



# Open-ended Property Funds as an Essential Building Block in a Successful Asset Allocation

Analysis of the  
Chair of Empirical Capital Market Research  
WHU – Otto Beisheim School of Management

and the  
Institute of Capital Market Research and Finance  
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# Open-ended Property Funds as an Essential Building Block in a Successful Asset Allocation

English Short-Version

The complete version is available in german language only.

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# 1. Introduction

Open-ended property funds (OPFs) are an asset class of their own. Their returns show only little variation and therefore little risk, and the correlation of returns with other asset classes is low. Due to these ideal conditions it is not surprising that investments in open-ended property funds have gained increasing popularity in the last years. They are already being offered in twelve member countries of the European Union. Regulated open-ended property funds managed assets of more than 300 billion Euros as of April 2008. For the German market, 84.6 billion Euros are managed in public mutual funds and 21.4 billion Euros in Spezialfonds (special funds for institutional investors).

The objective of this study is to examine the suitability of open-ended property funds as an investment component in private and institutional portfolios. We determine the optimal weights of open-ended property funds considering the trade-off between risk and return using portfolio optimization. In our analysis we consider the special characteristics of open-ended property funds, especially the positive autocorrelation resulting from return smoothing. The smoothing of returns can lead to an underestimation of risks and therefore to an advantageous assessment of open-ended property funds. Therefore, we conduct a well-founded academic analysis of the suitability of open property-funds as an investment component in private and institutional portfolios.

The remainder of this study is structured as follows. Section 2 introduces open-ended property funds and describes the construction of a market index. Section 3 presents descriptive statistics and analyzes the performance of open-ended property funds during crises. Next, Section 4 introduces the fundamentals of Markowitz portfolio optimization and examines the impact of open-ended property funds on the risk-return profile of efficient portfolios. Based on these results, Section 5 analyses the benefits of open-ended property funds for different holding periods. Finally, Section 6 evaluates the liquidity risk of open-ended property funds by examining the returns of funds around the temporary suspension of share redemptions.

## 2. The Market for Open-ended Property Funds in Germany

### 2.1 Fundamentals

From a legal perspective an open-ended property fund is a separate special set of assets with an investment focus on property which is initiated and managed by a fund management company. For investor protection purposes open-ended property funds have to follow various supervisory rules which regulate the identification, diversification and controlling of risks as well as the realization of gains and the liquidity of the funds (see e.g. Klug (2008)). Open-ended property funds were introduced in Germany in 1959 with the foundation of the Internationales Immobilien Institut (international real estate institute, known as iiii-investments) and the issue of the iiii-funds No. 1, the first open-ended property funds in Germany. Over the last years the market has grown substantially (see Table 1).

In 1998 there were 16 open-ended property funds with assets of 43.1 billion Euros under management. As of April 2008 the market contains 43 funds with assets of 84.6 billion Euros. Table 1 provides an overview of the full sample of all the open-ended property funds listed from 1991 to April 2008, as well as the sub-sample of generally investable funds and the sub-sample of retail investable funds. For our analysis we use all open-ended property funds voluntarily reporting their data to the BVI Bundesverband Investment und Asset Management e.V. (German Asset Management and Investment Association).

**Table 1: Overview of the Market for Open-ended Property Funds in Germany**

Year	Total Market of Reporting OPFs			Investable OPFs		Retail-investable OPFs	
	No.-	in €m	Market Share	No..	in €m	No..	in €m
1991	12	9.807	100%	11	9.806	11	9.806
1992	14	13.690	100%	13	13.359	13	13.359
1993	14	21.840	100%	13	21.467	13	21.467
1994	14	25.764	100%	12	25.226	12	25.226
1995	14	29.694	100%	12	29.084	12	29.084
1996	14	37.023	100%	12	36.347	12	36.347
1997	15	40.493	100%	13	39.735	13	39.735
1998	16	43.137	100%	14	42.305	14	42.305
1999	16	49.987	99%	14	49.104	14	49.104
2000	18	47.455	99%	16	46.535	16	46.535
2001	18	54.485	98%	16	54.337	16	54.337
2002	21	69.391	98%	19	69.242	19	69.242
2003	23	83.234	98%	21	83.086	20	81.799
2004	26	85.288	98%	24	84.985	23	83.145
2005	27	80.404	94%	25	80.081	23	77.982
2006	32	73.623	97%	29	72.230	25	69.630
2007	35	80.948	97%	30	78.900	26	75.840
2008 <sup>1</sup>	35	84.594	97%	30	82.384	26	78.948

This table shows the assets under management and the number of reporting open-ended property funds (OPFs), of generally investable OPFs, as well as of retail-investable OPFs. The number of reporting OPFs may differ from the number of available OPFs, as funds report their data on a voluntary basis. The representativeness of reporting funds is indicated in the column market share which displays the ratio of available OPFs to reporting OPFs. The two sub-samples of investable OPFs and retail-investable OPFs are separated from the total market for OPFs. Assets under management are calculated at year-ends, except 2008 which is as of April 2008. The data is from BVI Bundesverband Investment und Asset Management e.V. (German Asset Management and Investment Association).

In general, the portfolio return of open-ended property funds is determined by rental income, maintenance costs, and value increases or decreases. The latter are hard to ascertain as comparable properties are not traded regularly. In general, properties are evaluated in regular intervals (at least once a year) by an independent appraisal board according to German investment law. Most often the income valuation approach is used. In this valuation approach a property is appraised based on objectively evaluated price and income forecasts and dy-

dynamic capitalization rates on the valuation date. Therefore, the daily net asset values of open-ended real estate funds are based on the annual expert appraisals from the last valuation date, but do not necessarily reflect “true” daily property values. This valuation approach minimizes subjective views about future expectation and dampens over- and understatements of property values. However, due to the inclusion of past appraisal reports in the determination of current net asset values, valuation returns are smoothed. This effect is known as “appraisal smoothing” in the literature and results in a positive autocorrelation of returns (see e.g. Ross and Zisler (1991), Geltner (1991)). That is, a positive (negative) return in one month tends to be followed by a positive (negative) return in the next month. As a consequence, this autocorrelation results in a significant underestimation of the risk of open-ended property funds (Maurer, Reiner, and Rogalla (2004)). Therefore, a correction in the form of an un-smoothing of returns has to be performed where return series is recomputed to be free of autocorrelation according to the method of Getmansky, Lo and Makarov (2004).

## **2.2 Construction of Open-ended Property Funds Indices**

Before we can evaluate the advantages of open-ended property funds in the asset allocation, we have to calculate a representative index. We start the construction of the indices in February 1991, as we have a sufficient number of funds from this date onwards, and end in April 2008. The monthly raw data of the open-ended property funds contains share prices for each month-end. The data is adjusted for share splits and is reported net of management fees. Dividend payouts are re-invested in the respective fund (before taxes). For all open-ended property funds we calculate a monthly pre-tax return based on the adjusted share prices. Next, we calculate a value-weighted index from the pre-tax returns of the individual funds. We restrict the maximum weight to 25 percent to avoid that the index is dominated by a single fund.

## 3. Positive Portfolio Effects due to the Addition of Open-ended Property Funds

### 3.1 Descriptive Statistics

In order to answer the question of the effects of an integration of open-ended property funds into the asset allocation, we consider further asset classes in this section. For equities, we select the Nikkei 500, the S&P 500 and the DJ Stoxx 600 to represent the equity markets of Japan, the US, and Europe, respectively. For fixed income, we select bond indices from JP Morgan: their respective Japan, US, European and UK Government Bond Index. The UK Government Bond Index is considered separately as the European Government Bond Index excludes UK bonds. Furthermore, we allow investments in the short-term money-market (London Interbank Offered Rate). In terms of alternative investments, we select the FTSE EPRA/NAREIT Germany index to represent exchange-listed Real Estate Investment Trusts (REITs) as a potential equivalent to open-ended property funds. Furthermore, we consider investments in hedge funds (HFRI Fund of Funds Composite Index) and commodities (S&P GSCI) indices. Table 2 shows descriptive statistics for the various indices over our sample period from February 1991 to April 2008.

Table 2 shows descriptive statistics for the various indices over our sample period from February 1991 to April 2008. From the alternative investments, commodities and hedge funds have the highest average monthly returns of 0.64 percent and 0.52 percent, respectively. Bond markets show similar returns in the range of 0.41 percent per month for Japan and 0.62 percent per month for Europe. American and European equity markets have similarly high average monthly returns of 0.62 percent and 0.61 percent, respectively. Open-ended property funds' average monthly return of 0.42 percent is higher than the average money-market return of 0.35 percent per month and REIT returns of 0.31 percent per month.

Equity markets have the highest total risk with monthly standard deviations in the range of 4.60 percent for Europe and 6.55 percent for Japan. Only commodities show a similarly high standard deviation of 5.82 percent per month. Bond markets have substantially lower monthly standard deviations in the range of 1.11 percent for Europe and 2.83 percent for Japan. Hedge funds show a comparable total risk with a standard deviation of 1.46 percent per month. Even after adjusting for the positive autocorrelation due to "appraisal smoothing" open-ended property funds only have a very low standard deviation of 0.34 percent per month. Without the autocorrelation-correction, the monthly standard deviation would only be 0.21 percent. Only the money-market has a lower risk than open-ended property funds with a standard deviation of 0.17 percent per month. Unlike open-ended property funds, REITs have a risk comparable to equity markets with a standard deviation of 6.29 percent.

Table 2: Descriptive Statistics for Monthly Return Distributions

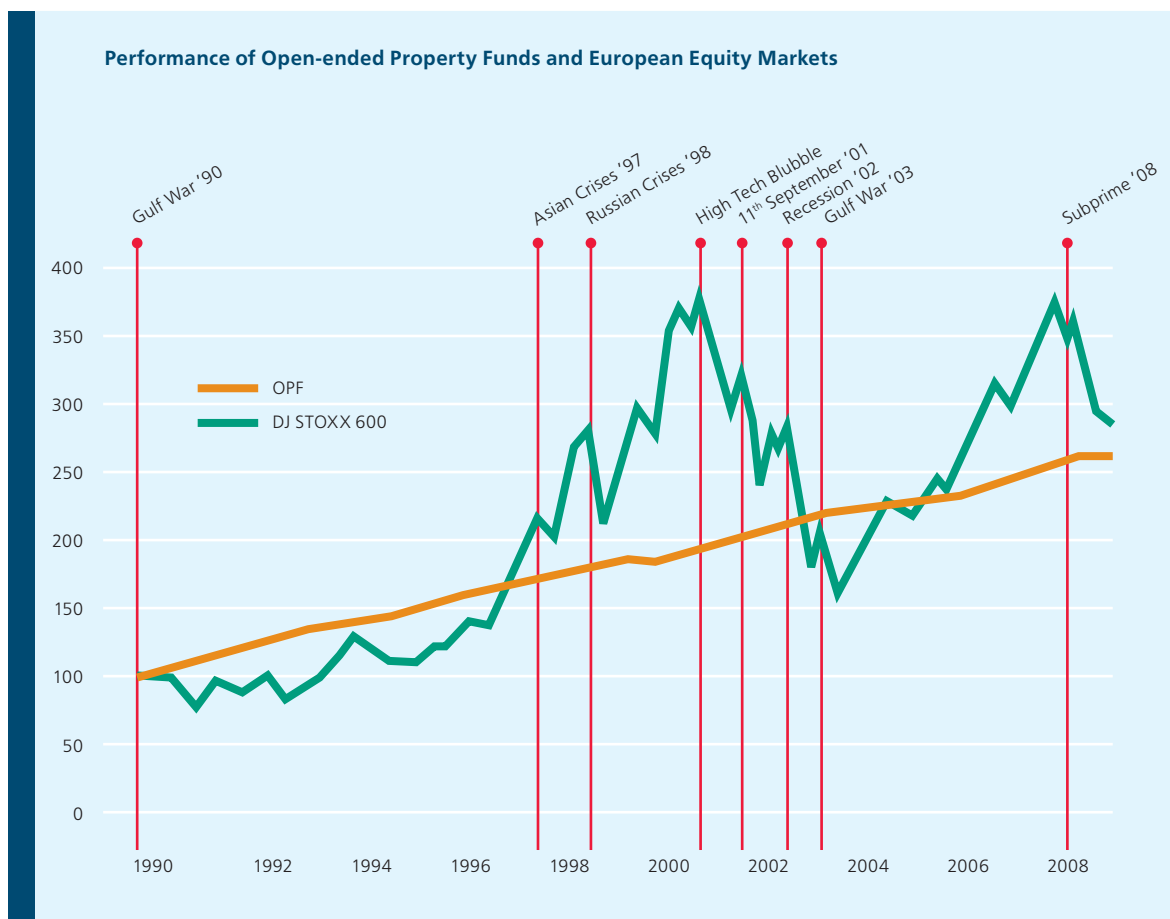
	Open-ended Property Funds		Equity Markets			Bond Markets and Money-Markets					Alternative Investments		
	With AC	Without AC	NIKKEI 500	S&P 500	DJ STOXX 600	JPM Japan	JPM US	JPM Europe	JPM UK	GMK	S&P GSCI	HFRI FoHF	REITs
Mean (%)	0.43	0.43	-0.08	0.62	0.61	0.41	0.51	0.62	0.60	0.35	0.52	0.64	0.31
Std. Dev. (%)	0.21	0.34	6.55	4.84	4.60	2.83	2.80	1.11	2.3	0.17	5.82	1.46	6.29
Skewness	0.60	0.19	0.23	-0.17	-0.73	0.25	0.53	-0.44	-0.05	1.27	-0.06	0.01	-0.31
Excess-Kurtosis	1.17	2.21	0.23	0.16	1.15	0.70	0.49	0.17	0.15	0.63	0.03	4,36	1.84
Min. (%)	-0.21	-0.88	-15.47	-13.33	-15.55	-8.43	-5.48	-2.98	-6.26	0.17	-15.50	-6.49	-21.28
Max. (%)	1.13	1.61	19.05	12.16	13.38	11.10	11.40	3.06	6.89	0.78	16.58	6.70	20.34
Jarque-Bera-Stat.	37.52 <sup>3</sup>	41.57 <sup>3</sup>	2.18	1.17	28.30 <sup>3</sup>	17.58 <sup>3</sup>	11.32 <sup>3</sup>	6.69 <sup>2</sup>	0.21	57.82 <sup>3</sup>	0.11	153.78 <sup>3</sup>	30,18 <sup>3</sup>

The table displays mean, standard deviation, skewness, excess kurtosis, minimum, and maximum for the monthly return distribution from February 1991 until April 2008. The assets considered are open-ended property funds before and after autocorrelation (AC)-adjustment with the method of Getmansky, Lo und Makarov (2004), equity markets (Nikkei 500, S&P 500, DJ Stoxx 600), bond markets (JP Morgan Japan, US, Europe and UK Government Bond Indices), money-markets (LIBOR), and alternative investments (S&P GSCI, JFRO Fund of Funds Composite Index, FTSE EPRA/NAREIT Germany). All indices are total return indices (or their distributions were reinvested) and denominated in Euros. No autocorrelation effects could be detected for the time series of equity- and bond-markets as well as alternative investments. The test of Jarque and Bera (1980) is used to test the assumption of normally distributed monthly returns. <sup>3</sup>, <sup>2</sup> and <sup>1</sup> indicate, that the assumption of a normal distribution of monthly returns can be rejected with a 1 percent, 5 percent and 10 percent significance-level, respectively. All statistics are based on continuous returns.

### 3.2 Returns of Open-ended Property Funds During Capital Market Crises

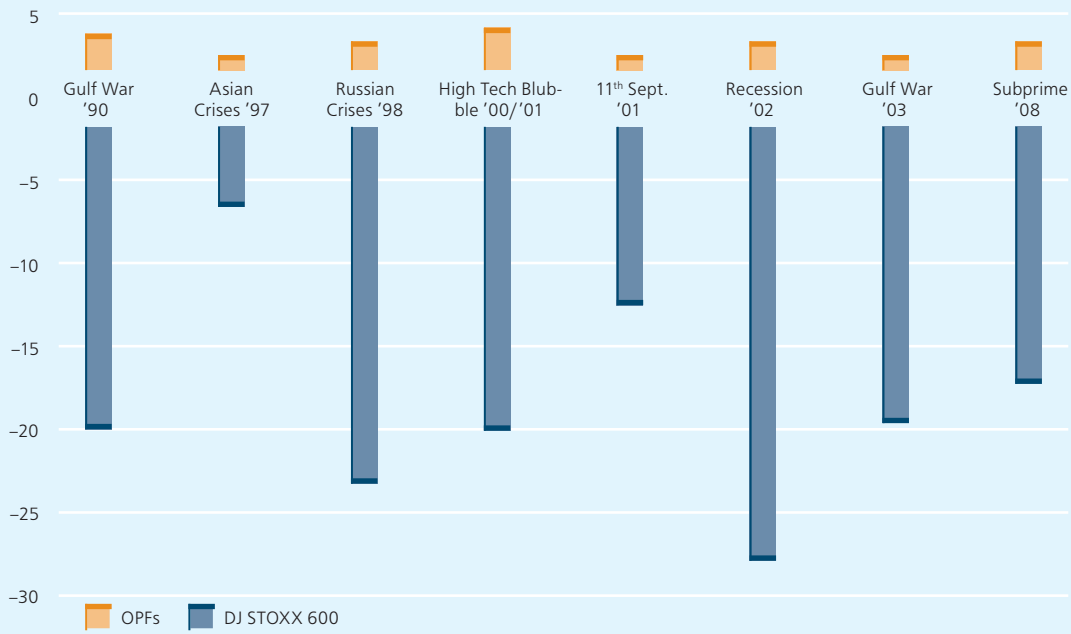
Figure 1 compares the performance of open-ended property funds in Germany with the European equity market (DJ Stoxx 600) from 1990 until April 2008. The extremely consistent development of open-ended property funds is immediately obvious.

Colored markings indicate various crises such as the gulf war, the Asian crisis and the current subprime crisis. During all crises equity markets face substantial losses, while open-ended property funds are seemingly untouched.



Average indexed performance of the Open-ended Property Funds Index and the DJ STOXX 600. 1990=100.

### Performance of Open-ended Property Fund Gains During Equity Market Crises



OPFs = Open-ended Property Fund. Performance information in percent.

# 4. Markowitz Portfolio Theory and Efficient Asset Allocation

## 4.1 Foundations of Markowitz Optimization

In the early 1950s Harry M. Markowitz created the foundations for the theory of efficient portfolio selection, a contribution which earned him the Nobel Prize in Economics in 1990. Portfolio theory in the spirit of Markowitz essentially consists of the systematic combination of securities in order to find the portfolio with the lowest possible risk, measured by the variance of returns (or its square root, the standard deviation), for a given level of expected return (Markowitz (1952)). For our purposes, the portfolio optimization has to satisfy two restrictions. Firstly, the portfolio must be fully invested. Secondly, short-sales are excluded. The investor can invest in all assets considered in Table 2. In the following we differentiate between three investor types, for whom we show the results of Markowitz optimizations:

- For the traditional retail investor we assume weights of 10 percent to 20 percent in equities, 45 percent to 65 percent in bonds, 0 percent to 5 percent in alternative investments and 20 percent to 40 percent in the money-markets. This investor's portfolio structure is conservatively defensive.
- The modern retail investor has a more offensive portfolio and therefore a higher share of equities (15 percent to 35 percent) and alternative investments (10 percent to 20 percent). Correspondingly, the weights of bond markets (35 percent to 55 percent) and money-markets (5 percent to 25 percent) are lower than for the traditional retail investor.
- Lastly, we investigate an institutional investor. We assume this investor has to abide by the regulatory investment restrictions for German life insurers. This implies a maximum investment of 80 percent of the portfolio in foreign exchange positions. The limit for risky investments (equities, hedge funds) is 35 percent. In addition, non-European equities as well as in-

direct commodity investments may not exceed a limit of 10 percent. Hedge funds may be part of the portfolios up to a limit of 5 percent. The cumulative REITs and open-ended property funds weight may not exceed a limit of 25 percent.

Given these three investor types, Markowitz optimization is used to find an optimal portfolio within the stipulated investment limits. Initially, we perform the optimization without open-ended property funds and subsequently add these to the optimization.

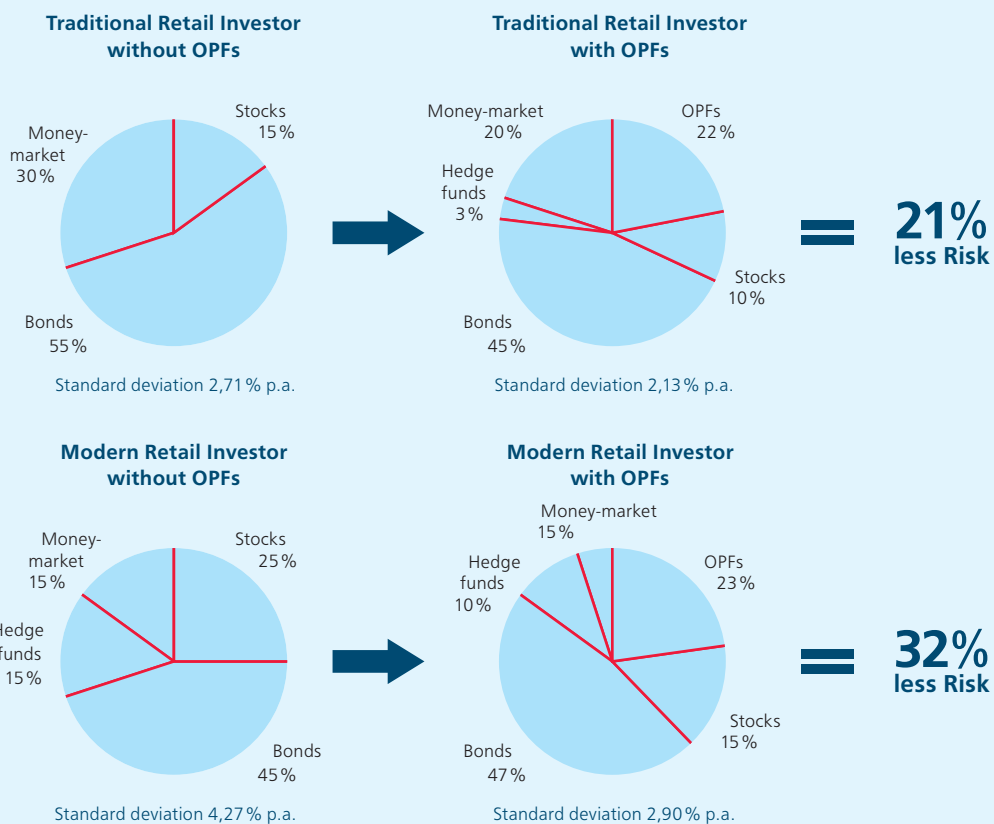
## 4.2 Open-ended Property Funds in the Portfolios of Retail Investors

Using Markowitz optimization we determine optimal portfolios for retail investors subject to the weight limits discussed in the prior section. As Figure 3 shows, both types of retail investors are able to realize a substantial risk reduction (measured by the standard deviation of portfolio returns) for the same return level through the addition of open-ended property funds to the portfolio. The traditional retail investor, whose portfolio is configured defensively, is able to lower the annual standard deviation of his or her portfolio from 2.71 percent p.a. to 2.13 percent p.a.; a reduction in risk of about 21 percent. The modern retail investor is even able to reduce risk by about 32 percent with the addition of open-ended property funds to the portfolio: the standard deviation of portfolio returns is reduced from 4.27 percent p.a. to 2.90 percent p.a.

Examining the portfolio composition of the optimal portfolio of the traditional retail investor, we can see that open-ended property funds are added with a substantial weight of 22 percent to the portfolio. Correspondingly, the weights of money-markets and bonds are reduced by about 10 percentage points each. For the modern retail investor, the addition of open-ended property funds with a weight of 23 percent is optimal. The

investment in open-ended property funds leads to a reduction in the equity and money-market weights of about 10 percent each as well as a reduction of hedge fund weights by 5 percent. Interestingly, the weight of bonds is not reduced, but even slightly increased by 2 percentage points. For both investors, investments in REITs are not considered at all. This asset class is completely dominated by open-ended property funds.

**Figure 3: Optimal Portfolios for Retail Investors**

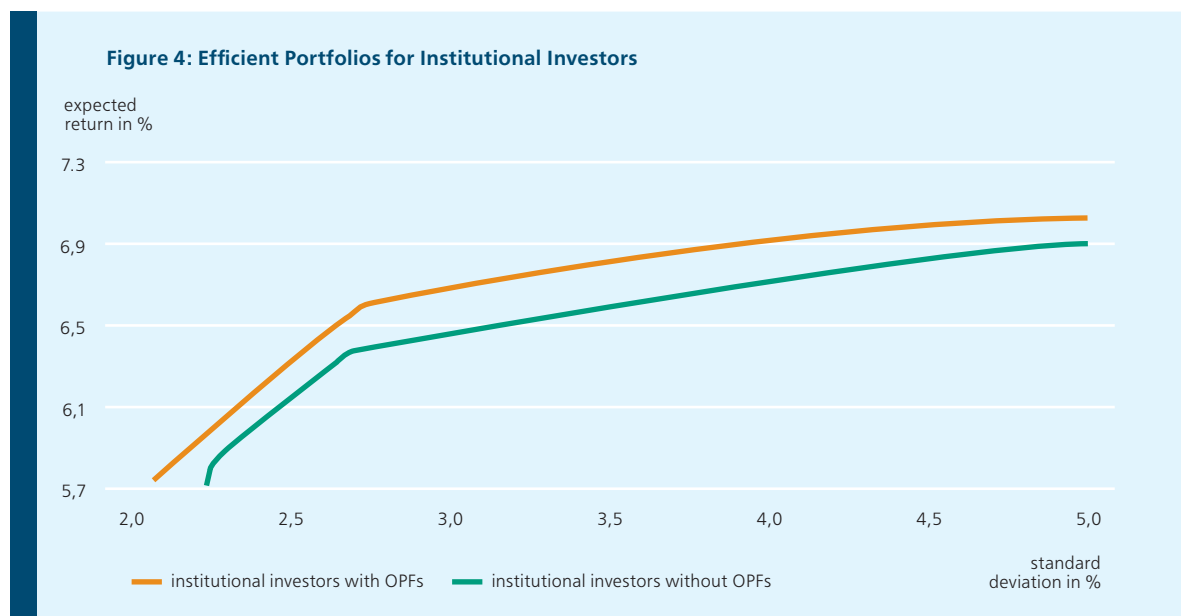


OPFs= Open-ended Property Funds. Risk is measured by standard deviation.

### 4.3 Open-ended Property Funds in Portfolios of Institutional Investors

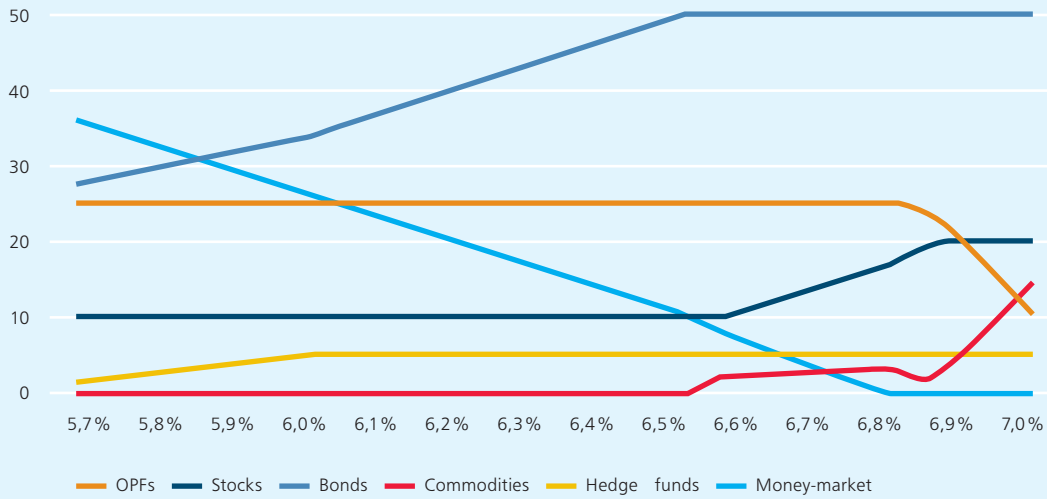
Figure 4 shows the efficient portfolios (efficient frontiers) when we optimize the portfolios for institutional investors with and without the inclusion of open-ended property funds and abiding by the institutional investment constraints described in Section 4.1. Efficient portfolios exhibit the optimal risk-return combinations under the given restrictions. As is evident in Figure 4, the efficient frontier is moved upwards by the addition of open-ended property funds to the portfolio. Hence, we find that the inclusion of open-ended property funds improves the risk-return profile.

Figure 5 shows the portfolio composition along the efficient frontier i.e. the weights of each asset class for the different expected return levels. It is evident that open-ended property funds are initially always included at the regulatory limit of 25 percent. Only with an expected return of more than 6.9 percent p.a. the weight of open-ended property funds decreases as they are replaced by assets with a higher expected return such as hedge funds. Overall, we conclude that open-ended property funds not only play an important role in defensive portfolios geared towards risk reduction, but are also essential in more growth-oriented portfolios.



OPFs= Open-ended Property Funds.

Figure 5: Composition of Efficient Portfolios for Institutional Investors



OPFs= Open-ended Property Funds. Composition of the efficient Markowitz portfolios in percent with given target return as for a German life insurance company.

## 5. The Suitability of Open-Ended Property Funds for Different Holding Periods

Finally, we analyze the influence of open-ended property funds on portfolio returns and portfolio risk for different holding periods. Starting point of the analysis is a benchmark portfolio consisting of one third equities, one third bonds, and one third money-market investments. We successively increase the proportion of open-ended property funds from 0 percent to 25 percent and decrease all other asset classes accordingly, maintaining the relative weights of the other asset classes to each other. In Table 3, we analyze the effects on average minimal returns (AMR) for different holding periods (1 to 10 years). Portfolio returns for the various holding periods are simulated using a bootstrap approach. Thereby, the time series of future returns is constructed from historical returns by drawing with replacement. We simulate 1,000 runs for each holding period. The AMR is then simply calculated as the average return of the 50 portfolios with the lowest returns.

Examining the AMR in Table 5, it is obvious (a) that the AMRs increase with increasing holding period and (b) that an inclusion of open-ended property funds improves the AMR. With an inclusion of 5 percent open-ended property funds and a 1-year holding period the AMR improves from -12.98 percent to -12.04 percent. With 25 percent open-ended property funds this result is further improved to -8.35 percent. For an 8-year holding period, the AMR without open-ended property funds turns positive for the first time. With the inclusion of 20 percent open-ended property funds, the AMR is already positive for a 7-year holding period. Overall, we can conclude that open-ended property funds already have very positive effects on the risk-return profile of investment portfolios for relatively small investment weights.

**Table 3: Average Minimum Returns for Various Holding Periods**

Years	1	2	3	4	5	6	7	8	9	10
0% OPF	-12.98%	-13.48%	-10.24%	-10.41%	-9.06%	-7.97%	-5.99%	0.08%	4.36%	5.71%
5% OPF	-12.04%	-12.27%	-8.99%	-8.84%	-7.50%	-6.33%	-4.27%	1.75%	6.01%	7.50%
10% OPF	-11.10%	-11.08%	-7.75%	-7.29%	-5.97%	-4.72%	-2.57%	3.39%	7.63%	9.27%
15% OPF	-10.18%	-9.90%	-6.53%	-5.76%	-4.46%	-3.14%	-0.91%	5.00%	9.23%	11.00%
20% OPF	-9.26%	-8.73%	-5.32%	-4.26%	-2.97%	-1.58%	0.73%	6.59%	10.80%	12.70%
25% OPF	-8.35%	-7.58%	-4.12%	-2.78%	-1.51%	-0.04%	2.34%	8.15%	12.35%	14.37%

This table shows the average minimum return (AMR) for holding periods of 1 to 10 years with an increasing weight of open-ended property funds (OPFs) in the benchmark portfolio. The benchmark portfolio contains one third equities, one third bonds, and one third money-market investments. With the inclusion of OPFs the equity-, bond- and money-market-weights are reduced correspondingly. The calculations are based on a standard block bootstrap Monte Carlo simulation with 5 lags and 1,000 runs following Efron and Tibshirani (1994). The AMR is calculated as the average return of the 50 portfolios with the lowest returns.

## 6. Excursus: Liquidity Analysis for Open-ended Property Funds

In this section we analyze the performance of open-ended property funds around the temporary suspension of share redemptions. In principle, open-ended property funds have to redeem shares on a daily basis. Therefore, they always maintain a certain level of liquid assets, as property cannot be sold quickly. German investment law requires that the managers of open-ended property funds hold a minimum of 5 percent of a fund's assets in cash or easily liquefiable investments to guarantee the redemption of outstanding shares at all times (Maurer, Reiner and Rogalla (2004) and Gullett and Redman (2005)). The possibility of daily share redemption creates the risk that investors redeem too many shares in a short time-period, rendering the fund's liquidity position too small to satisfy all redemptions. If the liquidity reserve threatens to fall under the minimum level, the redemption of shares may be suspended in order to raise money by selling property investments. Until today this has happened exactly three times in Germany (see e.g. Banner, Fecht and Tyrell (2007)):

- On December 13, 2005 Deutsche Bank Real Estate suspended the redemption of shares in its open-ended property fund Grundbesitz-Invest in order to conduct a complete revaluation of the property until March 3, 2006. This temporary suspension of share redemption followed a massive outflow of investments (more than one billion Euros, thereof 300 million Euros in the three days before the suspension), as the fund management expected a devaluation of its property holdings by several hundred million Euros.
- and on January 17, 2006 and January 19, 2006 KanAm had to temporarily suspend the share re-

**Table 4: Buy-and-Hold Abnormal Returns for Temporarily Suspended Open-ended Property Funds**

BHAR	DB Grundbesitz-Invest	KanAm grundinvest	KanAm US grundinvest
12 months before suspension	-0.49%	3.13%	3.90%
During suspension	-1.52%	1.91%	2.36%
12 months after suspension	10.70%	1.38%	1.90%

This table shows the buy-and-hold abnormal returns (BHARs) for DB Grundbesitz-Invest, KanAm Grundinvest, KanAm Grundinvest US and the average of all suspended funds for the 12 months before suspension of share redemptions, during suspension, and the 12 months after suspension. The benchmark for calculating BHARs is the value-weighted total market index without the suspended funds. The KanAm Grundinvest US is denominated in US-\$ and was not converted to Euros for this analysis. The calculation of BHARs is based on continuous returns and follows the approach by Barber und Lyon (1997). The data source for the prices and distributions of the temporarily suspended funds is Thomson Financial Datastream.

demption in two of its open-ended property funds, grundinvest US and grundinvest, after investors redeemed shares worth more than 700 million Euros within a few days. The apparent reason for the massive redemptions was a negative evaluation by a ratings agency which led to a panic among investors. KanAm did not need a revaluation of the properties and used the time of suspension to raise the required liquidity. The funds were re-opened on March 31, 2006 and April 13, 2006.

For the performance analysis, we calculate the abnormal return of the temporarily suspended open-ended property funds compared to the overall market of open-ended property funds for the 12 months before the suspension of redemptions, for the period of suspension itself, and for the 12 months afterwards. We use Buy-and-Hold Abnormal Returns (BHAR) to maintain an investor's perspective. From the results in Table 4, it is evident that the BHAR of the KanAm funds are positive for all time peri-

ods examined. For the DB Real Estate fund the BHAR is slightly negative before and during suspension, but, in return, it is positive and quite high for the 12 months afterwards with 10.7 percent. These results indicate that investors did not redeem their shares due to bad performance before the temporary suspension of share redemptions. Also, the positive performance during and after the suspension indicates that no asset fire sales occurred. Overall, these three cases show that the temporary suspension of share redemptions in the respective open-ended property funds was a useful tool to protect investors from liquidity risk.

## 7. Summary of Results

The objective of this study is to determine the contribution of open-ended property funds to the asset allocation. Our main results are summarized as follows:

- Open-ended property funds experience positive returns during crisis times while international equity markets often post losses of more than 20 percent.
  - The addition of open-ended property funds to a benchmark portfolio increases expected returns while decreasing portfolio risk.
  - Open-ended property funds contribute to increasing returns, decreasing risks, and increasing diversification in the portfolios of private and institutional investors.
  - These results hold for different optimization approaches and an adjustment for auto-correlation in return time-series (and the resulting substantial increase in risk).
  - Even for small investment weights, open-ended property funds already have positive effects on the risk-return profile of investment portfolios. This result is independent of the investment holding period.
  - Therefore, open-ended property funds can be rightfully called an essential building block of a successful asset allocation.
- Share redemption in open-ended property funds may be temporarily suspended, resulting in liquidity risk for investors. However, on aggregate, the three temporarily suspended German funds experienced an outperformance compared to the overall market for open-ended property funds before, during, and after the time of suspension. Therefore, ex post the temporary suspension of share redemptions can be regarded as a useful tool to protect investors from liquidity risk.

## 7. References

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