Letter to the Ministry of Finance

The benchmark portfolio for the Government Pension Fund – Global

1. *Background*

In its letter dated 20 June 2008, the Ministry of Finance asked for Norges Bank's recommendations concerning the composition of the fixed income benchmark portfolio for the Government Pension Fund – Global. In particular, Norges Bank was asked to assess whether the benchmark portfolio should be expanded to include sectors such as emerging bond markets and high-yield corporate bonds.

In this letter, Norges Bank assesses how appropriate it would be to expand the benchmark portfolio on the basis of an analysis of historical risks and returns. The operational challenges associated with such a change are also presented.

Norges Bank last assessed emerging bond markets in its letter dated 6 February 2003 and high-yield bonds in its letter dated 20 October 2006. The Bank's recommendations in the present letter do not depart from the assessments made on those occasions.

In its letter dated 20 June 2008, the Ministry of Finance also asked for an assessment of a number of issues of a more general nature concerning the basic principles for the composition of the fixed income benchmark and the choice of index supplier. Norges Bank will respond with a broad review of these issues at a later date.

2. *The current fixed income benchmark portfolio*

The current benchmark index for the Government Pension Fund – Global's fixed income investments is composed of Lehman Global Aggregate[1] (LGA) and Lehman Global Real (LGR) indices.

In cases where the issuer of bonds has a sufficiently high credit rating to be included in the LGA/LGR indices, and the bonds are issued in hard currency[2], they may already be included in the current benchmark portfolio. The vast majority of sovereign states classified as emerging markets currently have a sufficiently high credit rating. The current benchmark portfolio therefore has exposure to emerging bond markets. However, Lehman Brothers (Barclays) does not produce indices for emerging markets based on local currency.

High-yield corporate bonds are not currently included in the benchmark portfolio for the Government Pension Fund – Global. Within the current framework based on Lehman

[1] The Lehman indices have been acquired and are now operated by Barclays Bank.
[2] Hard currency is used here to denote a stable currency backed by political and economic stability and low inflation, such as the USD, EUR, CHF, SEK, CAD and JPY.

Brothers indices, this could easily be achieved by including the Lehman Global High-Yield Index.

The two questions discussed in this letter are different in nature. The question concerning emerging markets is about expanding the benchmark portfolio to include bonds in local currency and requires an assessment of the marketplace. Issuers would be sovereign states and would almost exclusively have credit ratings that make them eligible for the current benchmark portfolio. The question concerning high-yield bonds is about a broader set of issuers in the benchmark portfolio, but expansion would be within the framework of existing and approved marketplaces. Such investments would reduce the credit quality of the benchmark portfolio, and so the aim must be to increase the expected return. These matters will therefore be considered separately.

Previously the Ministry of Finance defined the investment universe for the Government Pension Fund – Global by means of a list of approved currencies and specific requirements for issuers' credit ratings. The minimum credit rating requirements for companies were removed at the beginning of 2006, and the list of approved currencies and credit rating requirements for public issuers were abolished with effect from summer 2007.

Norges Bank Investment Management (NBIM) currently reaches a decision on whether new types of investment can be included in the portfolio on the basis of an extensive approval procedure. The bulk of the instruments being considered for the benchmark portfolio in this context have not been through this approval process.

3. *Emerging bond markets in the benchmark portfolio*

Emerging bond markets are a very diverse sector comprising bonds issued in both hard and local currency by a variety of countries in Europe, South America and Asia. Over the past decade, there has been rapid economic development in these countries, and new bond markets have emerged. Bonds in hard currency have been refinanced in local currency, and issues of new government debt have increasingly been in local currency. Issuing debt in local currency is a major advantage for the local authorities. This has coincided with positive economic development in most emerging markets. Generally speaking,

- emerging markets have enjoyed stronger economic growth than the industrialised countries;
- their internal balances have improved due to better fiscal discipline, high saving and rapid growth;
- their external balances have improved due to strong external demand and better integration into the global economy; and
- inflation has slowed significantly, the role of the central bank has become more independent in the formulation of monetary policy, and flexible exchange rate regimes have become more common

This positive economic development has resulted in these countries' credit ratings having been upgraded far more often than they have been downgraded. At the same time, institutional investors have shown greater interest in emerging bond markets and been more willing to hold bonds issued in local currency. This can be attributed to high investment yields and an expectation of structural appreciation of these currencies over time.

Developments in recent months, with many emerging economies experiencing high levels of exchange rate volatility, go to show how investments in these markets can still entail a significant element of country risk and high levels of dependence on a foreign investor base.

Market indices
JPMorgan has been the leading supplier of indices for emerging fixed income markets since the early 1990s. The company currently supplies indices for bonds issued by public issuers in local currency dating back to 2003. Appendix 1 presents JPMorgan's methodology for the inclusion of countries and instruments in these indices in more detail. The analysis in this letter is based on JPMorgan's local-currency indices.

Risks and returns
Table 1 provides an overview of risks and returns for the following indices:

- Lehman Global Aggregate (LGA), which is the starting point for the Government Pension Fund – Global's benchmark portfolio
- JPMorgan Government Bond Index – Emerging Markets Broad (GBI-EM Broad), which includes all of the emerging markets that meet the criteria
- JPMorgan Government Bond Index – Emerging Markets (GBI-EM), which is slightly narrower than the GBI-EM Broad, the most important difference being that India and China are not included

The time series available for our analysis date back only to 2003, and so sub-division into different time periods is not appropriate. A combination of the LGA and GBI-EM has also been included to illustrate the gain for the benchmark portfolio in which the inclusion of emerging markets might result. The weights in this combined Lehman Brothers/JPMorgan index are 97.8 per cent LGA and 2.2 per cent GBI-EM. This corresponds to the ratio between the market capitalisation of the two indices.

Table 1: Analysis of monthly returns from March 2003 to August 2008

	Lehman Global Aggregate	JPMorgan GBI-EM Broad	JPMorgan GBI-EM	LGA + GBI-EM
Annualised return	6.0%	12.5%	13.5%	6.1%
Annualised volatility	5.5%	7.3%	9.3%	5.4%
Return/volatility (Sharpe ratio)	1.1	1.7	1.4	1.1

Table 1 shows that emerging markets generated a substantially higher return than the broad LGA index during the period. The volatility of this return was also substantially higher.

Table 1 also shows that, although the inclusion of emerging markets would have given a marginally higher return for a diversified portfolio, it would not have resulted in significant changes in the ratio of return to risk for a well-diversified portfolio.

Table 2 shows that correlations between emerging markets and the broad index resulted in limited diversification gains during the period.

Table 2: Correlation matrix for monthly returns from March 2003 to August 2008

	GBI-EM Broad	GBI-EM	LGA
GBI-EM Broad	1		

GBI-EM	0.95	1	
LGA	0.53	0.53	1

Operational factors
Some of the currencies included in the indices for emerging markets are not currently approved in line with NBIM's internal procedures. Nor have we carried out the formal approval process that NBIM must perform before actual investments can take place. We would nevertheless like to highlight a number of factors that will make it a challenge to build up market exposure to the relevant indices.

Some countries regulate capital movements in such a way that the Government Pension Fund – Global will not normally have access to the market. This applies to both China and India, where investments would have to be made within quotas that are already insufficient to achieve index exposure for the Government Pension Fund – Global. These two markets account for about half of the JPM GBI-EM Broad, making it an inappropriate benchmark portfolio.

A number of countries, mainly in South America, have tax rules for investments which mean that institutional investors will generally use derivatives to achieve exposure to these markets. The use of derivatives introduces costs and counterparty risk, and it is not appropriate to base index management on such instruments.

Bond markets in emerging markets are substantially less liquid than other markets for government bonds. Transaction costs are significantly higher when purchasing instruments, and liquidity in the market can deteriorate markedly at times. In practice, this means that a strategic allocation to this asset class in the Government Pension Fund – Global would have to be phased in over a long period, and that we could not expect to be able to sell these investments if problems arise in particular markets. A summary of these operational factors is provided in Appendix 2.

For a global investor, it is very important to assess the quality of settlement systems on the basis of each country's financial market legislation. The markets must also meet certain requirements to be included in the investment universe. Generally speaking, settlement risk is higher in emerging markets than in developed markets. Furthermore, settlement efficiency in emerging markets has come somewhat further for equities than for fixed income instruments. A summary of our custodian institutions' assessments is given in Appendix 3.

4. *High-yield bonds*

In the Lehman Brothers index, the market for high-yield bonds is limited to issuers with a credit rating of Ba1/BB+ or below from at least two of the big three credit rating agencies (Moody's, Standard & Poor's and Fitch). A low credit rating indicates a higher probability of bankruptcy. At an aggregate level, this higher risk is reflected in a higher yield on investments.

High-yield bonds are an important part of the market for corporate bonds in USD. The inclusion of this segment in the benchmark portfolio for fixed income investments in USD would increase overall exposure to corporate bonds by 2.1 percentage points to 12.3 per cent of the overall fixed income benchmark portfolio and by 7 percentage points to 41.6 per cent of the fixed income benchmark in USD.

The situation is different in Europe, where the market for high-yield bonds is still considerably smaller, and issuers are primarily US companies. In Asia, the market for corporate bonds is either underdeveloped or illiquid, and is not currently part of the benchmark portfolio for the Government Pension Fund – Global.

Market indices

In the US market, there are a number of well-established suppliers of indices for this segment. The differences in the design of these indices are of a technical nature, and there is no reason to believe that different indices result in significantly different exposure to aggregate or systematic risk factors. The analysis in this letter is based on the Lehman US Corporate High-Yield Index.

Risks and returns

The use of data from the US market makes it possible to assess what changes in the benchmark portfolio's characteristics we would have seen had this segment been part of the benchmark portfolio for the past 20 years[3]. We have performed a historical simulation based on the various sub-indices of the Lehman US Aggregate Index: the Lehman US Treasury, Lehman US Corporate, Lehman US Securitized and Lehman US Corporate High-Yield.

Over the period as a whole, risk, as measured by the volatility of monthly returns, was higher for high-yield bonds than for the bonds included in the current index LGA (i.e. corporate, securitised and government bonds with a high credit rating). Generally speaking, return volatility in the segment is between that for the equity market and the other fixed income categories (see Table 3).

Table 3: Annual volatility based on monthly returns 1988-2008

	S&P 500	LEH US TRS	LEH US CRED	LEH US SEC	LEH US HY	Dagens Vekter	Dagens vekter + HY
Hele perioden	13.6%	4.5%	4.6%	2.6%	7.2%	3.9%	4.2%
sep 04 - aug 08	9.6%	3.7%	3.3%	2.3%	5.2%	3.1%	3.2%
sep 00 - aug 04	16.7%	5.7%	5.3%	3.0%	10.0%	4.7%	5.1%
sep 96 - aug 00	16.6%	3.8%	4.4%	2.5%	5.3%	3.5%	3.7%
sep 92 - aug 96	8.0%	4.5%	5.3%		4.1%	3.8%	3.9%
sep 88 - aug 92	14.3%	4.5%	4.3%		9.8%	3.5%	4.0%

[3] The data used are monthly return data from February 1988 to August 2008. The S&P 500 Total Return Index (SPTR) has been used as an approximation of equity market returns during the period.

Over the period as a whole, the return in the high-yield segment was somewhat higher than in the less volatile government and credit markets, but well below that in the equity market (see Table 4). The return has been low in periods of widened spreads to higher-quality bonds and higher bankruptcy rates. Had the segment been part of the benchmark portfolio for fixed income investments in USD, the annualised return would have been around 0.1 percentage point higher than with the current composition of the portfolio.

Table 4: Annualised returns, monthly data 1988-2008

	S&P 500	LEH US TRS	LEH US CRED	LEH US SEC	LEH US HY	Dagens vekter	Dagens vekter + HY
Hele perioden	11.0%	7.1%	7.4%	5.9%	8.0%	6.5%	6.6%
sep 04 - aug 08	6.1%	4.8%	3.2%	4.4%	5.0%	3.8%	3.9%
sep 00 - aug 04	-5.0%	7.1%	8.8%	7.1%	7.4%	7.1%	7.2%
sep 96 - aug 00	24.2%	7.2%	6.8%	6.4%	5.7%	6.4%	6.3%
sep 92 - aug 96	14.4%	5.9%	6.8%		9.9%	5.0%	5.4%
sep 88 - aug 92	15.9%	11.3%	11.9%		11.7%	9.1%	9.4%

The correlation matrix in Table 5 shows that investments in this segment can have attractive correlation properties relative to other fixed income segments, but the correlations between fixed income segments vary considerably over time. However, the correlation with the equity market is generally high.

Table 5: Correlation matrix, 1997-2008

	S&P 500	*LEH US TRS*	*LEH US CRED*	*LEH US HY*	*LEH US SEC*
S&P 500	1				
LEH US TRS	-0.26	1			
LEH US CRED	0.05	0.84	1		
LEH US HY	0.53	-0.09	0.35	1	
LEH US SEC	-0.08	0.85	0.83	0.08	1

Including the high-yield segment in the benchmark portfolio would have made a positive contribution to returns, but a larger contribution to volatility in the benchmark portfolio. The ratio of return to risk would have been weakened by the inclusion of this segment in the period in question (see Table 6).

Table 6: Ratio of return to risk, monthly data 1988-2008

	S&P 500	LEH US TRS	LEH US CRED	LEH US SEC	LEH US HY	Dagens Vekter	Dagens vekter + HY
Hele perioden	0.81	1.58	1.61	2.27	1.11	1.65	1.58
sep 04 - aug 08	0.64	1.30	0.97	1.91	0.96	1.24	1.19
sep 00 - aug 04	(0.30)	1.25	1.66	2.37	0.74	1.50	1.40
sep 96 - aug 00	1.46	1.89	1.55	2.56	1.08	1.81	1.72
sep 92 - aug 96	1.80	1.31	1.28		2.41	1.30	1.38
sep 88 - aug 92	1.11	2.51	2.77		1.19	2.62	2.38

Operational factors

This segment can be viewed as part of the US corporate bond market, and so there are no operational challenges in areas such as legislation, supervision and settlement systems.

However, it would be very difficult to achieve good index exposure to the segment, because there are large numbers of issuers and securities, some of them highly illiquid. This means substantially higher transaction costs than in the rest of the corporate bond market, and that the segment would have to be phased into the portfolio over a very long period. As a large investor, the fund could not expect to be able to withdraw from the market in periods of rising yield spreads and bankruptcy rates. High transaction costs mean that it would be natural to maintain a stable and diversified portfolio of this type over time. Indexing in the traditional sense of attempting to replicate an index is not an option.

Broad exposure to high-yield bonds would leave the fund exposed to a growing number of bankruptcies. It might be appropriate to expand Norges Bank's capacity for following up the fund's requirements in this respect.

5. *Summary and recommendations*

The benchmark portfolio for fixed income investments should be representative of investment opportunities in the global capital market. Bond investments in emerging markets are a growing sector in both absolute and relative terms, while high-yield corporate bonds are a significant segment of the US fixed income market. It is natural to consider including these segments in the benchmark portfolio.

The benchmark portfolio should also exploit the opportunities that the capital markets offer for diversification. Our analyses indicate that there would have been a marginal improvement in the ratio of return to risk had bonds issued in local currency in emerging markets been part of the benchmark portfolio over the past five years. The sector is still so small relative to the overall fixed income market that including the sector in the benchmark portfolio cannot be expected to result in significant changes in the relationship between expected return and risk.

However, some of the markets that would naturally form part of a benchmark portfolio for investments in emerging markets are not currently investable for the Government Pension Fund – Global. In other markets, it is not possible to achieve exposure without using derivatives, which results in higher costs and introduces an element of counterparty risk. In some of the remaining markets, investments would entail substantially greater operational challenges than investments in the markets in which the fund currently invests. Norges Bank is currently attaching great importance to developing investment management in other parts of the investment universe where the strategic decision has already been taken.

Norges Bank does not therefore currently recommend expanding the benchmark portfolio for bond investments to include emerging markets.

Our analyses of historical returns do not lead us to expect that the inclusion of high-yield corporate bonds in the benchmark portfolio would result in a significant improvement in the ratio of return to risk. Investments in high-yield bonds would have equity-like properties, and the gains associated with such properties are probably best captured through allocation to equity investments.

Norges Bank does not therefore currently recommend expanding the benchmark portfolio for bond investments to include high-yield bonds.

Yours faithfully

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Appendix 1: JPMorgan's emerging market indices

Until 2005, JPMorgan mainly offered variations on its Emerging Markets Bond Index (EMBI) consisting of government securities issued in hard currency (see Footnote 1 in the main body of the letter) by countries defined as emerging markets. Since 2005, in line with market developments, JPMorgan has also offered indices consisting of government securities issued in local currency[4].

With both the GBI-EM and GBI-EM Broad, the index universe consists of countries that have not been defined as high-income countries by the World Bank for the past two years. The GBI-EM has stricter requirements concerning market access for foreign investors. The most important difference between the two indices is therefore that the GBI-EM does not include China and India. With both indices, JPMorgan sets minimum liquidity requirements (see table below) for the inclusion of individual securities.

In emerging markets, there is always a certain risk of sudden changes in the regulatory framework that may significantly affect market access and liquidity, such as the introduction or abolition of rules regulating capital flows. By definition, changes in the regulation of capital flows will not affect the composition of the GBI-EM Broad, but they may still impact on market liquidity and the practical availability of bonds.
JPMorgan also offers an index (GBI-EM Broad Diversified) where the largest markets are limited to 10% of the index.

For a more detailed overview of JPMorgan's inclusion criteria, see Table 1.

Table 1: Definition of instruments in JPMorgan's GBI-EM universe

Instrument type	The index includes only fixed-rate bonds
Liquidity (assessment is threefold):	
o Pricing	Bonds in the index must be traded sufficiently often that there are no out-of-date prices
o Availability	There must be two-way bid-offer spreads, and it must be possible to sell out of a bond for cash
o Cost of replicating index	An investor must be able to replicate the index without excessive transaction costs
Maturity	Only bonds with more than 13 months to maturity are included
Nominal value	There is no lower limit, but strict liquidity rules ensure that the very smallest bonds are nevertheless excluded

Table 2 below shows the country composition of the various JPMorgan emerging market indices.

Table 2: Country weights in JPMorgan's indices

[4] The indices in question are the Government Bond Index – Emerging Markets (GBI-EM), the Government Bond Index – Emerging Markets Broad (GBI-EM Broad) which also includes India and China, and the GBI-EM Diversified and GBI-EM Broad Diversified where the largest markets are limited to 10% of the index.

Per cent						
Country	**Currency**	**No. of instruments**	**GBI-EM Broad**	**GBI-EM Broad Diversified**	**GBI-EM**	**GBI-EM Diversified**
Argentina	ARS	1	0.03	0.05	0	0
Brazil	BRL	12	12.68	10	1.28	3.75
Chile	CLU	10	0.64	1.07	1.4	4.11
China	CNY	49	25.57	10		
Colombia	COP	10	2.44	4.06	0.65	1.92
Czech Republic	CZK	13	1.94	3.23	4.23	10
Egypt	EXP	1	0.1	0.17	0.23	0.66
Hungary	HUF	16	4.12	6.84	8.96	10
India	INR	14	11.77	10		
Indonesia	IDR	26	2.43	4.04		
Malaysia	MYR	21	4.91	8.15	10.69	10
Mexico	MXN	14	9.38	10	20.4	10
Peru	PEN	6	0.56	0.93	1.22	3.59
Poland	PLN	11	10.48	10	22.8	10
Russia	RUB	3	0.47	0.78	1.02	2.99
Slovakia	SKK	7	0.47	0.78	1.02	2.99
South Africa	ZAR	10	4.66	7.74	10.15	10
Thailand	THB	25	3.69	6.12	8.02	10
Turkey	TRY	6	3.64	6.04	7.91	10
	Total	**255**	**100**	**100**	**100**	**100**

Appendix 2: Background information on emerging bond markets

		Number of Securities in the index	Liquidity based on JP Morgan's index team										
Country	Currency		Traded - Low	BENCH - Medium	Active - High	Mcap in local currency, in NOK	Mcap in "hard currency", numbers in NOK	Bid/Ask Spread	Settlement risk	NBIM EQ Invested:	In LGA today in "hard currency"	MOODY'S	S&P	FITCH
Argentina	**ARS**	**1**	1			1,763,621,353			**6**	NO	NO	B3	B	B
Brazil	**BRL**	**12**	12			658,790,224,575	341,516,940,484	6-10 bp	**2**	YES	YES	Ba1	BBB+	BBB-
Chile	**CLU**	**10**	10			33,863,188,971	50,059,363,634	4-10 bp	**2**	YES	YES	A1	AA	A+
China	**CNY**	**49**	17	10	22	1,388,235,006,000	53,225,172,019		**8**	YES	YES	A1	A+	A+
Colombia	**COP**	**10**	10			135,466,413,297		3-15 bp	**5**	NO	NO	Baa3	BBB+	BBB-
Czech Rep.	**CZK**	**13**	13			207,578,884,204	54,316,439,619	50-80 cents	**0**	YES	YES	A1	A	A+
Egypt	**EXP**	**1**	1			5,646,222,851		100 bp	**3**	YES	NO	Ba1	BB+	BB+
Hungary	**HUF**	**16**	16			217,826,230,372	143,198,260,029	20 bp	**0**	YES	YES	A2	BBB+	BBB+
India	**INR**	**14**	3	2	9	639,673,251,860	24,976,381,516	2-10 bp	**10**	YES	YES	Baa2	BBB-	BBB-
Indonesia	**IDR**	**26**	2	10	14	132,173,084,828			**0**	YES	NO	Ba3	BB-	BB
Malaysia	**MYR**	**21**	17	3	1	265,671,636,368	73,665,190,813	4-25 bp	**0**	YES	YES	A3	A-	A-
Mexico	**MXN**	**14**	14			504,418,073,218	313,487,566,507	2-9 bp	**0**	YES	YES	Baa1	BBB+	BBB+
Peru	**PEN**	**6**	6			30,135,862,208	50,270,475,907	15-20 bp	**1**	YES	YES	Ba1	BBB-	BBB-
Poland	**PLN**	**11**	11			561,668,245,771	187,199,503,733	5-15 bp	**0**	YES	YES	A2	A-	A-
Russia	**RUB**	**3**	3			25,284,630,865	201,486,557,613	35-75 bp	**7**	YES	YES	Baa1	BBB+	BBB+
Slovakia	**SKK**	**7**	7			50,711,588,527	28,753,563,840	20 bp	**1**	YES	YES	A1	A	A+
South Africa	**ZAR**	**10**	10			247,593,809,500	40,179,379,026		**0**	YES	YES	Baa1	BBB+	BBB+
Thailand	**THB**	**25**	21	2	2	199,982,974,007	12,317,724,039	5-25 bp	**0**	YES	YES	Baa1	BBB+	BBB+
Turkey	**TRY**	**6**	6			192,806,671,565		15-20 bp	**2**	YES	NO	Ba3	BB-	BB-
	Grand Total	255	180	27	48	5,499,289,620,338	1,574,652,518,777							

Light yellow: presumed inaccessible markets

Unbearable risk	10 - 8
Substantial risk	7-5
Bearable risk	4-0

Appendix 3: Quality of settlement systems

Norges Bank has obtained updated assessments from the evaluation systems of two global custodian institutions (JPMorgan and Citigroup) whose operations give them an in-depth insight into the settlement systems in each country. The following is a classification of the various markets in JPMorgan's GBI-EM Broad Diversified index based on best-practice standards and SEC Rule 17f-7.

	JPMorgan		Citibank
Market	Settlement efficiency	Deposit risk	Deposit risk
China	2.1	1.4	2
India	1.6	1.4	2
Indonesia	1.6	1.3	2
Malaysia	1.5	1.3	2
Thailand	1.5	1.1	2
Czech Republic	1.8	1.4	1.5
Hungary	1.3	1.1	1
Poland	1.6	1.4	1
Russia	2.2	1.6	2
Slovakia	1.7	1.7	2
Turkey	1.5	1.3	2
Argentina	1.6	1.3	3
Brazil	1.5	1.3	1
Chile	1.5	1.3	1
Colombia	1.8	1.3	2
Mexico	1.5	1.0	1
Peru	1.8	1.1	2
Egypt	2.1	1.7	2
South Africa	1.8	1.1	2

Both JPMorgan and Citibank give markets a score from 1 to 3, where 1 is best. Russia, China and Egypt score worst on settlement efficiency at JPMorgan. Egypt, Slovakia and Russia score worst on deposit risk at JPMorgan. Argentina scores particularly poorly on deposit risk in Citibank's evaluation. It should be stressed that this type of evaluation is relatively subjective and liable to change.