BI Norwegian Business School - campus Oslo

GRA 19502

Master Thesis

Component of continuous assessment: Forprosjekt, Thesis MSc

Preliminary Report

Navn:	Emilie Klev Bergheim, Amalie Stranden

Start:	01.01.2018 09.00
Finish:	15.01.2018 12.00

Efficient management of the real estate share in the GPFG: how much and how?

MSc in Business, Major in Finance
Supervised by Bruno Gerard

Abstract

In this master thesis, we investigate the institutional investment management approach by Norges Bank Investment Management (NBIM) in the Norwegian Government Pension Fund Global (GPFG) within real estate. To assess the fund's efficiency, we look at factors within their management approach considering listed vs unlisted real estate investments and passive vs active management approach. We will address two issues. Firstly, whether to invest in real estate or not, and in the case of investing, determining the appropriate level of investment by using the portfolio optimization approach. Secondly, the fashion to invest, investigating the allocation to listed vs unlisted investments and make comparisons with equities and bonds. Primarily three sources of market wide indices will be used; FTSE, MSCI and S&P. By adding our own assumptions and applying these on the Markowitz framework we find the optimal share of real estate in GPFG. We will also run a regression to find the significance of adding either or both listed and unlisted to a long-term portfolio.

Table of Contents

1.0 Introduction & Motivation

The research question to be studied in this thesis is: *How much of the GPFG should NBIM invest in real estate and how should they do so?*

The Government Pension Fund Global (GPFG) has since it was founded in 1990 been saving for current and future Norwegian generations and aim to ensure a return on the fund after the oil has ran out. As of the beginning of 2018 it has a market value of approximately NOK 8.5 trillion which is equivalent to approximately USD 1.05 trillion. The fund has three areas of investments, namely equities, fixed-income and real estate. Real estate was added to the portfolio in 2011. The allocations as of September 2017 were 65.9 % to equity investments, 31.6 % to fixed-income investments and finally 2.5 % to unlisted real estate investments.

Norges Bank Investment Management (NBIM) is a business unit within the central bank of Norway, Norges Bank, who manages the GPFG following the guidelines issued by the Ministry of Finance. The main objective is to achieve the highest attainable return obtaining a moderate level of risk. Norges Bank Real Estate Management (NBREM) was established in 2014, and has taken shape as an established and self-sufficient entity within NBIM. NBREM is in charge of managing the unlisted real estate investments with a upper limit of 7 % of the fund to be invested.

Real estate is considered the most important alternative asset class. The question of whether to invest in real assets, and real estate in particular, is an important question for all long term investors including pension funds, endowments and sovereign funds. Andonov, Kok, and Eichholtz (2013b) state that the three main reasons to add real estate to investments portfolios include: 1) diversification and reduction of the overall risk of the portfolio; 2) hedging against inflation; and 3) delivering steady cash flows to the portfolio (i.e. rental income).

The real estate market is considered inefficient and there are opportunities to make greater returns and benefit from market imperfections. We have seen that previous studies have recommended to *increase* the allocation to real estate. This can be due to self-interest of real estate fund managers to earn more money, and

has therefore motivated us to investigate if this is the reason for their recommendations instead of it being in the fund's best interest. Hence, we want to assess whether an increase in the allocation actually is the optimal decision for GPFG.

Our thesis will emphasize *how* NBIM manages the real estate allocation in GPFG and if it is done in an optimal manner. The focus will be on the split between listed and unlisted investments in real estate, which analysis will be done quantitatively. We will take a qualitative approach when considering active vs. passive management. When evaluating the optimal allocation to real estate in the GPFG we will do the same as done in previous studies, but add newer data and assess it more critically. This includes being critical towards the return biases, making the returns appear less correlated with returns of other asset classes than what actually is the case. Our contribution may lead us to suggest a decrease in the share of real estate rather than an increase, which is recommended by others.

2.0 Literature Review

Investments in real estate can be done using different vehicles or channels. Investment alternatives include investing via listed funds (REITs or shares in real estate companies), via unlisted funds and as a direct investment. Van Nieuwerburgh, Stanton, and de Bever (2015) find that the correlation between listed and unlisted real estate approaches one in the long run. This is supported by several other studies, including Kutlu (2010), Bond and Chang (2013), Boudry, Coulson, Kallberg, and Liu (2012), Hoesli and Oikarinen (2012), Stefek and Suryanarayanan (2012), and Yunus, Hansz, and Kennedy (2012). They conclude that listed and unlisted are perfect substitutes in the long run. Regardless, Van Nieuwerburgh et al. (2015) recommend to invest in both listed and unlisted real estate as they can behave differently in the short and medium horizon. They do not recommend increasing the allocation to real estate for GPFG, as the current holdings are close to the ones of the global market portfolio. Furthermore, they recommend the use of the Opportunity Cost Model (OCM) for real estate investments, giving more power to the asset manager with the right knowledge as he is closer to the market, and also putting a particular focus to risk exposures.

Andonov, Kok, and Eichholtz have written three articles related to our master thesis, and they all stress that pension funds invest in highly contrasting vehicles for real estate. Andonov, Eichholtz, and Kok (2012) find that "the costs and performance of pension funds' real estate investments are driven by three main variables: size, the choice to invest internally or externally, and geography." Larger pension funds are often managed internally and their size implies more favorable investment opportunities due to stronger negotiating power. This in turn leads to lower costs compared to smaller funds. Large funds are able to allocate more resources to monitoring of external managers and can create internal units, which enhance performance. Andonov, Eichholtz, and Kok (2013a) suggest the same points while also including that US pension funds underperform compared to global peers, partly because they are less likely to follow an internal investment approach. Andonov et al. (2013b) studies the contribution real estate brings to the overall performance of pension funds. They find that larger funds have lower costs and the performance is more benchmark-adjusted than that of smaller funds. The study suggests that an external management approach is expensive, as well as argues that such an approach does not add significant value to the fund's

performance. A combination of indirect and direct investments in real estate are often preferred by large pension funds, while smaller often focus solely on direct investments. When deciding whether to invest in real estate or not, "the practical implementation issues of real estate" should be considered. Also, the internal management approach is advised to be followed.

Clark and Urwin (2008) claim that good governance by institutional asset owners makes a significant difference to value creation, as measured by the long-term risk-adjusted rate of return. The design and management of sovereign funds are increasingly important for national welfare in global financial markets. The price of poor performance is high (Clark & Urwin, 2016). This has also been stated by other academics as K. P. Ambachtsheer (2011) and Lerner, Schoar, and Wongsunwai (2007). Good governance of long-term funds is closely connected to fund efficiency. It has been pointed out that the ethical processes related to GPFG have a highly valid political justification. On the other hand, the processes create a source of institutional contradiction as there is found reason to question the functional efficiency of the fund (Clark & Monk, 2010). GPFG have scored poorly on the Clark and Urwin best practice investments management framework indicating a low degree of efficiency. Chambers, Dimson, and Ilmanen (2012) assess "the Norway Model" and discuss how GPFG is managed. The paper compares the Norway Model to the Yale University Endowment Model to evaluate the investment model of GPFG's effectiveness. The attention is drawn to seven aspects of the Norway model for endowment asset management, and stresses that the Norway Model can be an appropriate alternative to the Yale Model. However, the authors further argue that the success of Norway's investments in the long run depends on the "fund's culture and competence, on building and retaining professionalism, and on clarity in line structures and delegated responsibilities". The fund needs to guarantee that its active management strategies are effective and exploit its long horizon of the competitive edge in building more dynamic strategies.

The role of real estate and its allocation in long-term funds have been in focus in earlier literature. Bajtelsmit and Worzala (1995) investigate the actual role of real estate in pension plan investment portfolios. Using 1991 asset allocations for 159 pension plans, they find that the allocation does not vary substantially in fund size

or type, and that the average corporate allocations to equity real estate was 4.48%. Among others, Steinert and Crowe (2001) argue that increased recognition of real estate, an attractive risk return profile and an increasing demand for annuity style income streams should drive increased allocations to the real estate sector. The paper suggests an optimal weighting to international real estate of 10-20% in constructed portfolios. Hoesli, Lekander, and Witkiewicz (2004) also express the benefits of including real estate in mixed-asset portfolios. They find that the optimal allocation to real estate is 15-20%, and that real estate is an even more effective portfolio diversifier when both domestic and international real estate assets are considered. When it comes to more specific advices to the share of real estate in GPFG, The Ministry of Finance investigated and found that the share of real estate in GPFG should be increased from its initially 5%. Moreover, it was concluded under the revision of the Storting that the share should be increased to 7% (Regjeringen, 2016).

K. Ambachtsheer (2015) argues that Norway's and NBIM's historical mainly passive approach to managing GPFG has been a defensible successful strategy. Furthermore, it is suggested that following an active approach that is built and implemented attentively can possibly cause an increase in the long-term return of GPFG without taking on additional long-term risk. This approach is known as "the Canada Model". To take on a more active management approach in GPFG, an Opportunity Cost Model (OCM) is recommended by Ang, Brandt, and Denison (2014) for evaluating fund performance. This model is already in use by the Canada Pension Plan Investment Board (CPPIB) and the Singaporean GIC Private Limited. The approach is also referred to as the Reference Portfolio Approach. Van Nieuwerburgh et al. (2015) discuss how the Ministry should regulate real estate investments in the management mandate to Norges Bank, and how Norges Bank's performance should be reviewed. Further, they comment on the usefulness of the OCM for managing the GPFG. An illustrative example is used to show how to practically implement the OCM. Cremers and Lizieri (2014) find that funds with high segment active share on average outperform the real estate market by 1.9% per year, by employing proprietary IPD data for 256 UK real estate funds over 2002-2011. These funds do not seem to take on additional risk.

Regarding the actual diversification benefits of real estate, Edelstein and Quan (2006) examine "how individual parcel appraisal smoothing affects the accuracy of aggregate real estate performance indexes". They find that there is a downward bias of appraisal based rate of return index, understating the true sample mean return of approximately 9 %. Also, the variance of appraisal based return indexes are undervalued by 55 % for the overall sample real estate return index. This bias in real estate returns caused by the way they are measured make them look better and less risky than what is the case. Miles, Cole, and Guilkey (1990) also support that real estate returns are smoothed by the appraisal process, which understates the volatility and creates biases in the correlations with other asset class returns. On the other hand, Gau and Wang (1990) argue that the return biases can be rather small and don't have a significant impact on the real estate return indices. However, they admit that the mean of a time-series of holding period returns may be a considerably biased measure of real estate returns.

3.0 Theory

In this section, we will present and explain the main theories related to our research question *"How much of the GPFG should NBIM invest in real estate and how should they do so?"*.

3.1 Definition of Real Estate

In this master thesis, we define real estate investing as the purchase of property or land, which is non-moveable, with or without a building placed on it. The buyer receives ownership rights to build buildings on the property. Investments in real estate can be either listed or unlisted, and investment strategies can be mainly passive or active.

3.2 Portfolio Optimization

Modern Portfolio Theory (MPT) was pioneered by the well-known economist Harry Markowitz in the article Portfolio Selection published in the eminent Journal of Finance in March 1952 (Markowitz, 1952). In the article, Markowitz demonstrates how to reduce the risk of portfolios consisting of different assets by selecting assets whose values are not highly correlated. This is also known as diversification. Further, Markowitz introduced the concept of the Efficient Frontier which is a graphical representation of all the optimal portfolios of risky assets for an investor, that offers the maximum possible expected return for a given level of risk, where risk is measured by the standard deviation. Any other portfolio that lies outside the efficient frontier would be inefficient because it involves taking on additional risk without getting compensation.

To find the optimal portfolio among the candidates lying on the efficient frontier, one also need to consider an optimization plan involving a risk-free asset (Bodie, Marcus, & Kane, 2014). The Capital Allocation Line (CAL), also known as the Capital Market Line (CML), is a straight line created on a graph reflecting all possible combinations of risk-free and risky assets. The graph shows the return an investor can earn when assuming a specific level of risk in the investment. The optimal CAL is the combination of assets that has the highest Sharpe ratio, a common measure to compare the compensation of risk between different

portfolios. By combining the efficient frontier of risky assets with the optimal CAL, the optimal portfolio is found.

The optimal risky portfolio for different investors varies because of portfolio constraints such as tax considerations, dividend-yield requirements or other preferences. The optimization technique assumes normal distributions of returns, implying that standard deviation is used as the full measure of risk. Potential non-normality of returns can exist, and will require additional attention to risk measures which focus on worst-case losses such as Value at Risk (VaR) or expected shortfall (ES).

3.3 Market Efficiency

Market efficiency was developed by the well-known economist Eugene Fama in 1970 (Malkiel & Fama, 1970). His theory of Efficient Market Hypothesis (EMH) stated that it is impossible to outperform the market because all available information already is incorporated into the stock prices. This implies that no investor has an advantage of predicting a stock price return as all investors are subject to the same information. Investors who support this hypothesis tend to buy index funds and have a more passive portfolio management approach. The basic assumptions of the EMH are that information is universally shared and that stock prices follow a random walk, meaning in a loose sense that price changes should be random and unpredictable.

In the real world, the EMH has been criticized for being subject to anomalies. Amongst others, Shiller (1980) challenged the efficient-market hypothesis stating that with a rational stock market, investors base the prices on expected future dividends discounted to the present value. Later, Shiller extended his research to the real estate market. He argues that the real estate market is inefficient and that "it is far less rational than even the often irrational stock market". In his book "Market Volatility" (1992) he challenges the standard efficient-market hypothesis related to real estate by assessing why real estate goes in and out of booms. Shiller has met support by several other researchers on this subject.

3.4 The Capital Asset Pricing Model

As an important part of the modern portfolio theory the Capital Asset Pricing Model (CAPM), a framework about investments, was developed in the early 1960s by Treynor, Sharpe, Lintner and Mossin (Litterman, 2003). The model focuses on the understanding of prices and individual assets, moving away from the focus on choice and portfolio. The investor wishes to maximize return while minimizing the volatility. The model assumes perfect capital markets, that investors are risk averse, that the same information can be accessed by all investors, and that the risk-free rate exists, as well as other assumptions. CAPM distinguishes between market risk (beta) and firm-specific risk, where the former is non-diversifiable while the latter can be diversified away. The market risk is considered the only relevant risk since the investor is assumed to be fully diversified. The investor's compensation for taking on risk (having a positive beta) depends on the market risk premium.

3.5 Liquidity Risk & Other Risk Considerations

Liquidity risk is defined as "the risk arising from unpredictable changes in liquidity over time" (Acharya & Pedersen, 2005), and occurs when frequent transactions in the market are unavailable (Brueggeman & Fisher, 2016). Liquidity or marketability refers to how easily assets can be turned into cash, and it affects the size of the liquidity premium. Real estate can be difficult and time consuming to sell. As the difficulty increase, a higher liquidity premium is offered for carrying additional risk. To check if added risk of taking on illiquid investments are compensated, one can do a subjective assessment on how adequate the risk premiums earned on riskier assets are compared to the additional risk (Brueggeman & Fisher, 2016). Other risks that also affect real estate in different degrees, depending on the property, include business risk, financial risk, inflation risk, management risk, interest rate risk, legislative risk and environmental risk.

3.6 Hypotheses

We want to test what the optimal allocations of the GPFG are to real estate, equities and fixed-income investments. Our focus remains with the optimal share to real estate. Further, the allocations towards listed and unlisted real estate investments will be tested.

4.0 Methodology

In the empirical work of this master thesis we will perform descriptive research using mainly quantitative methods to answer both *how much* and *how* NBIM should invest in real estate in the management of GPFG. Our aim is to use well-known indices to retrieve the data we need for our investigation. We need broad data for equity and bonds, and both broad and more narrow data for real estate. We will add additional assumptions that will change the conclusions compared to previous research, and we aim to draw more applicable conclusions from the sample to the population. When choosing data sets, one must be aware of financial crisis, world wars etc. in order to obtain valid data and avoid breaks in the data.

4.1 Equity

For equity data, we will retrieve data from FTSE Russell. We will use the FTSE Global All Cap Index. This index is a "market-capitalisation weighted index representing the performance of the large, mid and small cap stocks globally" (FTSE Russell, 2017), covering both developed and emerging market with approximately 7,400 stocks. Alternatively, we can use the American stock market index S&P 500.

4.2 Bonds

We will use Bloomberg, a provider of indices, for bonds including indices on Global Treasury GDP weighted by country, Global Inflation-Linked and Global Aggregate. S&P 500 Bonds Index is also an alternative to use.

4.3 Real Estate

For real estate, we will use more specific real estate data sources to find the exact data we are looking for. If we get access, we will use MSCI World Core Real Estate Index containing the Global Property Benchmark to find data. To get time series for both listed and unlisted real estate investments we will use different data sources. MSCI/International Property Databank produces global indices for unlisted real estate investments. The IPD indices are based on reported valuations. For shares in listed real estate investment trusts (REITs) we will retrieve quarterly REIT returns via several indices, such as NAREIT, the appraisal-based NCREIF Property Index (NPI) and the global Core Real Estate Index (CREI).

4.3.1 Selected Funds and Type of Management

We will look into other long-term funds to make comparisons with the GPFG, like Canada Pension Plan Investment Board (CPPIB) and the Singaporean GIC Private Limited. We will compare share of listed and unlisted investments within real estate and analyze other relevant factors we might find. We will include a separate section where we qualitatively will discuss passive vs active management of long-term funds, and discuss how this affects the efficiency of the fund management.

4.4 Correlations

Correlation is an important measure in the Markowitz framework at the same level of importance as the mean and the standard deviation. The lower the expected correlation of an asset is with the rest of the portfolio, the higher are the diversification benefits.

For computing the correlations between stocks, bonds and both listed and unlisted real estate we will use specific indices that we find most appropriate and we have available. In our computation of correlations, we will use the aforementioned indices related to stocks, bonds, listed real estate and unlisted real estate. We will analyze correlations between the asset classes using historical time series retrieved from these indices, adjusted for our own assumptions.

4.4.1 Biases in Data

It exists biases in the real estate return causing correlations between asset classes and real estate to seem lower than they are, making returns and diversification benefits seem greater than what we see in reality. How to tackle this issue will be investigated further.

4.5 Mean-Variance Optimization

We aim to use a simple mean-variance optimization approach applying our own assumptions to find the optimal share of equity, bonds and real estate in the GPFG. We will compute the efficient frontier, and find the portfolio that maximizes the Sharpe ratio.

4.6 Regression Analysis

To test the significance of adding both or either listed or unlisted real estate to a portfolio, one possibility is to run a regression with portfolio return or Sharpe ratio as the dependent variable, and listed real estate, unlisted real estate, equities and bonds as independent variables. Alternatively, we can run a bivariate regression with the real estate return as the dependent variable, and listed and unlisted real estate as independent variables.

5.0 Thesis Progression

We will work carefully on developing our own assumptions to the methodology part both when it comes to characteristics of equity, bonds and real estate. We will keep a particular focus on real estate and discuss different aspects within this asset class including unlisted vs listed investments, internal vs external investments, direct vs indirect investments and passive vs active management.

We will collect data from the mentioned indices and work on getting access to as much data as possible to better be able to strongly support our research and analysis. When we have completed data sets on all asset classes we will start running tests incorporating our own assumptions. Next, we expect to find conflicting results compared to what is recommended in other papers, and also to reveal inefficient aspects of GPFG's management approach.

As we go, we will update findings within the parts about theory and literature review. We will keep our eyes open for new papers related to the research topic.

6.0 References

Acharya, V. V., & Pedersen, L. H. (2005). Asset pricing with liquidity risk. *Journal of financial Economics, 77*(2), 375-410.

Ambachtsheer, K. (2015). *Norway's Government Pension Fund Global: How should it be governed?* . Retrieved from

Ambachtsheer, K. P. (2011). *Pension revolution: a solution to the pensions crisis* (Vol. 388): John Wiley & Sons.

Andonov, A., Eichholtz, P., & Kok, N. (2012). *Value added from money managers in private markets? An examination of pension fund investments in real estate*. Retrieved from

Andonov, A., Eichholtz, P., & Kok, N. (2013a). *Value added from asset managers in private markets? An examination of pension fund investments in real estate*. Retrieved from

Andonov, A., Kok, N., & Eichholtz, P. (2013b). A global perspective on pension fund investments in real estate. *The Journal of Portfolio Management, 39*(5), 32-42.

Ang, A., Brandt, M. W., & Denison, D. F. (2014). Review of the active management of the Norwegian Government Pension Fund Global. *External Report to the Norwegian Ministry of Finance*.

Bajtelsmit, V. L., & Worzala, E. M. (1995). Real estate allocation in pension fund portfolios. *The Journal of Real Estate Portfolio Management*, 25-38.

Bodie, Z., Marcus, A. J., & Kane, A. (2014). *Investments* (10th global ed. ed.). Berkshire: McGraw-Hill Education.

Bond, S. A., & Chang, Q. (2013). REITs and the private real estate market. *Alternative Investments: Instruments, Performance, Benchmarks, and Strategies*, 77-97.

Boudry, W. I., Coulson, N. E., Kallberg, J. G., & Liu, C. H. (2012). On the hybrid nature of REITs. *The Journal of Real Estate Finance and Economics, 44*(1-2), 230-249.

Brueggeman, W., & Fisher, J. (2016). *Real Estate Finance and Investments* (15th ed.): Boston: McGraw-Hill.

Chambers, D., Dimson, E., & Ilmanen, A. (2012). The norway model. *The Journal of Portfolio Management, 38*(2), 67-81.

Clark, G. L., & Monk, A. H. (2010). The Norwegian government pension fund: Ethics over efficiency. *Rotman International Journal of Pension Management, 3*(1).

Clark, G. L., & Urwin, R. (2008). Best-practice pension fund governance. *Journal of Asset Management, 9*(1), 2-21.

Clark, G. L., & Urwin, R. (2016). Best-Practice Pension Fund Governance *Asset Management* (pp. 295-322): Springer.

Cremers, M., & Lizieri, C. (2014). How Active is Your Real Estate Fund Manager? *The Journal of Alternative Investments, 18*(1), 22-36.

Edelstein, R. H., & Quan, D. C. (2006). How does appraisal smoothing bias real estate returns measurement? *The Journal of Real Estate Finance and Economics, 32*(1), 41-60.

FTSE Russell. (2017). *FTSE Global All Cap index*. Retrieved from

Gau, G. W., & Wang, K. (1990). A Further Examination of Appraisal Data and the Potential Bias in Real Estate Return Indexes. *Real Estate Economics, 18*(1), 40-48.

Hoesli, M., Lekander, J., & Witkiewicz, W. (2004). International evidence on real estate as a portfolio diversifier. *Journal of Real Estate Research, 26*(2), 161-206.

Hoesli, M., & Oikarinen, E. (2012). Are REITs real estate? Evidence from international sector level data. *Journal of International Money and Finance, 31*(7), 1823-1850.

Kutlu, V. (2010). *The long term relation between indirect and direct real estate.* Msc thesis Tilburg University. 37.

Lerner, J., Schoar, A., & Wongsunwai, W. (2007). Smart institutions, foolish choices: The limited partner performance puzzle. *The Journal of Finance, 62*(2), 731-764.

Litterman, B. (2003). *Modern Investment Management: An Equilibrium Approach*: John Wiley & Sons.

Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance, 25*(2), 383-417.

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance, 7*(1), 77-91.

Miles, M., Cole, R., & Guilkey, D. (1990). A different look at commercial real estate returns. *Real Estate Economics, 18*(4), 403-430.

Regjeringen. (2016). Unoterte investeringer i Statens pensjonsfond. Retrieved from https://www.regjeringen.no/no/aktuelt/unoterte-investeringer-i-statens-pensjonsfond/id2481852/

Shiller, R. J. (1980). Do stock prices move too much to be justified by subsequent changes in dividends? : National Bureau of Economic Research Cambridge, Mass., USA.

Shiller, R. J. (1992). *Market volatility*: MIT press.

Stefek, D., & Suryanarayanan, R. (2012). Private and Public Real Estate: What Is the Link? *The Journal of Alternative Investments, 14*(3), 66-75.

Steinert, M., & Crowe, S. (2001). Global real estate investment: characteristics, optimal portfolio allocation and future trends. *Pacific Rim Property Research Journal, 7*(4), 223-239.

Van Nieuwerburgh, S., Stanton, R., & de Bever, L. (2015). A review of real estate and infrastructure investments by the Norwegian Government Pension Fund Global (GPFG).

Yunus, N., Hansz, J. A., & Kennedy, P. J. (2012). Dynamic interactions between private and public real estate markets: Some international evidence. *The Journal of Real Estate Finance and Economics, 45*(4), 1021-1040.