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Bonds in the Government Pension Fund Global

The Ministry of Finance issues guidelines for the Government Pension Fund Global in the management mandate for Norges Bank. The management guidelines set out the investment universe, the benchmark index and restrictions on the management of the fund. The investment universe dictates what the fund may be invested in. The benchmark index and management restrictions define what is acceptable risk for the owner. The benchmark index also serves as a yardstick for the decisions the Bank makes in its management of the fund. The management guidelines should be formulated in such a way as to pave the way for the best possible portfolio.

In its letters of 12 February 2016 and 9 June 2017, the Ministry asked the Bank to assess the guidelines for the management of the fund's bond investments. The Bank's recommendations and assessments are presented below.

Risks and returns for the fund's bond investments will be determined principally by which currencies the bonds are issued in, who they are issued by, and how long they are issued for. Consistent with this, we discuss below the currency composition, different segments of the bond market, and the importance of maturity. Finally, we look briefly at the need to amend the management guidelines in view of the fund's liquidity needs. The Bank's recommendations build on the analyses in a number of discussion notes published on its website, and on our experience with the current guidelines.

Considerations

Our point of departure is that the purpose of the fund's bond investments is to reduce fluctuations in the fund's overall return, ensure adequate liquidity and provide exposure

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to risk premiums in the bond market, cf. the discussion in the Ministry's letter to the Bank of 9 June and Report to the Storting No. 23 (2015-2016). The Bank believes that this is a reasonable representation of the roles that bonds should play in the fund, given a strategic allocation to equities of 70 percent. Not all bonds play these roles effectively, however, and so the management guidelines should be formulated in such a way that bond investments serve their intended purpose.

Together with the management restrictions, the benchmark index sets out what is acceptable risk for the owner. Our starting point is that the benchmark index should reflect the fund's most important risk characteristics. Historical fluctuations in the value of the fund can be explained mainly by the portfolio's exposure to equity risk and interest-rate risk. The desired exposure to these risks should therefore be reflected in the benchmark index. To serve as a relevant yardstick for management performance, the benchmark index must also be investable for the fund.[1]

The benchmark index cannot capture all of the risks that the fund should be exposed to at any given time. It is neither desirable nor appropriate for investments where there are no good benchmark indices for the fund, or where the return depends on the choice of concrete investment strategies, to be specified in the benchmark index. Guidance on investments of this kind should be given by the management restrictions.

Today's management mandate restricts high-yield bonds to 5 percent of the market value of the bond portfolio, and requires a credit rating for all investments in debt instruments. It also requires the Executive Board to set limits for minimum overlap, credit risk, liquidity risk and expected shortfall. Through these restrictions, the Ministry provides clear guidance on how the fund may be invested.

In this letter, Norges Bank recommends changes to the management guidelines for the fund's bond investments. We do not propose any changes to the investment universe. The fund should continue to be allowed to be invested in all tradable debt instruments.[2] In future, the benchmark index for the bond portfolio should consist of nominal government bonds issued in dollars, euros and pounds. The Ministry's desired exposure to interest-rate risk should be reflected in the benchmark index through an upper limit on the maturity of the bonds included in the index. The Bank believes that the current management restrictions provide adequate guidance on how the fund may be invested, and that there is no need for additional restrictions. The Bank's proposed changes to the management guidelines reflect the purpose of the bond investments, clarify the role of the benchmark index in the fund's management, and pave the way for the best possible portfolio. The Bank's advice is based on an overall assessment of currency composition,

[1] In Report to the Storting No. 27 (2012-2013), the Ministry defines investability as "the extent to which an investment idea or rule can be implemented in operational asset management". A requirement of investability also means that the instruments included in the index must be available for a fund of our size, and that these investments can be made without heavy costs for the portfolio.

[2] See section 3-1 of the mandate.

segments and maturity. The recommendations in each of these areas should be viewed in combination.

We assume that the fund will continue to be invested in some of the currencies and segments that we recommend removing from the benchmark index. The need for transactions in the fund will then be smaller than the proposed changes to the benchmark index might otherwise suggest.

The Bank's proposed changes to the composition of the benchmark index mean that deviation between the benchmark index and the portfolio will increase. The proposed changes mean that strategies focusing on harvesting premiums in the bond market will be regulated in the mandate in the same way as equivalent strategies in the equity market. It will be easier than today to view these strategies in context, and it will be possible to manage them as part of the internal reference portfolio. The Bank reports regularly on how its choices in the internal reference portfolio impact on the fund's risks and returns. In keeping with the requirements of the management mandate, this reporting will provide a true and detailed overview of the Bank's management performance and ensure that the Ministry and others are able to evaluate this performance.

Currency composition

One central premise for the investment strategy is that the risk in the fund can be reduced by diversifying investments across asset classes, sectors, countries and currencies. Our analyses show that short-term correlations across countries and currencies have increased in both the equity market and the bond market.[3] The benefits of broad international diversification therefore appear to be smaller than before for both equities and bonds in the short term. This does not necessarily mean that the reduction in risk that an investor achieves by spreading his investments has decreased to the same extent in the longer term. The long-term effect depends on what is the cause of the increase in short-term correlations.

The value of an investment can be expressed as the discounted value of expected future cash flows. Our analysis shows that the increase in short-term correlations across equity markets is due primarily to greater co-movement in discount rates than before. For bonds, however, the increase in correlations is attributable mainly to greater co-movement in cash flows. As a rule, changes in cash flows are more persistent than changes in discount rates.

Thus we find that the risk reduction that a long-term investor achieves by diversifying investments across countries and currencies differs between equities and bonds. In the

[3] The main points in the Bank's analysis are drawn from Discussion Note 1/2017: *International diversification for long-term investors*.

long term, the gains from broad international diversification are considerable for equities but moderate for bonds. For an investor with 70 percent of his investments in an internationally diversified equity portfolio, there is little reduction in risk to be obtained by also diversifying his bond investments across a large number of currencies.

The benchmark index for bonds currently consists of 23 currencies. Our recommendation is that the number of currencies in the bond index is reduced. This will have little impact on risk in the overall benchmark index.

We propose that the Ministry goes back to a specific list of currencies for the bond index rather than leaving this decision to the index supplier. The currencies on the list must be liquid and investable for the fund. The most liquid market for bonds is currently that for US Treasuries, followed by those for bonds issued by countries in the euro area and the UK. The Japanese bond market is large but far less liquid than those for the other currencies that currently have a substantial weight in the index. An index consisting of bonds issued in dollars, euros and pounds alone will be sufficiently liquid and investable for the fund.

The currencies in the bond index should be assigned weights based on the size of the country's GDP as is the case today. GDP weights will ensure that the currency composition of the index is relatively stable, and also help ensure that the fund does not lend disproportionately to countries in the euro area with high levels of debt. A bond index consisting of dollars, euros and pounds will result in the following weights based on the current calculation method: 54 percent dollars, 38 percent euros and 8 percent pounds. To avoid unnecessary, frequent transactions, the sub-index should be rebalanced back to the GDP weights annually rather than monthly as is the case today.

The Ministry could consider including more currencies on the index's currency list. The Bank does not, in principle, see any operational challenges in including all of the developed-market currencies included at present in the bond index. These currencies will have little impact on the characteristics of the index, however, and will make it slightly less liquid and generate somewhat higher transaction costs.

The bond index currently includes a selection of emerging-market currencies. The selection is made by the index supplier. We have found that the current index presents a number of operational challenges. Currencies move in and out of the index. One example is the Turkish lira, which was included in the index on 31 March 2014 but left again at the end of September 2016 when Turkey was downgraded. For a large fund, it is a challenge to adjust the portfolio to sudden changes of this kind in a cost-effective manner. High GDP relative to the size of the market for local government debt has also

resulted in high percentage ownership in some markets. This means that the index is not investable for the fund.[4]

Investors have been rewarded historically for the risk associated with investing in high-yield currencies, most of which are emerging-market currencies. The current index is not suitable as a basis for systematic strategies for investing in high-yield currencies. The index is concentrated in a small number of currencies, and not necessarily high-yield currencies. For example, the South Korean won – where yields are currently the same as for nominal US Treasuries – accounts for around 25 percent of the index's exposure to emerging markets. The index supplier's decisions on which currencies to include in the index are made partly on the basis of considerations that may not be relevant to the fund. The Indian rupee and Indonesian rupiah are examples of high-yield currencies that are not included in the index but are nevertheless investable for the fund.

Against this background, the Bank believes that emerging-market bonds should now be removed from the benchmark index. It should be left to the Bank to establish systematic strategies for investing in high-yield currencies. The risk associated with strategies of this kind will, in principle, be adequately captured by the existing restrictions in the mandate. Should the Ministry nevertheless wish to provide further guidance, the management mandate could, for example, specify what proportion of the fund may be invested in bonds issued in emerging-market currencies.

The proposed changes mean that the currency composition of the benchmark index for bonds will vary less over time, and that the need for portfolio adjustments following upgrades and downgrades of currencies will be reduced. Along with having liquid currencies on the currency list and annual rebalancing of the index, this will reduce transaction costs.

With a currency list consisting solely of dollars, euros and pounds, and continued use of GDP weights, average credit quality in the bond index will be improved. In its letter of 20 June, the Ministry announced plans to introduce a new mandate requirement that the Executive Board must approve all issuers of government bonds. Together with the current restrictions on how the fund may be invested, this means that the mandate requirement concerning fiscal strength is redundant and should be removed.

The Bank recommends that a specific currency list is drawn up for the bond index. The currency list must ensure that the index is liquid and investable for the fund. The currency list should consist of US dollars, euros and British pounds.

[4] Since 31 March 2014, the GDP weights in the government bond sub-index have been subject to a weighting factor to ensure that the index is investable for the fund. Chile, Hong Kong and Russia have been assigned a factor of 0.25, cf. section 3-2(4) of the mandate.

Segments

Investors own bonds other than government bonds in order to earn a risk premium. Corporate bonds are the largest segment behind government bonds in terms of market value. Investors hold corporate bonds instead of government bonds to capture a credit premium. The realised credit premium has varied greatly over time but has been marginally positive on average since 1930.[5] The credit premium varies with the maturity of the bonds. Corporate bonds with a short maturity have historically had a higher credit premium than corporate bonds with a longer maturity.

Corporate bonds have historically helped reduce the volatility of a bond portfolio. This is a result of a negative correlation between the realised credit premium and the return on government bonds. However, a fixed allocation to corporate bonds has not notably affected risks and returns in a portfolio that already has a 70 percent equity allocation, in either the short or the long term. This is due to the positive correlation between the realised credit premium and the equity premium.

Corporate bonds currently make up 30 percent of the bond index. The Bank's recommendation is that corporate bonds are removed from the benchmark index. This will have little impact on risk in the overall benchmark index. In the same way as with investments in emerging-market bonds, it should be left to the Bank to establish systematic strategies for earning a risk premium in the corporate bond market. The risk with strategies of this kind will, in principle, be adequately captured by the existing restrictions in the mandate. Should the Ministry nevertheless wish to provide further guidance, the management mandate could, for example, specify what proportion of the fund may be invested in corporate bonds.

Corporate bonds are currently rebalanced to a set weight of 30 percent at the end of each month. Monthly rebalancing results in numerous unnecessary transactions in the index. Our advice on changes to the bond index includes replacing monthly rebalancing with annual rebalancing. Our calculations suggest that annual transactions in the index will then decrease by 13 percentage points from 17 percent of the index for bonds to around 4 percent.

Should the Ministry wish to keep corporate bonds as part of the bond index, the number of currencies should be reduced. Similarities between the credit premium and the equity premium indicate that the Ministry should reduce the share of corporate bonds in the index. The Ministry should also consider which weighting principle is appropriate, and how this impacts on the index's currency composition. The Ministry should, in particular, consider how the choice of weighting principle will impact on the share of US Treasuries in the benchmark index. US Treasuries are currently the primary source of liquidity in the management of the fund. Based on the choices above, the Ministry needs to consider

[5] The main points in the Bank's analysis are drawn from Discussion Note 2/2017: *Corporate bonds in a multi-asset portfolio*.

whether the current rule on rebalancing between government and corporate bonds is still appropriate. Given that the credit premium varies considerably with the maturity of corporate bonds, the Ministry should also look at maturity.

The bond index currently also includes inflation-linked bonds and bonds issued by international organisations. These segments account for 7 and 3 percent respectively of the bond index. The Bank proposes that inflation-linked bonds and bonds issued by international organisations are removed from the benchmark index. These segments reduce the share of nominal government bonds in the index. Nominal government bonds are more liquid and play a greater role in reducing the fund's overall volatility. As a result, inflation-linked bonds and bonds issued by international organisations do not necessarily serve the intended purpose of bonds in the fund with regard to reducing volatility and contributing liquidity.

The Bank's recommendation is that the benchmark index for bonds should comprise nominal government bonds issued in currencies on a currency list.

Maturity

A bond's maturity is the time remaining until it falls due for repayment. Investors hold bonds with a long maturity to match their portfolio to long-term obligations or to earn a term premium. The term premium is the excess return that an investor can achieve by holding a bond with a long maturity rather than continuously reinvesting in bonds with shorter maturities. All else equal, prices of long-maturity bonds are more sensitive to changes in interest rates than those of short-maturity bonds.

In a multi-asset portfolio of equities and bonds, the contribution from bonds to overall volatility will depend on the correlation between the two asset classes.[6] When the correlation between equities and bonds is around zero, maturity will have little effect on overall volatility. If the correlation is positive, overall volatility will increase with maturity. On the other hand, overall volatility will decrease with maturity if the correlation is negative. The shorter the maturity of bond investments, the more robust overall volatility will be to changes in the correlation between equities and bonds.

The maturity of the benchmark index for bonds has increased in recent years. There are also considerable differences in maturity between issuers. Increased maturity has meant that the fund's overall volatility now depends more on the correlation between equities and bonds than it did before. Future correlations between equities and bonds are uncertain and cannot be controlled. The future maturity of the bond index is also uncertain and depends on developments in the bonds entering and exiting the index.

[6] The main points in the Bank's analysis are drawn from Discussion Note 2/2016: *Risk and return of different asset allocations*.

Maturity can, however, be managed by setting a target for the index's maturity. The choice of maturity could potentially have considerable consequences for the fund's overall volatility and should therefore be reflected in the benchmark index. To reduce uncertainty about the fund's volatility, there should be an upper limit on the maturity of the bonds included in the index. A shorter maturity will also impact on the fund's long-term risk characteristics, but to a lesser extent than before now that the equity share is increasing. The upper limit on maturity must not be set too low, as this would lead to parts of the index no longer being investable for the fund. The Bank's recommendation is that the upper limit for maturity is set at around ten years for the bonds included in the proposed index.

The effect of a shorter maturity on expected returns in the bond index depends on the expected term premium. In its advice on the equity share on 1 December 2016, the Bank assumed an expected term premium of around zero. That is still our assumption. If the maturity of the bond index is reduced, it will be more consistent across countries, more stable over time, and less affected by adjustments by non-price-sensitive players. A shorter maturity will also improve the natural liquidity of the bond index.

The maturity of the bond index should be managed. We recommend setting an upper limit for maturity of around ten years for bonds included in the index. A shorter maturity will help reduce uncertainty about the fund's volatility.

Liquidity

In its letter of 9 June, the Ministry asked the Bank to assess liquidity requirements for the bond index, and whether the Ministry should provide further guidance on liquidity in the bond portfolio. Our analyses show that a portfolio equal to the current bond index is sufficiently liquid given the fund's liquidity needs.[7] A higher equity share will not affect the fund's liquidity needs with the current specification of the rebalancing rule.

The changes we recommend in this letter will improve liquidity in the index. Nominal government bonds issued in dollars, euros and pounds are more liquid than the segments and currencies we propose removing from the index. These markets are large, and trading volumes are stable, even in periods of turmoil in financial markets. Nominal government bonds issued in dollars, euros and pounds are therefore a natural source of liquidity for the fund. The recommendation to reduce the maturity of the benchmark index will also improve the natural liquidity of the index.

A portfolio equal to the current bond index is sufficiently liquid given the fund's liquidity needs. The Bank's recommendations in this letter may improve liquidity further, and so we believe that there is no need to amend the management guidelines in this area.

[7] See Discussion Note 3/2017: *The liquidity of a diversified portfolio*.

Yours faithfully

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Enclosure

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Table 1: Currency composition of the benchmark index for bonds

Current benchmark index for bonds				Proposed new benchmark index for bonds			
	Billions of kroner	Percentage of benchmark index for bonds	Percentage of overall benchmark index assuming 62.5 percent equities		Billions of kroner*	Percentage of benchmark index for bonds	Percentage of overall benchmark index assuming 70.0 percent equities
USD	1165	43.8%	16.4%	USD	1306	54.4%	16.3%
EUR	715	26.9%	9.9%	EUR	900	37.5%	11.3%
JPY	174	6.5%	2.4%	GBP	197	8.2%	2.5%
GBP	154	5.8%	2.1%				
CAD	86	3.2%	1.2%				
KRW	54	2.0%	0.8%				
AUD	53	2.0%	0.7%				
MXN	48	1.8%	0.7%				
CHF	40	1.5%	0.6%				
SEK	29	1.1%	0.4%				
PLN	20	0.7%	0.3%				
RUB	17	0.6%	0.2%				
THB	16	0.6%	0.2%				
DKK	16	0.6%	0.2%				
ZAR	13	0.5%	0.2%				
MYR	12	0.5%	0.2%				
ILS	12	0.4%	0.2%				
SGD	12	0.4%	0.2%				
CZK	8	0.3%	0.1%				
NZD	7	0.3%	0.1%				
HUF	5	0.2%	0.1%				
HKD	3	0.1%	0.0%				
CLP	2	0.1%	0.0%				

Data for current benchmark index as at July 2017. For technical reasons, we have assumed a market value for the fund of 8 trillion kroner and an equity share of 70 percent when calculating shares of the proposed new benchmark index for bonds.

Table 2: Historical risk and return characteristics of the overall benchmark index

	Current benchmark index	**Proposed new benchmark index**	
		All maturities	Maximum maturity of 10.5 years
Annualised return	8.4%	*8.4%*	8.1%
Annualised volatility	10.9%	*10.7%*	10.8%

We have assumed an equity share of 70 percent for both the current benchmark index and the proposed new benchmark index. The differences between the current and proposed indices can therefore be attributed to differences in the specification of the benchmark index for bonds. Calculations performed on monthly data for the period from January 2010 to July 2017.
The composition of the portfolio will differ from the benchmark index.

Table 3: Historical risk and return characteristics of the benchmark index for bonds

	Current benchmark index for bonds	**Proposed new benchmark index for bonds**	
		All maturities	Maximum maturity of 10.5 years
Annualised return	3.1%	*3.1%*	2.1%
Annualised volatility	5.2%	*4.9%*	4.7%
Duration	7.1	*7.0*	4.2
Annualised turnover with monthly rebalancing	16.6%		
Annualised turnover with annual rebalancing	5.8%	*3.9%*	3.6%

Calculations performed on monthly data for the period from January 2010 to July 2017.
The composition of the portfolio will differ from the benchmark index.

Table 4: Percentage ownership of nominal government bonds in the benchmark index for bonds

	Current benchmark index for bonds	**Proposed new benchmark index for bonds**		
		All maturities	Maximum maturity of 10.5 years	*Maximum maturity of 20 years*
USD	1.01%	*2.21%*	2.66%	*2.61%*
EUR	0.77%	*1.68%*	2.44%	*1.90%*
GBP	0.54%	*1.18%*	2.67%	*1.87%*

Percentage ownership based on a market value for the fund of 8 trillion kroner and market data for July 2017. The composition of the portfolio will differ from the benchmark index.