estimated relative return difference	19	13	27

Source: Norges Bank Investment Management



Expected relative volatility by strategy

31 December 2015. Percentage points

Strategy	Equity	Fixed income	Cross asset allocation	Total
Fund allocation	0.15	0.20	0.06	0.22
Internal reference portfolio	0.16	0.11	0.00	0.19
of which systematic factors	0.07			0.07
of which universe expansion	0.12	0.12		0.16
Allocation decisions	0.07	0.14	0.06	0.13
Security selection	0.15	0.02		0.14
Internal security selection	0.15	0.02		0.14
External security selection	0.05			0.05
Asset management	0.06	0.03	0.01	0.07
Asset positioning	0.06	0.03	0.01	0.07
Total	0.23	0.19	0.05	0.28

Source: Norges Bank Investment Management



Expected relative volatility and shortfall

31 December 2015. Percentage points

Strategy	Expected relative volatility 3 years price history	Expected relative volatility 10 years price history	Expected shortfall 10 years price history
Fund allocation	0.22	0.26	0.74
Internal reference portfolio	0.19	0.20	0.51
of which systematic factors	0.07	0.07	0.20
of which universe expansion	0.16	0.16	0.50
Allocation decisions	0.13	0.17	0.45
Security selection	0.14	0.24	0.73
Internal security selection	0.14	0.24	0.75
External security selection	0.05	0.05	0.14
Asset management	0.07	0.09	0.29
Asset positioning	0.07	0.09	0.29
Total	0.28	0.37	0.95

Source: Norges Bank Investment Management



Factor regressions

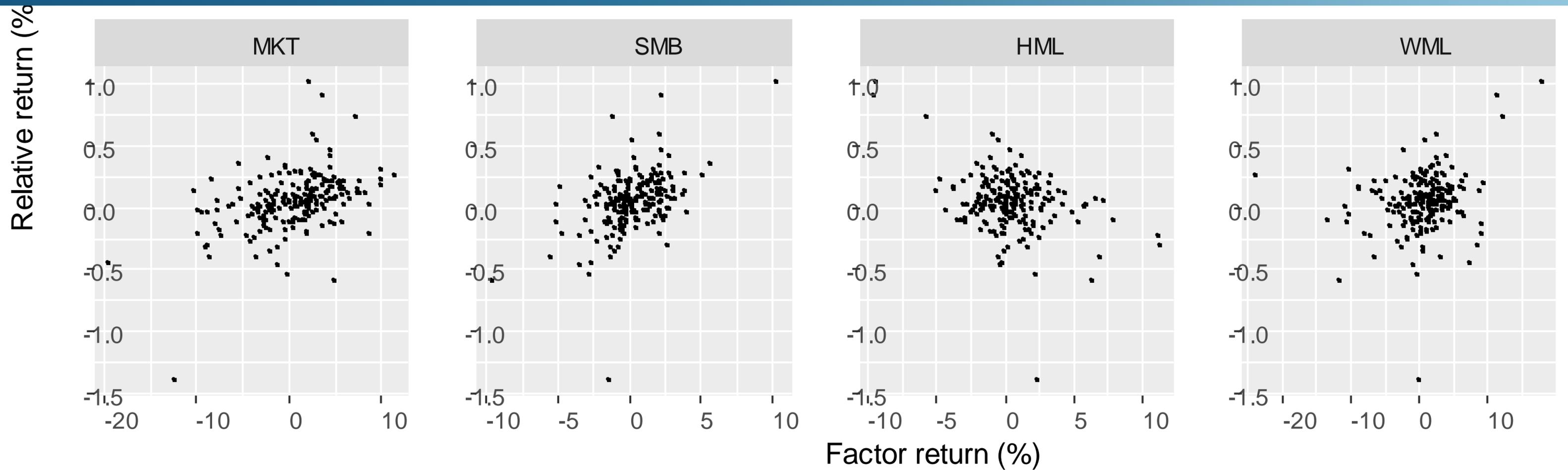
$$r - r_b \approx \beta_1(MKT - r_f) + \beta_2SMB - \beta_3HML + \beta_4WML + \alpha$$

Factor regressions

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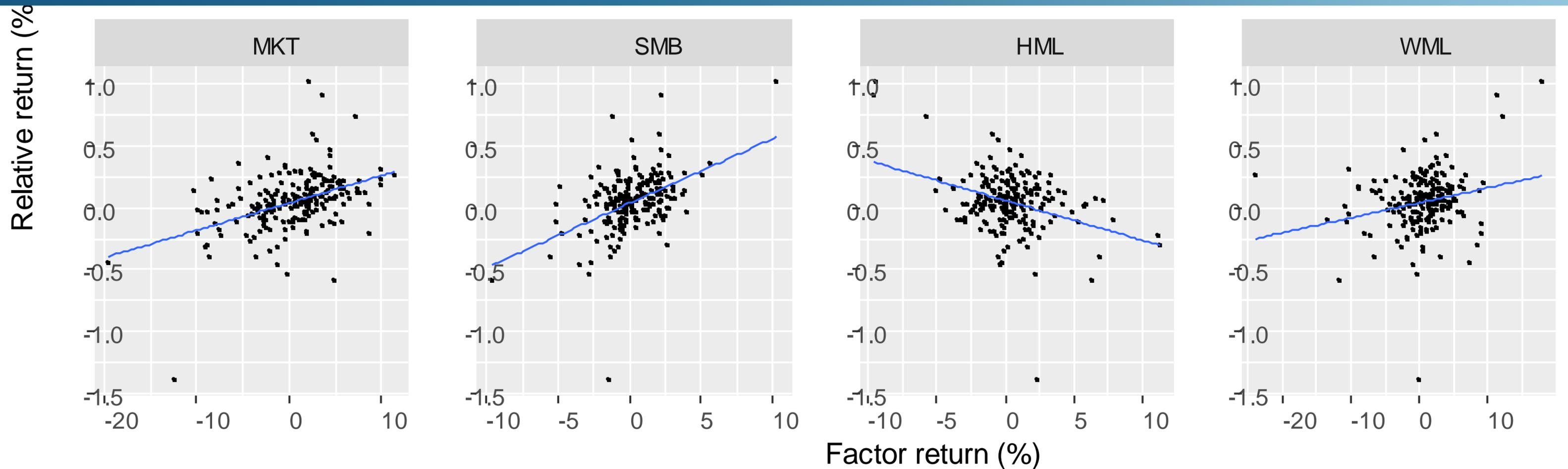
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Factor regressions

$$r - r_b \approx \beta_1 (MKT - r_f) + \beta_2 SMB - \beta_3 HML + \beta_4 WML + \alpha$$



Risk-adjusted measures

Equity investments. Annualised

	Since 01.01.1999		Last 10 years		Last 5 years	
	Before costs	After costs	Before costs	After costs	Before costs	After costs
Sharpe ratio equity investments	0.30	0.29	0.36	0.35	0.78	0.77
Sharpe ratio equity benchmark index	0.26	0.26	0.35	0.35	0.78	0.78
Sharpe ratio difference equity investments versus benchmark index	0.03	0.02	0.01	0.00	0.00	0.00
Information ratio equity investments	0.67	0.50	0.36	0.21	0.49	0.32
Jensen's alpha equity investments (percent)	0.46	0.32	0.14	0.02	0.06	-0.02
Appraisal ratio equity investments	0.62	0.43	0.21	0.03	0.14	-0.06

Source: Norges Bank Investment Management



Risk-adjusted measures

Fixed income investments. Annualised

	Since 01.01.1999		Last 10 years		Last 5 years	
	Before costs	After costs	Before costs	After costs	Before costs	After costs
Sharpe ratio fixed-income investments	0.82	0.81	0.85	0.84	1.59	1.57
Sharpe ratio fixed-income benchmark index	0.82	0.82	0.91	0.91	1.49	1.49
Sharpe ratio difference fixed-income investments versus benchmark index	0.00	-0.01	-0.06	-0.07	0.10	0.08
Information ratio fixed-income investments	0.13	0.08	0.03	0.00	-0.19	-0.27
Jensen's alpha fixed-income investments (percent)	0.13	0.08	0.04	-0.01	0.29	0.26
Appraisal ratio fixed-income investments	0.12	0.08	0.02	-0.01	0.73	0.64

Source: Norges Bank Investment Management



Risk-adjusted measures

For equity and fixed income. Annualised

	Since 01.01.1999		Last 10 years		Last 5 years	
	Before costs	After costs	Before costs	After costs	Before costs	After costs
Sharpe ratio equity and fixed-income investments	0.49	0.48	0.50	0.49	1.01	1.00
Sharpe ratio equity and fixed-income benchmark index	0.48	0.48	0.52	0.52	1.01	1.01
Sharpe ratio difference equity and fixed-income investments versus benchmark index	0.01	0.00	-0.02	-0.03	0.00	-0.01
Information ratio equity and fixed-income investments	0.39	0.27	0.12	0.02	0.37	0.20
Jensen's alpha equity and fixed-income investments (percent)	0.10	0.01	-0.19	-0.27	0.00	-0.06
Appraisal ratio equity and fixed-income investments	0.16	0.01	-0.26	-0.38	0.01	-0.16

Source: Norges Bank Investment Management



Regression analysis of relative return

Equity investments. Measured in dollars after management costs

Sample period	Intercept, bps annualised		Regression coefficients					Variance explained in percent (R squared)
	Before mgmt costs	After mgmt costs	Market (MKT)	Small vs large (SMB)	Cheap vs expensive (HML)	Profitable vs unprofitable (RMW)	Conservative vs aggressive investment (CMA)	
Since 01.01.1999	35	21	0.02	0.05	-0.01	0.02	-0.01	47
Last 10 years	15	3	0.02	0.04	-0.01	0.02	-0.03	48
Last 5 years	19	11	0.02	0.02	0.01	-0.01	-0.01	31

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

Regression analysis of relative return

Fixed income investments. Measured in dollars after management costs

Sample period	Intercept, bps annualised		Regression coefficients		Variance explained in percent (R squared)
	Before management costs	After management costs	Default (duration adjusted)	Term	
Since 01.01.1998	13	9	0.08	-0.02	30
Last 10 years	1	-4	0.10	-0.03	40
Last 5 years	15	11	0.00	-0.05	31

Source: Norges Bank Investment Management, Barclays Capital . Bold indicates significant at 5% confidence level



Regression analysis of relative return

Equity and fixed income. Measured in dollars after management costs

Sample period	Intercept, bps annualised		Regression coefficients							Variance explained in percent (R squared)
	Before mgmt costs	After mgmt costs	Market (MKT)	Small vs large (SMB)	Cheap vs expensive (HML)	Profitable vs unprofitable (RMW)	Conservative vs aggressive investment (CMA)	Default (duration adjusted)	Term	
Since 01.01.1998	7	-2	0.02	0.03	0.01	0.03	-0.02	0.03	-0.01	57
Last 10 years	1	-7	0.02	0.04	0.02	0.02	-0.05	0.03	-0.01	69
Last 5 years	16	10	0.01	0.03	0.00	0.02	0.01	0.01	-0.04	49

Source: Norges Bank Investment Management, Kenneth French, Barclays Capital. Bold indicates significant at 5% confidence level



Factor-adjusted returns

Equity investments, after management costs

Model	Asset pricing equation	α (bps, annualized)			R^2		
		Full period	Last 10 year	Last 5 year	Full period	Last 10 year	Last 5 year
CAPM	MKT	31	3	1	19 %	30 %	23 %
Fama-French 3F	MKT + SMB + HML	30	1	7	44 %	46 %	31 %
Fama-French 4F	MKT + HML + SMB + WML	19	-1	-2	48 %	46 %	33 %
Fama-French 5F	MKT + HML + SMB + CMA + RMW	21	3	11	47 %	48 %	31 %
MSCI 5F	MKT + HML + SMB + CMA + RMW	51	24	4	43 %	43 %	35 %
AQR 6F	MKT + HML + SMB + UMD + QMJ + BAB	31	32	29	45 %	43 %	36 %

Source: Norges Bank Investment Management, Kenneth French, MSCI, AQR



Factor-adjusted returns

Equity and fixed-income investments, after management costs

Data	α (basis points, annualised)	Coefficients							R^2
		MKT	SMB	HML	RMW	CMA	DEF Adj	TERM	
French	-2	0.02	0.03	0.01	0.03	-0.02	0.03	-0.01	57.00 %
MSCI	20	0.01	0.04	-0.01	-0.01	-0.02	0.03	-0.01	55.00 %

Source: Norges Bank Investment Management, Kenneth French, MSCI, Barclays. Bold indicates significant at 5% confidence level



Discussion notes


THE SMALL-FIRM FACTOR

The small-firm effect (SFE) refers to average excess returns that a portfolio of capitalisation stocks earns over capitalisation stocks. In this note, we review extensive empirical evidence on the effect and various theoretical explanations that have been put forward for the effect.


THE VALUE FACTOR

In this note, we review the theory and evidence of the value effect. The value effect is the excess return that a portfolio of stocks with a low market value relative to their book value has, on average, earned over a portfolio of stocks with a high market value relative to their book value (stocks with high market fundamentals). We will focus on the existence of a value effect.


THE QUALITY FACTOR

Quality-based investment strategies aim to capture the documented excess returns of high-quality stocks over low-quality stocks. In this note, we review the empirical evidence on the quality premium and discuss some of the explanations that researchers have put forward for the effect.

FAKTORER I NORSKESTYRKINGEN: THE QUALITY FACTOR 11


THE TERM FACTOR

In this note, we review the theory and evidence of the term premium. The term premium is the excess return that an investor obtains in holding a long-term bond instead of a short-term bond.


THE CREDIT FACTOR

In this note, we review the theory and evidence of the credit premium. The credit premium is the excess return that an investor obtains for holding a portfolio of stocks with a high credit rating relative to a portfolio of stocks with a low credit rating. A natural objective is to discuss the so-called credit spread puzzle and different attempts to resolve it.


THE CURRENCY CARRY FACTOR

The carry trade in currency markets means that an investor buys a high-yielding currency and finances the investment by borrowing money in a currency with a low interest rate. The empirical literature on the carry trade indicates that the average return from this strategy is positive and statistically and economically significant. There are, however, also prolonged periods of losses involved with the carry trade, which seems to be consistent with a risk-based explanation.

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THE TIME-SERIES MOMENTUM FACTOR

In this note, we survey the academic literature and provide empirical evidence related to time-series momentum strategies in the futures markets. We find that this phenomenon is remarkably consistent across 47 diverse futures contracts in our study, and has led some to consider time-series momentum an asset pricing anomaly.

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