# A Review of Real Estate and Infrastructure Investments by the Norwegian Government Pension Fund Global (GPFG)

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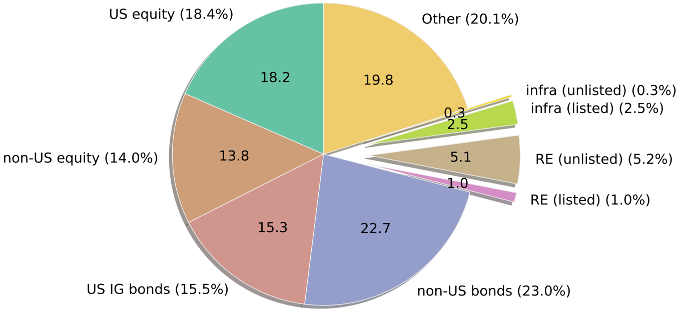
# Global Market Portfolio (2013)

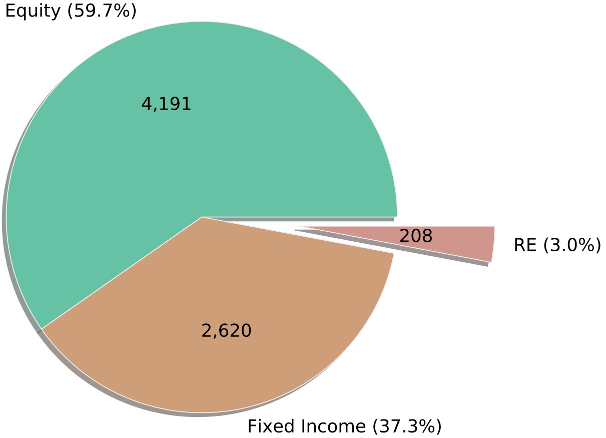
($ billion)




- **Real estate**: buildings; mainly office, retail, residential, industrial.
- **Infrastructure**: physical structures necessary for economy to operate; mainly power, water, communications, transport, public facilities.
- Graph shows value of investable equity markets, listed and unlisted.
  - Estimates differ by source.

# GPFG Portfolio (September 30, 2015)

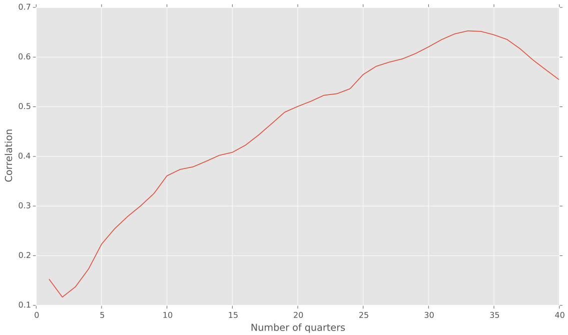
(Billions of NOK)



# Listed vs. unlisted real estate

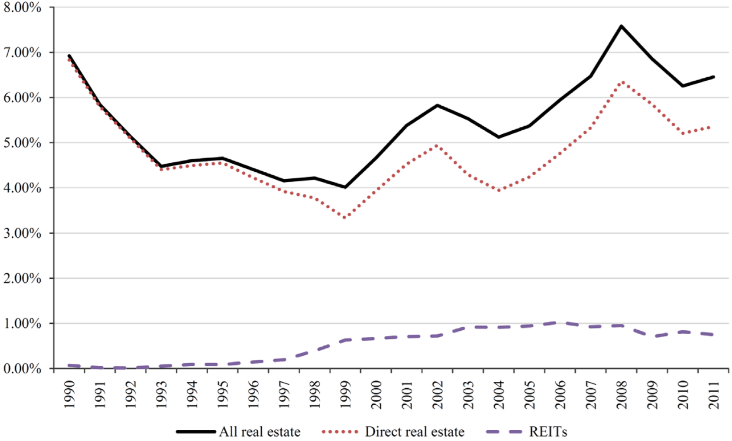
1. We recommend that the Ministry of Finance, in its management mandate to Norges Bank, allow for both listed and unlisted real estate investments, as it does today.
    - Academic literature concludes that listed and unlisted real estate have the same characteristics in the long run.
    - No strong evidence for superior performance or lower risk for unlisted-asset investments, or for long-term diversification benefits of adding unlisted assets to a listed-real-estate portfolio.
    - The unlisted asset space is too large (about 80% of the market) to ignore.
    - We see no compelling reason for a dramatic shift away from the current listed-unlisted split of GPFG's real estate portfolio.

# Correlation between REITs and NCREIF




- Correlation $\rightarrow$ 1 once data issues are corrected for, i.e., listed and unlisted RE close substitutes over long horizons.
  - E.g., Oikarinen et al. (2011); Ang et al. (2013); Kutlu (2010); Bond and Chang (2013); Boudry et al. (2012); Hoesli and Oikarinen (2012); Stefek and Suryanarayanan (2012); Yunus et al. (2012).
- However, they can behave differently over short and medium horizons.

# Real Estate in Pension Fund Portfolios (1990–2011)




**Source**: Andonov, A., P. Eichholtz, and N. Kok, 2015, Intermediated investment management in private markets: Evidence from pension fund investments in real estate, *Journal of Financial Markets* 22, 73–103.

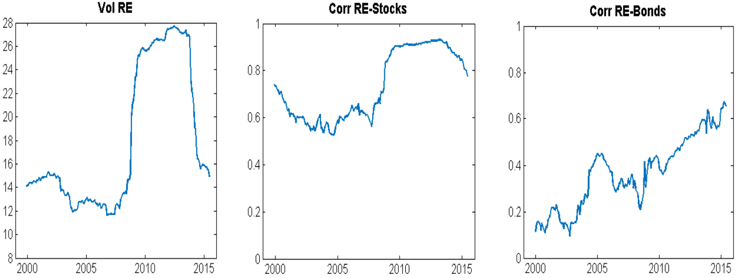
# Target allocation to real estate

2. We do not recommend that the Ministry increase the Fund's target allocation to real estate.
    - Current target real-estate holdings are close to proportions in global market portfolio.
    - Global listed real estate has fairly compensated investors for exposure to global stock-market and bond-market risks in the period 1994–2015.
    - Correlations between real estate and returns on stocks and bonds have been rising over time, reducing the diversification benefits from real estate and resulting in a higher required rate of return.

# Factor Model for Real Estate

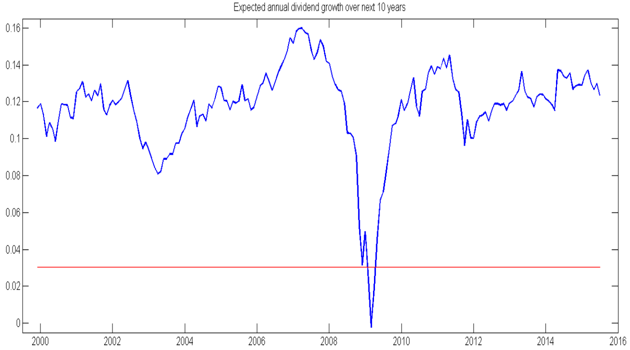
| | Global | | U.S. | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| $\alpha$ | 0.02 | −0.13 | 0.26 | −0.01 |
| t-stat | 0.09 | −0.63 | 0.75 | −0.03 |
| $\beta^s$ | 0.82 | 0.87 | 0.75 | 0.75 |
| t-stat | 11.21 | 14.73 | 5.97 | 8.99 |
| $\beta^b$ | 0.68 | 0.55 | 0.27 | 0.45 |
| t-stat | 5.01 | 4.69 | 1.23 | 3.01 |
| $\beta^{size}$ | – | 0.33 | – | 0.54 |
| t-stat | – | 4.24 | – | 6.84 |
| $\beta^{value}$ | – | 0.58 | – | 0.87 |
| t-stat | – | 7.16 | – | 9.09 |
| $\beta^{mom}$ | – | −0.07 | – | −0.15 |
| t-stat | – | −1.41 | – | −2.15 |
| $R^2$ | 62.43 | 71.19 | 31.85 | 57.77 |
| Exp. ret. | 9.55 | 11.32 | 9.66 | 12.87 |

# Time-Variation in Risk of Real Estate



# Real Estate Valuation Levels

3. Current valuation and risk levels of real estate assets seem high compared with historical pricing.
   - Especially for core assets in top-tier gateway cities
   - We recommend caution for new real estate investments.



# Infrastructure

4. Historical return performance of infrastructure assets

- Global listed infrastructure investments have fairly compensated investors for exposure to global stock- and bond-market risks from 1999–2015.
- Some evidence for abnormal returns on core infrastructure assets (2003–2015 with available data), which could justify an overweight position in the portfolio.
- Current valuation and risk levels of listed infrastructure reflect more moderate income-growth expectations than in real estate.
- But recent evidence suggests that unlisted trophy assets were sold at stretched valuation levels

# Factor Model for Infrastructure

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Index | Infrastructure | | EM Infra. | | Core Infra. | |
| $\alpha$ | 0.13 | 0.04 | 0.26 | 0.23 | 0.33 | 0.27 |
| t-stat | 0.85 | 0.31 | 1.03 | 0.93 | 2.36 | 1.94 |
| $\beta^s$ | 0.61 | 0.66 | 0.91 | 0.94 | 0.69 | 0.70 |
| t-stat | 11.94 | 13.46 | 15.94 | 14.73 | 19.17 | 18.19 |
| $\beta^b$ | 0.47 | 0.51 | 0.45 | 0.45 | 0.52 | 0.54 |
| t-stat | 3.53 | 4.05 | 2.80 | 2.94 | 4.94 | 5.38 |
| $\beta^{smb}$ | – | −0.43 | – | 0.03 | – | −0.18 |
| t-stat | – | −5.81 | – | 0.24 | – | −2.51 |
| $\beta^{hml}$ | – | 0.04 | – | −0.22 | – | 0.15 |
| t-stat | – | 0.38 | – | −1.31 | – | 1.54 |
| $\beta^{mom}$ | – | 0.18 | – | 0.05 | – | 0.10 |
| t-stat | – | 4.35 | – | 0.72 | – | 2.35 |
| $R^2$ | 75.57 | 80.55 | 70.50 | 71.15 | 84.26 | 85.47 |
| Exp. ret. | 7.37 | 8.47 | 9.61 | 9.92 | 8.09 | 8.81 |

# Opening Up for Unlisted Infrastructure

5. The Ministry should open up for unlisted infrastructure investment in the management mandate to Norges Bank, to take advantage of investment opportunities unavailable in the listed space.

# Share of listed versus unlisted infrastructure

Reasons for tilting *towards listed* assets:

1. Most private infrastructure assets currently held in listed form.
2. Lack of data that convincingly shows evidence of out-performance on a risk-adjusted basis of unlisted investments. Listed infrastructure assets have performed reasonably well.
3. Unlisted asset investments subject to myriad non-financial risks (political, reputational, environmental) and operational complexities.
4. Building substantial direct infrastructure portfolio requires many boots on the ground. Norges Bank's compensation practices and culture may not allow it to compete globally for senior talent.

Reasons for tilting *towards unlisted* assets:

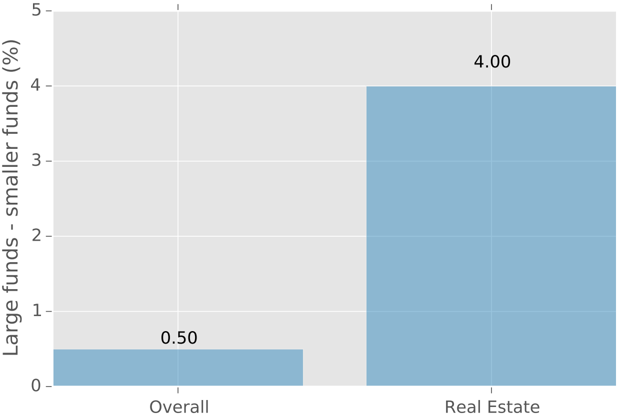
1. Observed investment strategies of GPFG's peers often focused on unlisted assets. Seem to concentrate on large, stable-return infrastructure assets.
2. Being able to deploy stable capital long term provides opportunities to create value in relatively inefficient markets.
3. Important governance issue is lack of alignment with external manager objectives. Direct investments provide better control over asset governance.
4. Liquidity advantage of listed assets is limited, given the large size of the holding for GPFG peer institutions.

# Implementation Issues

6. The management mandate should give Norges Bank the opportunity to continue to build up its internal real estate investment team for both its listed and unlisted portfolios, as it does today.

- We recommend that Norges Bank also start building a team with expertise in listed and unlisted infrastructure.
- Institutional investors of a certain size have achieved lower costs, and higher gross returns, with internal than with external management, both in the unlisted and listed space.
- GPFG's size should allow it to fully exploit these economies of scale.

# Performance of Large vs. Small Pension Funds




**Source:** Dyck and Pomorski (2011)

- Much of this difference due to **lower costs**.
  - Primarily due to use of internal management **(1/3 the cost of external)**.
  - Similar results found by Andonov et al. (2012, 2015)

# Opportunity Cost Model (OCM)

7. We recommend that the Ministry use the Opportunity Cost Model (OCM) for its real estate and infrastructure investments in the management mandate to Norges Bank.

- The OCM approach delegates investment authority to the asset manager, who is closer to the market.
- Should result in better adaptability to changing opportunities across and within asset classes.
- With the OCM, real estate and infrastructure investments (beyond those already included in the benchmark stock and bond indices) are only justified if their expected returns exceed those of the appropriate combinations of stocks and bonds.
- Rather than filling a target allocation to real estate (or infrastructure), the OCM shifts the focus from asset-class labels to the underlying risk exposures.
- While the application of the OCM to real estate and infrastructure investments is more challenging than for listed assets, we provide specific recommendations for how best to address these challenges.

# Concrete Example of OCM

- Say Norges Bank wanted to evaluate a potential Manhattan office purchase
- Pursue investment if and only if it outperforms appropriate combination of stocks and bonds
- Find good comparable listed investment with same (systematic risk) characteristics: geography, property type, level of development, property type, currency, etc.
- SL Green is listed U.S. REIT with focus on class-A office in Manhattan
- Delever SL Green returns, and regress excess returns on excess stock and bond returns:

$$R^{RE}_{t+1} = 0.30 R^f_t + 0.26 R^b_{t+1} + 0.44 R^s_{t+1}.$$

- Project expected return 5.3%, volatility of systematic return 10.4%.
- Listed stock and bond indices are same as in reference portfolio: no arbitrariness, easy to measure reliably
- **Need independent portfolio-construction group to do cost of capital calculations, inside or in collaboration with risk-management department.**

# Opportunity Cost Model

8. The OCM obviates the need for a separate real estate benchmark like the IPD index. The OCM provides an easy-to-understand and measure benchmark consisting of listed stock and bond indices. Problems with appraisal-based indices like IPD:

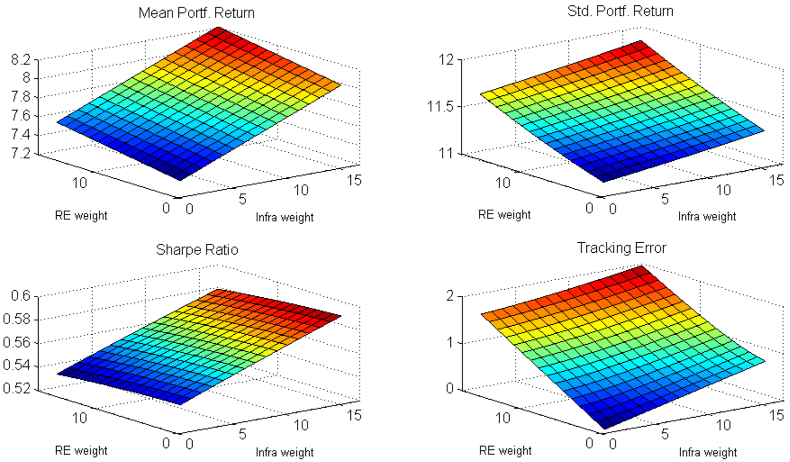
   - Appraisal data impute excessive smoothness
   - Not investable
   - Index composition depends on which owners choose to report data.

# Maximum Portfolio Weights

9. The Ministry should set *maximum* portfolio weights for real estate and infrastructure of 10% each to limit total portfolio volatility.

    - 10% is *not* a suggested target allocation, but a maximum under any circumstances.
    - Norges Bank should *only* use this flexibility if return expectations warrant it.

# Varying real estate and infrastructure weights in OCM



# Risk Management

10. Instead of using tracking error to measure the active risk in its real estate and infrastructure investments, Norges Bank should use the OCM with maximum weights, combined with a set of reporting requirements spelled out in the report.

- If benchmark portfolio does not include some asset class (e.g., RE or infrastructure), then the more diversification we get by adding the new asset class, the *worse* the portfolio's tracking error.
- It is hard to measure the return on unlisted real estate and infrastructure frequently and precisely enough to use tracking error.
- For long-term investments, volatility of short-run deviations from a benchmark may not be all that meaningful.
- By construction, the OCM generates a portfolio with the same amount of systematic risk as the Reference Portfolio of stocks and bonds.

# Reporting

11. To further improve transparency, the Ministry should require Norges Bank to report detailed costs for managing the real estate and infrastructure portfolios.

- Portfolio weights and returns on RE/Infra portfolios.
- Systematic returns on RE/Infra portfolios.
- Exposures (betas) of RE/Infra portfolios to stocks, bonds and other relevant factors.
- Ex-post and ex-ante measures of volatility of on RE/Infra portfolios portfolios.
- Herfindahl index of RE/Infra portfolios.
- The total costs incurred for managing RE/Infra portfolios, as well as a breakdown of these costs into (a) listed versus direct investments, (b) external versus internal management costs, and (c) by external counter-party.
- Potential conflicts of interest with external counterparties related to the governance of unlisted assets.

# Clean Energy

12. We recommend that the Ministry open up for unlisted clean energy infrastructure investments in the management mandate to Norges Bank. This would give Norges Bank the opportunity to explore such investments.

- These investments will constitute a majority of energy investments over the next 30 years.
- Historical performance of clean energy infrastructure stock indices has been poor, but the evidence is based on a short sample (8 years).
  - May reflect the growing pains of a new industry and investment class.
- Technological obsolescence risk and political risk.
- Green building as a clean energy infrastructure investment.
- Fixed income: green bonds and green securitizations worth exploring.

# Emerging Markets Infrastructure

13. We recommend that the Ministry open up for unlisted emerging-market infrastructure investments in the management mandate to Norges Bank. This would give Norges Bank the opportunity to explore such investments.

    - Listed EM infrastructure investments have shown strong historical performance, after accounting for standard sources of risk.
    - Enormous need for all types of infrastructure in developing countries and the shrinking role of traditional funding sources provides a compelling rationale for continued growth.
    - The main challenge lies in managing several incremental sources of risk such as political risk, regulatory risk, and management & governance risk.
    - Partnerships with multinational institutions and/or regional partners compelling to mitigate some of this risk.

# Emerging Markets Infrastructure

14. In the management mandate to Norges Bank, the Ministry has opened up for real estate investments in developing countries. Norges Bank's strategy has been to start by investing in mature markets. We recommend that Norges Bank, having built up this investment expertise, explore investments in select real estate projects in developing countries.

    - Due to urbanization, a growing middle class, and a rebalancing towards a larger service sector, much of the world's future demand for real estate will be in developing countries.

# Governance of Long-term Investment Strategies

- Unlisted real estate and infrastructure investments may need longer to come to fruition
  - Performance of mature assets should be evaluated over longer horizons
  - Assets in development phase should be evaluated qualitatively
- Evidence from listed assets shows that 10% real estate and 10% infrastructure allocation (funded via OCM) would have added 0.6% to annual fund return
- Experience from Canadian pension fund managers consistent: 0.5%–1% added return for about a 1% increase in portfolio volatility.