**Leverage: Please Use Responsibly**
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# Leverage: Please Use Responsibly

***Executive Summary.*** *During the recent economic downturn, investors have been confronted with the negative impact of leverage. Consequently, investors now question loan-to-value (LTV) levels in their funds. Until recently, percentages around 50%–65% were common but never based on in-depth research or optimization. This paper examines the benefit of leverage using a simulation model to account for a multitude of scenarios and shows that portfolios with up to 40% LTV are still efficient. More leverage is likely to decrease return expectations. The reasons behind this conclusion are threefold: the disproportionately high cost of distress, asymmetric performance fees, and the impact of incremental interest rates.*

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Over the last thirty years, liquidity increased substantially and as a result, usage of debt took a serious flight, with a peak in the years 2005–2007. The impact on highly leveraged real estate funds has been well-publicized. Billions of dollars worth of real estate were handed over to banks, as equity diminished. While many investors were very keen on highly leveraged vehicles before the crisis, now many investors seem to be reluctant to take too much, if any, leverage.

Overall, this seems to demonstrate that sentiment has a very strong influence on the amount of leverage and that not many investors have a long-term leverage policy in place. In fact, the topic is rather complex and probably not fully understood. Literature provides some guidance on the use of debt, although there is not yet a clear practical guide on the ideal amount of leverage. Important is the widely-accepted theory of Modigliani and Miller (MM) (1958), which proves that a different financial structure for a company does not result in a different company value, unless leverage provides some tax benefits. In other words, without tax benefits leverage does not add extra value to a real estate portfolio. Boyd, Ziobrowski, Ziobrowski, and Cheng (BZZC) (1998) analyzed the impact of using leverage in a mixed-asset portfolio and their results clearly supported the MM findings. They concluded that for non-taxable investors, leveraging real estate caused a decline in mixed-asset portfolio efficiency. More precisely, for non-taxable investors the allocation towards real estate declined when leverage increased, so their advice to those investors was to avoid leverage. For taxable investors, however, the allocation initially increased, before declining again. This implied the

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existence of an optimum, which they concluded was somewhere between 20% and 75%. This optimum was theoretically proven by Cannaday and Yang (1996), McDonald (1999), and others. They showed that the optimal loan-to-value (LTV) ratio increases as the marginal tax rate of the investor increases.

Anson and Hudson-Wilson (2003) list six reasons why leverage could or even should be used. They provide a clear overview of all advantages and disadvantages, although some conclusions are debatable. They argue, for instance, that the most productive usage of leverage is the stop-loss quality during a downturn. Of course leverage will limit the absolute loss, but unfortunately the probability that one will lose 100% of their investment also increases. It will therefore only work as a stop-loss if the remaining capital is held in cash, which is rather unlikely for institutional investors. Another interesting conclusion they draw is that diversification benefits of real estate are strengthened when using leverage. While Anson and Hudson-Wilson do not provide any empirical evidence in support of their conclusion, the opposite was clearly proven in BZZC and Hoorenman and van der Spek (2008). In these studies higher leverage resulted in a lower allocation towards real estate in a mixed-asset portfolio.

Finally, Tyrell and Bostwick (2005) conclude, using a theoretical approach, that there should be an optimal level of leverage. In their approach, they rightfully address the issue of increasing interest rates in line with rising leverage, resulting in diminishing returns to leverage. In addition, they also conclude that investors should leverage core investments up to the optimal leverage point, and therefore they encourage investors to take on a certain amount of leverage.

The above shows that the current literature does not provide a clear answer to the question of how much leverage should be used when investing in real estate. This paper will provide an answer to that question and in doing so, aims to create a better understanding of the effect of leverage on a private real estate investment trust (REIT).

The remainder of this paper is structured as follows: The first section will provide a description of all pros and cons of leverage and the effect it has on an institutional investors' portfolio. The second section explains the modeling framework. The third section presents the results. The paper closes with concluding remarks.

## The Pros and Cons of Leverage

While a high amount of leverage can arguably lead to higher theoretical returns, it is often used with disregard for the effect on risk and the effect on mixed-asset portfolio optimization. An assessment of the pros and cons of using debt can be used to create insight in the manner in which it is best employed.

The most important advantages of using leverage for investors are:

- A taxable investor can use the interest payments as a tax shield, thus reducing the tax burden and increasing the risk-return profile of the investment.
- A well-diversified portfolio is easier to construct with the use of leverage, as one will be able to purchase more properties. This is more valid for smaller investors than for large institutional investors.
- Leverage will generate some liquidity and flexibility when managing a real estate portfolio, which is especially useful for (semi-) open-ended funds. This advantage is, however, already achieved with relatively low levels of gearing.
- Leverage could enhance return on invested equity and is therefore even attractive to some tax-exempt investors, who are less concerned with an increased risk profile.
- Very high levels of non-recourse financing can create an asymmetric pay-off between rising and falling property markets as the loss of the investor holding non-recourse debt is capped and the upside is not. This stop-loss is touched upon in Anson and Hudson-Wilson (2003). To make a proper strategy out of this, one should hold a large part of investable capital in cash and invest



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**Exhibit 1**

**Balance Sheet Implication for Mixed Asset Investors using Leveraged Real Estate Investments**

| Assets | | Liabilities | | Assets | | Liabilities | |
|---|---|---|---|---|---|---|---|
| Real estate investment | 50 | Provision for pension liabilities | 100 | Real estate investment | 100 | Provision for pension liabilities | 100 |
| Bond investment | 50 | | | Bond investment | 50 | Debt | 50 |
| **Total assets** | **100** | **Total liabilities** | **100** | **Total assets** | **150** | **Total liabilities** | **150** |

only a small part in extremely geared property (>90%). Over several cycles, enjoying the huge benefits of upturns and losing only the initial equity in severe downturns, this may lead to a higher average return on employed capital. However, this is a theoretical exercise, as in practice it would be hard to find that sort of financing at acceptable rates.

For fund managers, leverage clearly provides some advantages. They will be able to purchase more real estate than the amount of capital they raised from investors. Generally, this will lead to a higher market share and to more fees. Many fund managers have switched in the past years or are switching from a gross asset value (GAV) towards a net asset value (NAV) based management fee, limiting the incentive to use large amounts of debt. However, the argument still stands with regard to acquisition and disposition fees as they are related to the size of the portfolio. Furthermore, leverage will give fund managers a bigger change on a higher than expected return, triggering a performance fee. The increased risk of not achieving the expected return will not trigger a decline in (performance) fee and is therefore no reason to hold back. Finally, leverage helps the manager to be more flexible. This flexibility can be used to service clients with matters such as redemptions and dividends.

There are also several disadvantages of using leverage, which are most evident for tax-exempt investors. For these investors, the addition of leverage in real estate vehicles within a mixed-asset portfolio, including fixed income, leads to value destruction. To explain this, bear in mind that adding leverage to real estate is the same as selling bonds in the market. If the investor is also investing in bonds, he basically sells and buys at the same time, creating an often inefficient long/short strategy. Exhibit 1 shows this situation for a pension fund investing half of the pension provisions in real estate and the other half in bonds. In the left balance sheet, the real estate exposure is presented as one line. In the right balance sheet, this real estate investment is consolidated assuming 50% leverage. Here it becomes clear that the debt used for leveraging the real estate investment is offsetting the bond investment. The net result of this consolidation is that the portfolio is 100% invested in real estate and the bond exposure is basically eliminated.

In addition to this, there are costs involved with both buying and selling bonds, which will reduce the net return. And finally, when looking at institutional investors like pension funds and insurance companies, one can argue that the credit quality of the real estate vehicle is often lower than that of the investor and therefore makes the short position more expensive than the long position. Double costs combined with a negative spread will therefore create a certain loss for investors.

Another disadvantage of using debt is that it does not improve the risk-return profile of the investment (again, for tax-exempt investors) but it does introduce interest rate volatility risk. Although this can be hedged, it still adds a lot of work with regard to hedge and debt covenant management for no obvious benefit in the risk-return profile. The effect leverage has on fees and management alignment could also be seen as a drawback. What is good for the manager may not always be good for the investor, and fee structures that have some dependence on GAV levels in combination with leverage can create unwanted incentives.

Lastly, evidence from pooled fund databases indicates that employing higher levels of debt does not



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even always increase the return. Evidence is shown in Exhibit 2 for Europe and the United States. For both regions, 'value-add' strategies underperformed core strategies even though these funds claim to provide additional value/return. This underperformance can probably partly be explained by the higher leverage. It is important to note that it is not possible to compare the risk-return profile between the U.S. and Europe as the timeframe is different, even though LTV's are dated equally and appear to be rather similar.

The difficulty of these databases is the fact that every fund has a different (legal) structure, a different allocation, and other specific issues. It is interesting therefore to see how the return of a fund would behave if we were able to control all parameters and test for different levels of LTV, fees, and interest rates. Therefore, a simulation model was created for this paper that mimics the dynamics of a fund.

## Research Design, Data, and Assumptions

A private REIT is modeled using Monte Carlo simulation in order to understand the effect of leverage within real estate portfolios. A number of key modules are developed, each covering a set of assumptions. These modules are: (1) the real estate market module, (2) the financial module, covering the leverage structure and assumptions, and (3) the REIT module covering the dynamics and structure of the private REIT. These modules are further explained in the following three paragraphs.

### Exhibit 2
**Risk and Return (net of fees) Profile for Different Investment Styles and Degree of Leverage**

| | Europe | | | U.S. | | |
|---|---|---|---|---|---|---|
| | Return | Risk | LTV | Return | Risk | LTV |
| Core | 5.8% | 11.6% | 40% | 4.4% | 6.5% | 34% |
| Value Add | 4.6% | 17.9% | 56% | 3.6% | 9.1% | 57% |
| Opportunistic | n.a. | n.a. | n.a. | 6.0% | 11.9% | 64% |

Notes: The sources are INREV (9 years average, Europe, local currencies) and NCREIF (21 years average, U.S.). LTV is dated end of 2009.

### Real Estate Market Module

First, the real estate market is modeled in such a way that it can be used for the simulation model. There are many different ways to model real estate returns. The selected approach models real estate by splitting real estate total return into two elements: the income return and the value growth of the underlying portfolio. This is shown below:

$$TR_t = IR_t + CG_t. \quad (1)$$

Here $TR_t$ is the total return at time $t$, $IR_t$ is the income return, and $CG_t$ is the capital growth. For the purpose of this study and to avoid making the simulation too complex, the model focuses only on the income return and capital growth for a diversified real estate portfolio. Deepening the model, for instance, by modeling the rental growth, yields, and other building blocks of the total return is unnecessary and increases complexity. Income return is partly dependent on the capital value growth of the previous year, as capital value normally functions as the denominator in its equation. It is therefore essential to model the capital growth first and to assume and model a dependency between these parameters. Real estate valuations are known to be smoothed and a lot of literature is written on this topic (e.g., Geltner, MacGregor, and Schwann, 2003). As the purpose of this model is to capture the return development of a non-listed real estate fund, it is useful to model real estate values as being appraisal based. To capture this smoothing in capital values, real estate value growth is assumed to be dependent on the previous value growth:

$$CG_t = (1 - \alpha) \cdot CG_{t-1} + \alpha \cdot CG_t^*. \quad (2)$$

Here $\alpha$ is the smoothing factor and $CG_t^*$ is the real market value change, which can be modeled independently and is normally distributed: $CG_t^* \sim N(CG_{\exp}, \sigma_{CG}^2)$. As a result, Equation 2 can be rewritten as follows:

$$CG_t = (1 - \alpha) \cdot CG_{t-1} + \alpha \cdot CG_{\exp} + \varepsilon_t. \quad (3)$$

Here $CG_{\exp}$ is the expected capital growth in the long run and the error term is normally distributed: $\varepsilon_t \sim N(0, \alpha^2 \cdot \sigma_{CG}^2)$. The variance of the error



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term ($\alpha^2 \cdot \sigma_{CG}^2$) can be observed in the market as the so-called 'smoothed' appraisal-based volatility.

The percentage change in income return is assumed to follow a random walk:

$$\frac{IR_t}{IR_{t-1}} - 1 = \mu_t, \quad \mu_t \sim N(0, \sigma_{IR}). \tag{4}$$

However, in addition to the specifications of the income return, the percentage change in income return is assumed to be partly dependent on capital growth of the previous year. Strong value growth in the first year is very likely to result in a decline in income return in the subsequent year. To incorporate this dependency, the vector ($\varepsilon_t$, $\mu_t$) is assumed to have a bivariate normal distribution, with mean (0,0) and covariance matrix:

$$\sum = \begin{bmatrix} \alpha^2 \cdot \sigma_{CG}^2 & \rho \cdot \alpha \cdot \sigma_{CG} \cdot \sigma_{IR} \\ \rho \cdot \alpha \cdot \sigma_{CG} \cdot \sigma_{IR} & \sigma_{IR}^2 \end{bmatrix}. \tag{5}$$

The correlation ($\rho$) can be estimated by regression with historical data. Vacancy is assumed to be incorporated into the income return and not modeled separately.

The data used for this study is partly based on NCREIF data, all property types. The data input are presented in Exhibit 3.

**Exhibit 3**

**Real Estate Simulation Model Assumption**

| Variable | Description | Value |
|---|---|---|
| $\alpha$ | Smoothing factor | 0.4 |
| $CG_0$ | Capital growth year 0 | 0% |
| $CG_{exp}$ | Expected long term capital growth | 1% |
| $\alpha \cdot \sigma_{CG}$ | Standard deviation appraisal based capital growth | 6.6% |
| $IR_0$ | Income return year 0 | 7.0% |
| $\sigma_{IR}$ | Standard deviation change in income return | 4.3% |
| $\rho$ | Correlation between capital growth and change in income return | −0.82 |

Note: The source is NCREIF.

## Financial Module

The second module covers the debt structure. Whether it is via a bank or special structured products like CMBS, borrowing money always involves costs. Besides an arrangement fee, the investor needs to pay an interest rate and this rate is dependent on the creditworthiness of the investor. The more risk the deal contains, the higher the interest rate the bank will require. Therefore, one should expect a positive correlation between leverage and credit spreads. Moreover, one can assume this relation to be exponential, as the risk increases exponentially when the LTV is approaching 100%.

Unfortunately, there is no information available that provides property lending interest rates by amount of leverage. Moreover, there is very little literature that effectively describes the relation between the cost of capital and the degree of leverage within the real estate market. Titman, Tompaidis, and Tsyplakov (2004) prove that there is a significant positive relationship. However, they clearly demonstrate that LTV is not the only explanatory variable for credit spreads. Because the model developed here will only be used to understand the impact on return for certain levels of LTV, the other variables are ignored and the credit spreads estimated solely on LTV.

The CDS market is used to capture this relationship. All available credit default swap (CDS) prices (source: Bloomberg) were gathered, along with the amount of leverage these companies have. Financial companies were excluded from the analysis, as their leverage ratio is incomparable to the other industries. The relationship between credit spreads and leverage was then estimated assuming exponential growth. Finally, all real estate-related CDSs were isolated and the same relationship estimated. The results are shown in Exhibit 4. The results for real estate-related companies show a somewhat steeper curve, implying that leverage for real estate companies is somewhat more expensive.

The estimated CDS spread formula for real estate companies is:

$$Spread_i = 39.0 \cdot e^{3.1 \cdot LTV_i}. \tag{6}$$

Here $Spread_i$ is the CDS spread on company $i$ in basis points and $LTV_i$ the LTV ratio for the same



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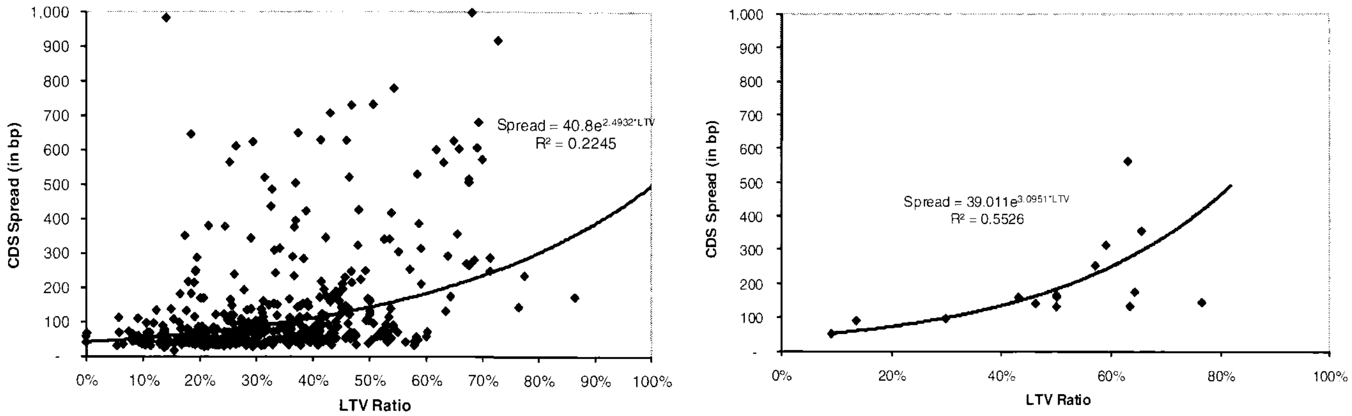
**Exhibit 4**

**LTV in Relation to CDSs for All Non-financials (left) and Real Estate Companies (right)**




Notes: *The number of CDSs used in the analysis is 418, 16 of which involve real estate companies. The source is Bloomberg.*

company in percentages. The $R^2$ of the estimated equation is 0.55. The spreads produced by the formula seem to be a fair representation of today's market. For instance, it is possible to obtain a 70% LTV with a 340 basis point spread. Assuming a 2.93% base rate, the total interest rate for a 70% leveraged real estate vehicle would be 6.33%.

## Private REIT Module

The final module structures the profile of the private REIT. The assumptions made for the fund model are set to reflect real examples of launched U.S. non-listed real estate funds. In the model, it is assumed that a 10-year closed-end fund is investing in U.S. diversified core real estate. The investment period is two years and at the end of the lifetime selling the portfolio at a price equal to the latest valuations is assumed to take two years. All investments and sales are executed halfway down the year and the debt is assumed to be put in place simultaneously with investments at a fixed interest rate. This interest rate is split into two parts: the risk-free rate and the credit spread. The risk-free rate is equal to the 10-year U.S. government bond (2.93% at the end of Q2 2010) and the credit spread is assumed to be dependent on the amount of leverage, as explained in the financial module in the previous paragraph. The amount of leverage is set at the beginning of the fund and during the lifetime there is no intention to keep this LTV ratio stable. Therefore, the LTV is likely to change, as values are changing. At the end of each year, but not during the investment period, excess cash is distributed to the investor as dividend.

In the case of negative NAV (LTV > 100%), a cash sweep mechanism distributes all income to the lender. This mechanism is in line with common practice and manages to avoid the situation where investors continue to enjoy (huge) income returns while the lenders take a loss on their outstanding loan. During wind-down of the fund, debt is repaid first to ensure that cash is not distributed to investors in case of negative NAV. This is also not an uncommon structure, although wind-down policies vary greatly.

The asset management fee is 100 basis points over the NAV, the performance fee is 20% if the internal rate of return (IRR) is higher than a 9% hurdle, and finally an acquisition fee of 0.5% of purchase price is charged. Additional set-up costs are assumed to be 0.2% of total targeted GAV and paid in the first year.

## Results

The simulation consists of 1,000 runs, modeling the fund, financial, and market modules as previously outlined. This is done for LTV levels of 0% to 90%, with incremental steps of 10%. Two performance measurements are used to evaluate the results. The most important measure is the IRR as it is used by many institutional investors and fund



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managers to make their investment decisions. The drawback of this measure is that it does not work very well for extreme scenarios, so net present value (NPV) is also used. A discount rate or required return is necessary to calculate the NPV, which is likely to increase as leverage increases. Fortunately, this issue has been widely discussed in the literature and the solution is the adjustment presented below:

$$RR_E = RR_I + \frac{D}{E} \cdot (RR_I - Rf). \tag{7}$$

Here $RR_E$ is the required return including leverage, $RR_I$ is the required return on investment and therefore without leverage, $D$ is the amount of debt, $E$ the amount of equity, and $Rf$ the risk-free rate of return. $RR_I$ is assumed to be the risk-free rate plus a real estate risk premium of 2.5% and based on the number above this results in a required return of 5.43% for unleveraged real estate.

The first simulation results immediately revealed the problems that are attached to the use of IRR. In a limited amount of scenarios (but growing for higher LTV levels), cash flows are never positive. This happens when capital revaluations are so negative that equity is wiped out and no money is returned to the investor. Consequently, no IRR can be calculated for these scenarios. Taking these scenarios out of the final set of results would severely positively skew the average result. Appointing a value of −100% would skew the average result negatively as there is little difference in value between a −25% IRR and a −99% IRR over 10 years. This issue has been resolved, admittedly in a fairly crude manner, by appointing an IRR of −30% to negative cash-flow scenarios. This is done because −30% is just around the level at which the worst scenarios perform for which an IRR can be calculated. In these scenarios, final equity is also effectively zero. This assumption is expected to influence the average IRR to be slightly positive, however conclusions are not expected to be affected by it.

Another issue was the fact that the outperformance fee could be disproportionately high. This mainly happened in extreme scenarios, as returns were amplified by leverage when LTV levels were high. This issue is therefore more likely to happen when investing in value add and opportunistic funds, which does not fall within the scope of this study. The problem behind this issue is the reinvestment assumption. Phalippou (2008) explains this and other problems in great detail. One of the major problems with IRR, he states, is the reinvestment assumption. When calculating an IRR, dividends are assumed to be reinvested at the IRR rate. But how fair is this when the fund generates a 20% IRR? It is rather unlikely that an investor will find another investment vehicle to invest his dividend in that generates that same return. The impact this has on performance fees sometimes generates a problem in the simulation model. Due to the reinvestment assumption, it is possible that the performance fee, at the end of the lifetime, is even bigger than the sum of all positive cash flows, in scenarios where dividends are disproportionately high. Furthermore, these types of scenarios will lead to a large cash outflow to the fund manager in the final year and therefore no cash flow to the investor, resulting in an unfeasible IRR. To cope with these extreme scenarios, the performance fee was maximized to the sum of all cash-outflows during the liquidation period. The argument behind this is that investors are not willing to commit equity for additional fees at the end of a successful fund. Fees should be paid from the divestment proceeds.

Two measures are used to evaluate risk. The first measure is the standard deviation of IRR outcomes and the second is the chance that the IRR will be negative. This is a simple measure that counts the amount of negative IRR scenarios and divides them by the total number of scenarios. This measure is more robust than the standard deviation, as it does not suffer from the IRR calculation problems stated previously since it is obvious that the incalculable IRR is negative instead of positive. The average IRR after costs and fees for each of the simulations with different levels of LTV are shown in Exhibits 5 and 6.

Exhibit 5 shows that using leverage will increase the IRR somewhat for low levels of LTV. For levels higher than 40% however, the IRR will start to decrease. In addition, investment risk will increase



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**Exhibit 5**
**Risk Return (IRR) Profile for Different LTV Levels**

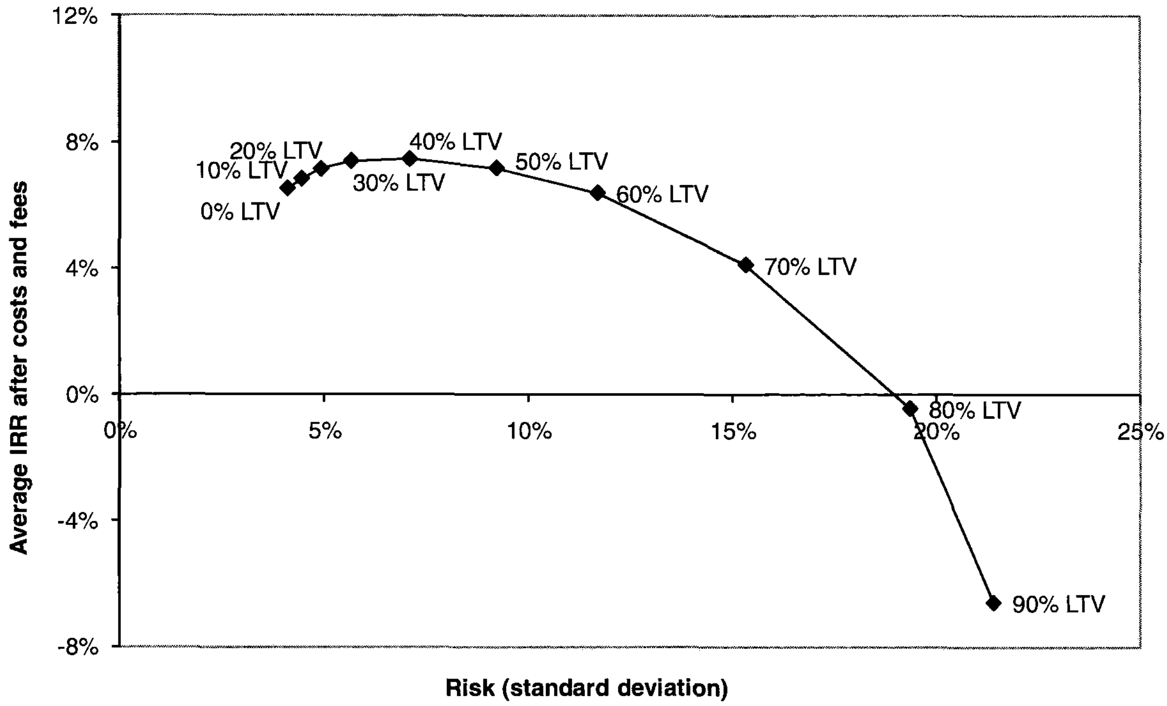


**Exhibit 6**
**Simulation Results for Different LTV Levels**

| LTV | IRR | P(IRR < 0) | SD IRR | Discount Rate | NPV/Investment |
|---|---|---|---|---|---|
| 0% | 6.5% | 6.5% | 4.1% | 5.4% | 12.3% |
| 10% | 6.8% | 7.5% | 4.4% | 5.7% | 13.0% |
| 20% | 7.1% | 8.4% | 4.9% | 6.1% | 13.4% |
| 30% | 7.4% | 10.1% | 5.6% | 6.5% | 13.2% |
| 40% | 7.5% | 11.4% | 7.1% | 7.1% | 12.2% |
| 50% | 7.2% | 14.3% | 9.2% | 7.9% | 9.4% |
| 60% | 6.4% | 19.5% | 11.7% | 9.2% | 3.8% |
| 70% | 4.1% | 27.0% | 15.3% | 11.3% | −7.7% |
| 80% | −0.4% | 38.0% | 19.3% | 15.4% | −31.0% |
| 90% | −6.6% | 54.4% | 21.4% | 27.9% | −79.7% |

Note: P(IRR < 0) is the chance that IRR is negative, SD IRR is the standard deviation of the IRR. Discount rate is the rate used to calculate the NPV and NPV/investment is the NPV of all cash flows divided by the initial investment.

with every incremental step in LTV. As a result, the additional risk is somewhat offset by a higher return for LTV levels up to 40%, albeit marginally. Higher LTV levels clearly lead to inefficient risk return profiles. The chance that the investor has a negative IRR at the end the lifetime of the fund rises disproportionally for every incremental level in LTV, as shown in Exhibit 6. One can easily see that the results are skewed to the left somewhat by looking at the 80% LTV results where the average IRR is −0.4% and the majority of the scenarios is still positive. This means that while higher LTV levels permit more extreme results and therefore longer and thicker tails, they occur



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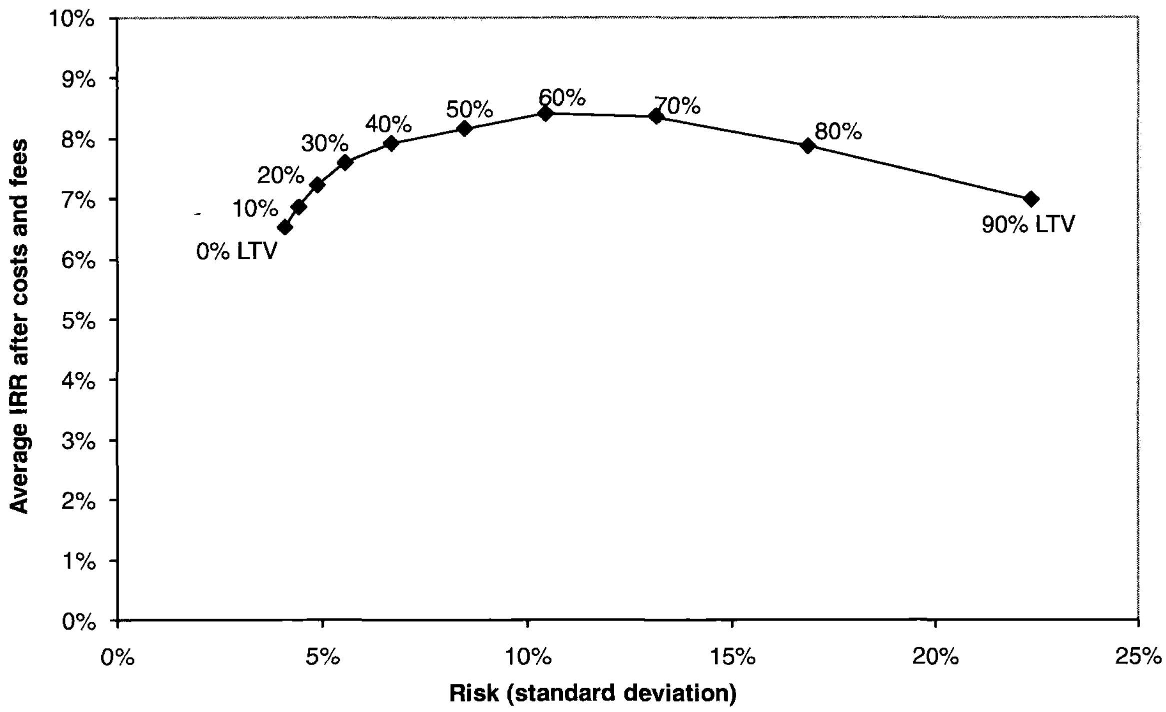
**Exhibit 7**
**Risk Return (IRR) Profile for Different LTV Levels**
When credit spreads are halved




less frequently in the positive tail than in the negative tail, which was capped at −30%.

The other performance measure that is used is the NPV divided by the initial investment (NPV/investment). This measure does not have the same problems as the IRR, although an additional assumption (discount rate) had to be made. The results are somewhat similar, as shown in Exhibit 6. The major difference is that the highest performance is achieved at 20% LTV. For higher LTVs, performance is already declining. This can be explained by the fact that NPV is determined using a discount rate and that rate is already adjusted for gearing risk. NPV/investment can therefore be viewed as a risk-adjusted return and the highest value should be the optimum.

The results of the simulation show that leverage only adds a limited amount of extra value to a core fund. These results suggest that the degree of gearing should be a lot smaller than most real estate managers and investors are used to; not more than 40% when maximizing the IRR or 20% when maximizing the NPV. This result is very different from the 50% or higher LTV that was common practice just before the financial crisis. It is also very different from the general viewpoint as leverage is not as linear and profitable as most people believe. The results will therefore be constructive in helping investors to better understand the private real estate fund industry and the choices they should make. In this light, it is useful to take a closer look at the results and to determine how sensitive they are to different assumptions.

## Credit Spread Sensitivities

The steep rise in financing costs when LTV levels rise is dragging down performance substantially for high levels of LTV. It is very plausible that funds with higher LTV levels also pay higher margins. The credit spread is subsequently decreased, implying cheaper debt, to establish how much the model and assumptions on these margins influence the result. This is done by dividing credit spreads by 2 and running the fund scenarios. The results are shown in Exhibits 7 and 8.



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**Exhibit 8**
**Simulation Results for Different LTV Levels**
When credit spreads are halved

| LTV | IRR | P(IRR < 0) | SD IRR | NPV/Investment |
|---|---|---|---|---|
| 0% | 6.5% | 6.5% | 4.1% | 12.3% |
| 10% | 6.9% | 7.3% | 4.4% | 13.2% |
| 20% | 7.2% | 8.3% | 4.9% | 13.9% |
| 30% | 7.6% | 9.4% | 5.6% | 14.3% |
| 40% | 7.9% | 11.0% | 6.7% | 14.3% |
| 50% | 8.2% | 12.1% | 8.5% | 13.4% |
| 60% | 8.4% | 14.5% | 10.4% | 10.9% |
| 70% | 8.4% | 17.4% | 13.1% | 5.1% |
| 80% | 7.9% | 21.7% | 16.9% | −6.6% |
| 90% | 7.0% | 29.2% | 22.3% | −29.2% |

Note: P(IRR < 0) is the chance that IRR is negative, SD IRR is the standard deviation of the IRR, and NPV/Investment is the NPV of all cash flows divided by the initial investment.

Not surprisingly, the highest IRR is achieved at higher LTV levels than if the full margin would be taken into account. The chance of a negative IRR is also much smaller for higher LTV levels. While the additional return at higher LTV levels again does not really make up for the additional risk, leveraging up to 50%–60% does not lead to lower IRR expectations. Anything higher than 60% LTV will have a negative impact on returns, while the risk increases significantly. An analysis of the NPV measure clearly reveals that the highest NPV is achieved at a lower LTV. The NPV/investment is maximized between 30% and 40% LTV.

Increasing credit spreads is plausible if one is setting up a new fund and has to decide on the best LTV level, but it may not always be an adequate description of reality. There are some existing funds with high LTV levels that have attractive financing in place. This can be a fund that attracted debt in years when it was much easier and cheaper to do so or a fund that has seen its assets drop in value significantly but has not surpassed any covenant threshold and can therefore maintain a low credit spread on its debt. In order to establish how the results change if a fixed credit spread is used instead of a spread that is dependent on the LTV level, the 'normal' credit spread at 40% LTV is used, which is 135 bp. The results are displayed in Exhibits 9 and 10.

Clearly, this scenario paints a very different picture. For every incremental step in LTV, the IRR increases. For higher LTV levels (50% and higher), it does so in an exponential manner that seems perfectly in line with the exponential increase of risk at those levels. Again, these results are rather unlikely for newly created funds, but could temporarily hold for some existing funds. Furthermore, there is a remarkable decline in the chance of a negative IRR. At 80% this chance shows a decrease. The cap on the performance fee causes this decline. With such a high LTV level and with relatively low credit spreads, dividends and therefore return on equity are very high. The reinvestment assumption implied by the IRR method drives the outperformance fee to incredible levels. Performance fees in these scenarios are capped, causing a decrease in the chance to achieve a negative IRR. Interestingly, the NPV/investment is maximized when LTV is 20%. Higher returns apparently do not compensate for the additional risk.

## Main Causes Further Explained

Higher LTV levels do not always imply higher returns, whether they are IRR or NPV. In fact, the LTV for core funds should probably be between 20% and 40% for a maximum performance. It is even likely that funds with higher LTV levels will generate lower IRRs rather than the higher IRRs that most people expect. Although these results may initially seem surprising, the reasons behind them are clear. There are three major reasons for the poor performance of medium to highly leveraged real estate funds: (1) a disproportionally high cost of distress; (2) the asymmetric effect of performance fees; and (3) the impact of incremental interest rates.

To understand the impact of distressed scenarios, a histogram of all results for 60% LTV is given in Exhibit 11. The IRR distribution is undoubtedly skewed to the left. One of the reasons the IRR is skewed to the negative side is that when a fund gets into a position with negative equity, it is difficult to recover.

The results for 0% and 60% LTV have been plotted in Exhibit 12 in order to analyze this in more detail. The fund with 60% leverage outperformed 7



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**Exhibit 9**
**Risk Return (IRR) Profile for Different LTV Levels**
When credit spreads are the same for all LTV levels

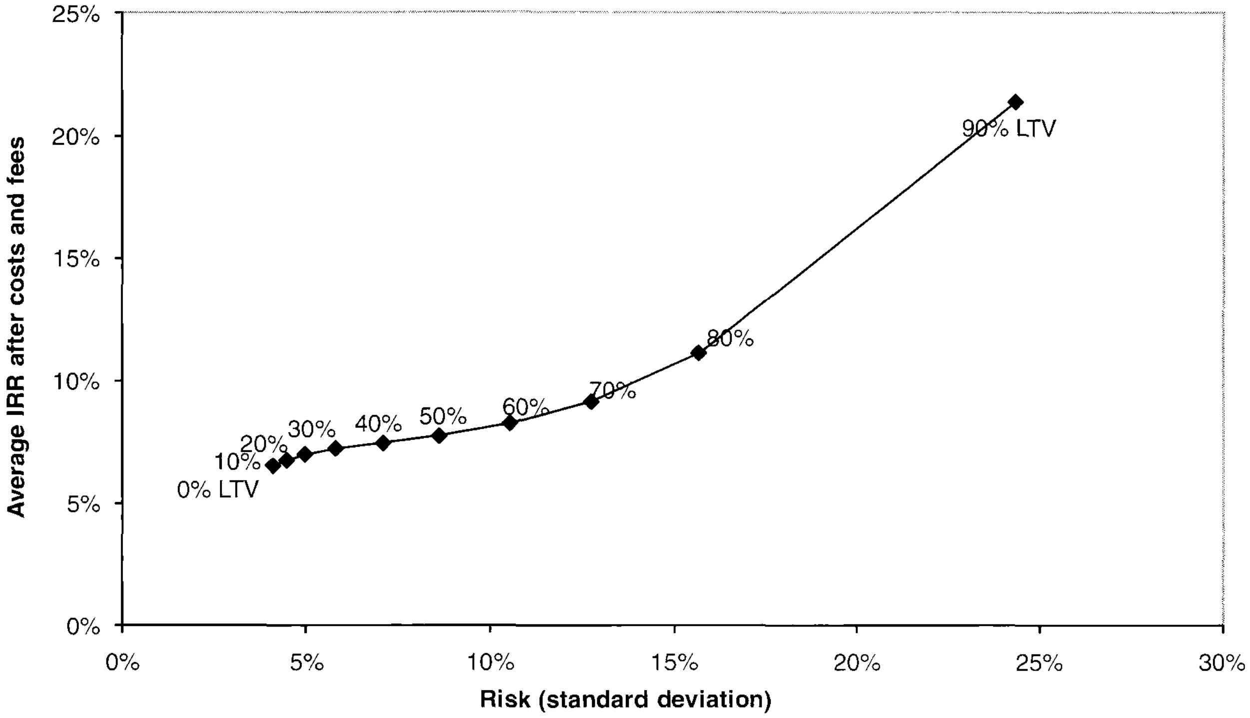


**Exhibit 10**
**Simulation Results for Different LTV Levels**
When credit spreads are the same for all LTV levels

| LTV | IRR | P(IRR < 0) | SD IRR | NPV/Investment |
|---|---|---|---|---|
| 0% | 6.5% | 6.5% | 4.1% | 12.3% |
| 10% | 6.8% | 7.8% | 4.5% | 12.5% |
| 20% | 7.0% | 9.0% | 5.0% | 12.5% |
| 30% | 7.2% | 10.7% | 5.8% | 12.4% |
| 40% | 7.5% | 11.4% | 7.1% | 12.2% |
| 50% | 7.7% | 13.9% | 8.6% | 11.6% |
| 60% | 8.3% | 14.7% | 10.5% | 10.4% |
| 70% | 9.1% | 15.1% | 12.7% | 7.3% |
| 80% | 11.1% | 13.9% | 15.7% | −0.1% |
| 90% | 21.4% | 15.0% | 24.4% | −2.9% |

Note: P(IRR < 0) is the chance that IRR is negative, SD IRR is the standard deviation of the IRR, and NPV/Investment is the NPV of all cash flows divided by the initial investment.

out of 10 scenarios. The underperforming scenarios, however, are showing bigger gaps in performance and more variety in IRR. Consequently, the impact of distress is proven to be disproportionately high. In both exhibits, the impact of the adjustment is visible. Approximately 2% of all outcomes is set at −30% and reflects those outcomes where it is impossible to calculate an IRR. However, this adjustment does have a positive impact on the average IRR and the results therefore slightly underestimate the negative impact LTV has on the IRR. The manual adjustment does therefore not influence the conclusions.

The second explanation is the asymmetric effect of performance fees. The most common structure of performance fee is a fixed percentage of all profits above a certain hurdle. This means that the fund manager will make an additional profit when things go right, but does not suffer when things go wrong. Basically, it means that the manager obtains a free option. For the investor, this means that there is an additional increasing cost when returns are increasing, while there is no benefit when returns are poor. The consequence is that high returns are dampened, while negative returns are not.



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**Exhibit 11**
**Probability Distribution IRR after Costs and Fees with 60% LTV**

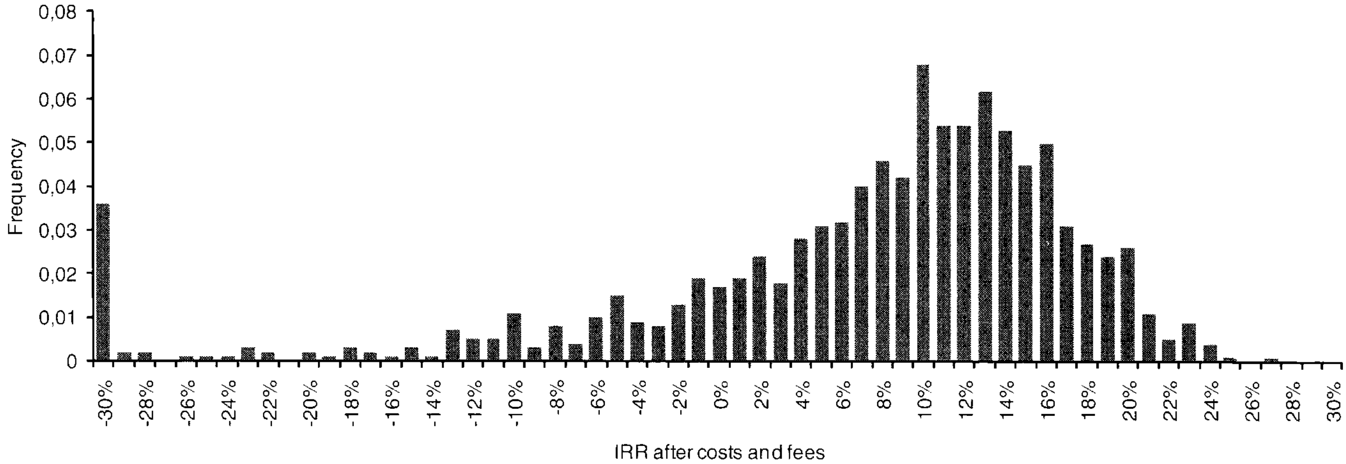
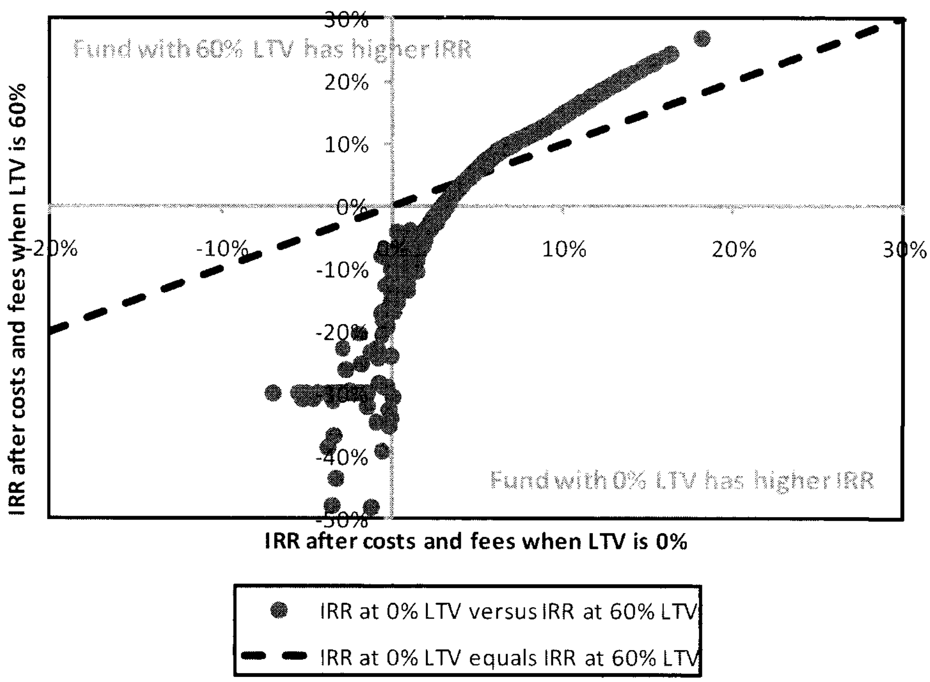



**Exhibit 12**
**0% LTV Results Compared with 60% LTV Results**




The final and most important explanation for the poor performance of medium to highly leveraged funds is the effect of incremental interest rates. Incremental interest rates are often ignored, but very relevant when making decisions on leverage. It is first useful to outline what incremental rates are to show the impact of this effect. Assume the interest rate on the debt of a real estate portfolio is 5% for a LTV level of 40% and 5.4% for a LTV level of 50%. The incremental interest rate is the interest rate that needs to be paid for the incremental part of the leverage; here the 10% between 40% and 50%. The incremental interest rate in the example is 7% for the amount of debt between 40% LTV and 50% LTV. In other words, this means that the first 40% costs 5% and the next 10% will cost



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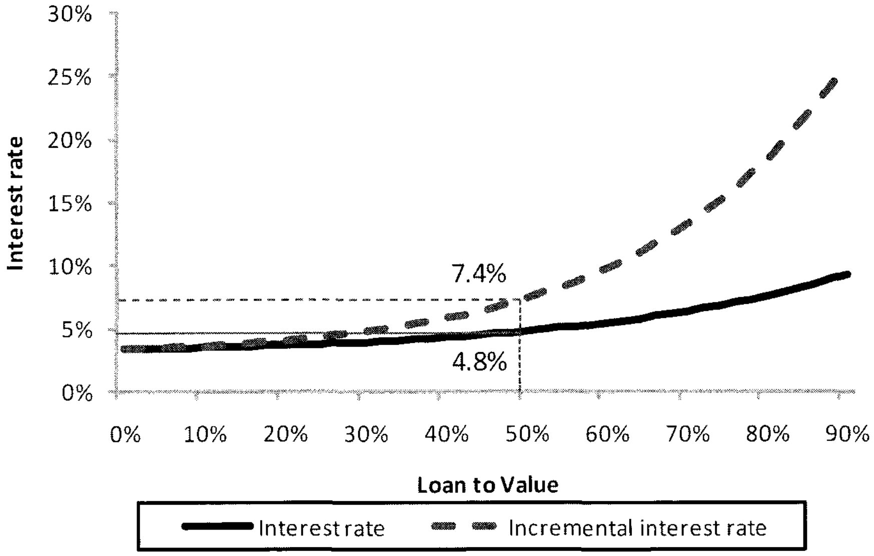
**Exhibit 13**
**Interest Rates and Incremental Interest Rates for Each LTV**




Note: The incremental interest rate was constructed using incremental steps of 2%.

7%. Combined, the cost of debt is (40% * 5% + 10% * 7%)/50% = 5.4%. Although 5.4% does not sound too expensive, the 7% incremental rate is much more expensive than the 5.4% and could imply that the expected positive real estate spread is negative for the last 10% of leverage. Exhibit 13 reveals the incremental rates for the credit spread assumptions. Here it is shown that the incremental interest rate is 7.4% at 50% LTV. If one combines this incremental cost of debt with the fund fees and expenses, the formerly assumed positive spread is actually negative at this level of LTV, clearly explaining the poor results for medium to highly leverage vehicles.

## Conclusion

The credit crisis has made investors and fund managers aware of the possible negative impact of leverage. Before the crisis, the general belief was that higher leverage would result in a higher IRR. The findings reveal that the added value of leverage for core funds is highly overestimated. Although some leverage will improve the return, using more than 40% is likely to have a negative impact on the investor's IRR. When measuring return with NPV, the optimal leverage is around 20%.

This paper discussed three reasons why leverage has a negative impact on return. First, the cost of distress is disproportionately high. Once a fund is in distress and equity is almost wiped out, it is difficult to recover. The higher the leverage, the higher the chance a fund will fall into distress. Secondly, the performance fee is asymmetrical, meaning a fee negatively affects positive scenarios, while negative scenarios are obviously not positively affected by payments from the manager. Finally, the importance and impact of incremental interest rates are demonstrated. Incremental interest rate is the rate that needs to be paid for the incremental amount of leverage. The research demonstrates that these rates rise exponentially if leverage increases, quickly resulting in negative spreads to real estate returns for the incremental part.

Future research could aim at a better understanding of the relationship between LTV and credit spread, and therefore also the incremental interest rates. Because this last concept is a major contributor to the negative effect leverage has on IRR, it certainly requires further understanding. At this time no public information is available or published by banks. If such information were available, it would be much easier for investors to determine their maximum leverage, instead of being led



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by the market. Furthermore, it would be useful to extend this analysis to non tax-exempt investment vehicles. The ability to deduct interest from income may seriously affect returns after tax and therefore conclusions might change. However, one thing should now be certain, leverage can add some additional return, but too much might turn out to be devastating. Hence: please use responsibly.

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