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Hypotheses
Hypotheses

Date centre investments are comparable to other conventional real estate asset classes in terms of risk and return.

Higher net present values for investors, owners and operators can be achieved by optimizing the data centre real estate decision-making criteria.
Discussion of results

1. Risk-return profile
2. Current situation
3. Decision-making criteria
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How are real estate asset classes compared in terms of risk and return?
Risk-return profile

- INREV guidelines for non-listed real estate vehicles

- 2 factors:
  - Amount of return (higher return = higher risk)
  - Degree of leverage (more leverage = more risk)

- 3 investment types:
  - Core
  - Value added
  - Opportunistic
## Risk-return profile

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Core</th>
<th>Value added</th>
<th>Opportunistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>Stable income</td>
<td>Income &amp; capital growth</td>
<td>Capital growth</td>
</tr>
<tr>
<td>Cash flow</td>
<td>Predictable</td>
<td>Capital constraints</td>
<td>None or limited</td>
</tr>
<tr>
<td>IRR ratio</td>
<td>$\leq 13%$</td>
<td>$11.5% \leq x \leq 18.5%$</td>
<td>$\geq 15.5%$</td>
</tr>
<tr>
<td>LTV ratio</td>
<td>$&lt; 60%$</td>
<td>$30% \leq x \leq 70%$</td>
<td>$&gt; 60%$</td>
</tr>
<tr>
<td>Risk</td>
<td>Low</td>
<td>Medium to high</td>
<td>High</td>
</tr>
<tr>
<td>Holding period</td>
<td>5-10 years</td>
<td>$\leq 5$ years</td>
<td>$\leq 5$ years</td>
</tr>
<tr>
<td>Real estate status</td>
<td>Income producing, fully let &amp; multi-tenant</td>
<td>Refurbishments or active management</td>
<td>Development or distressed real estate</td>
</tr>
</tbody>
</table>
Risk-return profile

How do data centre investments compare to conventional real estate investments in terms of risk and return?
Risks

✧ Specialized & active management needed
  – Mitigated by employing specialized operator

✧ High operating & maintenance costs
  – Operating: € 65,- / m² data hall compared to € 6,- / m² office A’dam
  – Maintenance: € 225,- / m² data hall compared to € 8,- / m² office
  – Compensated by high rent levels

✧ High initial capital investments needed
  – Mitigated by modular building

✧ Risk of obsolescence
  – Partly mitigated by modular building
Securities

✧ High rental fees
  – € 2.400,- / m² data hall compared to € 196,- / m² office Amsterdam

✧ High switching costs clients (clients are locked in)

✧ Predictable & stable income (dependent on occupancy)

✧ No or limited capital growth

✧ Stable or increasing demand expected

✧ Threat of new market entrants is limited
Risk-return profile

Arguments for core investment:

✧ Low dividend yields (comparable to IRR < 13%)

✧ Low return on equity (<3,45%)

✧ Low LTV ratio (< 60%)

✧ Return: predictable & stable income (no capital growth)

✧ Often multi-tenant
Arguments for value added investment:

✧ Active specialized management needed
  – Mitigation: employing specialized operator / invest in data centre REIT

✧ High initial capital investments needed
  – Mitigation: modular building

✧ High vacancy risk for new constructed data centres
  – Mitigation: signing lease agreements before construction

✧ High risk of obsolescence
Independency economic cycle

Chart 5: Take-up European data centre space (CBRE, 2014b; Eurostat, 2014)

Chart 6: Take-up European office space (CBRE, 2014a, 2014b)

Chart 7: Take-up European industrial space (CBRE, 2014d; Eurostat, 2014)
Conclusion 1 / 2

✧ **Mitigation of risks possible:**
  - Employ specialized & active operator
  - Modular building

✧ **Risk comparable to other real estate classes:**
  - High switching costs clients (clients are locked in)
  - Predictable & stable income
  - No or limited capital growth
  - Stable or increasing demand expected
  - Threat of new market entrants is limited

✧ **Diversification potential for real estate portfolios**
Conclusion 2 / 2

Core investment:
- Operational data centres
- Substantial occupancy levels

Value added investment:
- New data centres
- Or even opportunistic depending on signed lease agreements before construction
Which decision-making criteria are employed or could additionally be employed in real estate investment decision-making of this asset type?
Current situation

Locational aspects

- Power availability
- Connection availability:
  - Distance to internet exchange
  - Distance to other data centres (peering)
- Security:
  - Flooding risks
  - Approach routes airfields
  - Neighbouring buildings
  - Danger of car collision
Current situation

Building aspects

- Redundancy (tier level)
  - Common practice Amsterdam: 3 – 3+
- Energy efficiency (PUE)
  - New data center in Amsterdam: PUE <= 1,3
  - PUEs coming close to theoretical 1,0
- Data centre size
  - Economies of scale
- Overall power capacity
  - Shifted from m² data hall to MW power capacity
Decision-making criteria

Which of these criteria substantially influence the net present value of an investment in this real estate asset type? And what is their relative impact?
Decision-making criteria

Results sensitivity analysis

Results impact analysis
Findings 1/2

1. Power density
   - Affects capacity
   - Inordinate large effect: omission of extra cost for increasing densities

2. Building cost per m$^2$
   - Affects capex
   - Input based on Amsterdam market: large differences

3. Long term vacancy rates
   - Affects revenue
   - Input based on Amsterdam market: high vacancy rates of new data centers
Findings 2/2

4. $m^2$ data hall per rack
   - Affects capex
   - Considerable cost reductions through building in higher densities

5. Rent per 2 kW rack
   - Affects revenue
   - Input based on Amsterdam market: rents are not uniform
Implications

How should the decision-making criteria be optimized to maximize the net present value for data centre real estate investors, owners and operators?
Implications

✧ Current decision-making criteria seem to suffice

✧ Focus areas identified:
  – Power capacity
  – Lowering capex over opex
  – Vacancy prevention
  – Optimization for 2 kW racks
  – Correct calculation of energy premium
Implications

✧ Getting the power capacity just right
  – Minimize capex for unused power capacity
  – Theoretical 2.4 kW / m² data hall
  – Interviews: small overcapacity needed

✧ Lowering capex over opex
  – Reduced capex greatest effect on return
  – Multi-tenant DC: modular building
    • Spread investment & grow with occupancy
  – Single-tenant DC: more traditional building
    • Lower capex per m² data hall
    • Very limited flexibility
Implications

✧ Vacancy prevention
  – No construction without tenants
  – Modular building: grow with tenants

✧ Optimization for use of 2 kW racks
  – 2 kW racks most commonly used
  – No change expected in the near future

✧ Correct calculation of energy premium
  – To account for changes in energy prices
Recommendations

Real estate management:

✧ Data centres are interesting investments:
  - Low risk comparable to residential real estate (low vacancy)
  - Diversification potential (independence of other real estate assets)
  - Stable & predictable income
  - No uncertainty capital growth

✧ Do not invest directly if you do not have the specialized management

✧ Example of advanced modular building techniques

✧ Example of how to turn real estate into commodity
Recommendations

Data centre industry:

✧ Focus on true modular building
  – Mitigate risks such as vacancy, high capital investments
  – Create more efficient data centres

✧ Work on further standardization

✧ Start benchmarking projects to share information

✧ Work with clients to improve efficiency of the IT equipment and processes
Recommendations

Further research:

✧ How can data centres or other specialized industrial real estate be used as diversification in investment portfolios?

✧ Price hedonic study on the effects of building features of data centre on the return
Conclusion
Conclusion

✧ Data centre is comparable but different in income & lifetime:
  – Direct vs indirect income
  – Short lifespan due to technological development

✧ Data centres seem to move more independently from the economic cycle than other real estate types

✧ Current decision-making criteria suffice, focus areas:
  – Power capacity
  – Lowering capex over opex
  – Vacancy prevention
  – Optimization for 2 kW racks
  – Correct calculation of energy premium
Questions