vdpResearch GmbH

- vdpResearch was founded in 2008 as a 100 % subsidiary of the Association of German Pfandbrief Banks.

**Primary Aims:**

- Analysis and forecast of real estate markets from the view of the German financial industry.

- Providing actual market information such as rents, prices, etc. for use in property valuation.

- In order to fulfill their aims, vdpResearch operates a transaction database that is quarterly updated by the participating banks.
vdpResearch GmbH

Transactions Database

2.3 Mill. Data sets  ca. 260 participating banks

Research

Monitoring  Time Series / Forecast  Valuation

Collateral Risk Management

CRR Art. 208  LGD  Market Value / Mortgage Lending Value
Participating Banks
Index Construction – Comparable Sales

**Hedonic Model:**

\[
\ln p_{it}^{Houses} = b_0 + \sum_{k=1}^{K} \hat{a}_k x_{it} + \sum_{t=1}^{T} \hat{a}_d t^i + \hat{o}_i \{ t \} \ ^{t - i} \\
\]

**Index:**

\[
p_t^{Houses} = \exp(\hat{d}_t) \\
\]

- **Price:** Transaction price per square meter living-space
- **Regressors**
  - Macro location (municipality)
  - Micro location (street level)
  - Construction year
  - Fit-out and condition
  - Lot-size
  - Living-space
Index Construction – Income Approach

Hedonic Model:

\[
\ln R_{it}^{MF} = b_0 + \hat{a} \sum_{k=1}^{K} b_k x_{it} + \hat{a} \sum_{t=1}^{T} d^t D_i + \hat{d} \{ i \ t \} ^ {t-i}
\]

Index:

\[
R_t^{MF} = \exp(\hat{d} t) \cdot 100
\]

- Rent: Net rent per square meter living space
- Regressors
  - Macro location (municipality)
  - Micro location (street level)
  - Construction year
  - Fit-out and condition
  - Rented space
  - Object size (overall space available)
Index Construction – Income Approach

Hedonic Model:

\[
\ln \left( CF_{it}^{MF} \right) = b_0 + \ln \left(TP_{it}^{MF} \right) + \sum_{k=1}^{K} \hat{\alpha}_k x_{it} + \sum_{t=1}^{T} \hat{\alpha}_k d_i D_t + \hat{\beta}_i \{ t \} \hat{y}_{it} - i \ln CF_{it}^{MF} = \exp(\hat{d}^t) \cdot 100
\]

Capitalization Rate_{t} = \frac{\text{Net Cash Flow}_{t}}{\text{Transaction Price}_{t}}

For the estimation the same hedonic model has been used as in the rent equation.
Index Construction – Income Approach

Hedonic Rent index

Hedonic Cap rate index

\[ CV^\text{MF}_t = \frac{R^\text{MF}_t}{CR^\text{MF}_t} \cdot 100 \]

Capital value index

= Rent index/Cap Rate-Index
Owner-Occupied Housing
## Settlement Category

<table>
<thead>
<tr>
<th>Settlement Category</th>
<th>Nr</th>
<th>Type</th>
<th>Examples</th>
<th>No. of Districts</th>
<th>Population in M. ¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courbations</td>
<td>1</td>
<td>Core Cities</td>
<td>Berlin, Hamburg, Munich, Cologne, ...</td>
<td>42</td>
<td>19,0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Highly Dense Districts</td>
<td>Pinneberg, Region H, LK M, Mettmann,</td>
<td>41</td>
<td>13,5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Dense Districts</td>
<td>Segeberg, Osterholz, Dachau, ...</td>
<td>34</td>
<td>6,1</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Rural Districts</td>
<td>Hzgt. Lauenburg, Erding, PM, ...</td>
<td>19</td>
<td>2,9</td>
</tr>
<tr>
<td>Metropolitan Areas</td>
<td>5</td>
<td>Core Cities</td>
<td>Kiel, BS, OS, BH, Trier, Mainz, Freiburg, Ulm, ...</td>
<td>29</td>
<td>4,8</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Dense Districts</td>
<td>Wolfenbüttel, LK OS, Borken, Paderborn, ...</td>
<td>85</td>
<td>15,5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Rural Districts</td>
<td>Plön, Eichstätt, Cham, LK Rostock, ...</td>
<td>65</td>
<td>8,2</td>
</tr>
<tr>
<td>Rural Areas</td>
<td>8</td>
<td>Rural Districts with Higher Density</td>
<td>Schleswig-Flensb., Emsland, Fulda, Bautzen, ...</td>
<td>57</td>
<td>6,7</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Rural Districts with Lower Density</td>
<td>Dithmarschen, Regen, Uckermark, Stendal, ...</td>
<td>30</td>
<td>3,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td></td>
<td>402</td>
<td>80,2</td>
</tr>
</tbody>
</table>

¹) Census 2011 (May 2011)
Source: BBSR

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**Settlements**

- **Core Cities**: Berlin, Hamburg, Munich, Cologne, ...
- **Highly Dense Districts**: Pinneberg, Region H, LK M, Mettmann, ...
- **Dense Districts**: Segeberg, Osterholz, Dachau, ...
- **Rural Districts**: Hzgt. Lauenburg, Erding, PM, ...
- **Core Cities**: Kiel, BS, OS, BH, Trier, Mainz, Freiburg, Ulm, ...
- **Dense Districts**: Wolfenbüttel, LK OS, Borken, Paderborn, ...
- **Rural Districts**: Plön, Eichstätt, Cham, LK Rostock, ...
- **Rural Districts with Higher Density**: Schleswig-Flensb., Emsland, Fulda, Bautzen, ...
- **Rural Districts with Lower Density**: Dithmarschen, Regen, Uckermark, Stendal, ...

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Population Growth

Germany

By Settlement Category

Source: Federal Statistical Office, BBSR, own calculations
Monitoring Values

Houses

Condominiums

Source: vdpResearch
vdp House Price Index vs. Case-Shiller Composite
Multi-Family-Houses
Population Growth

Change in Population

Population

Source: Federal Statistical Office
Construction Activity

Source: Federal Statistical Office
Regional Differences in Price Change, 2007 - 2013

Condominiums

Change in Prices, 2007 - 2013

- under -4%
- between -4% and 0%
- between 0% and 3%
- between 3% and 7%
- between 7% and 10%
- between 10% and 15%
- above 15%

Single-family houses

Change in Prices, 2007 - 2013

- under -4%
- between -4% and 0%
- between 0% and 3%
- between 3% and 7%
- between 7% and 10%
- between 10% and 15%
- above 15%

Source: vdpResearch
Summary

- High price increases in core cities (Conurbations, Metropolitan Areas)

- Core cities are characterized by shortage of supply. Thus, the price increases are a result of a competitive market.

- Demand is concentrated on existing housing stock. Extrusion of demand for cheaper living space.

- Construction activity is growing slowly but still on a low level. Especially, core cities are affected, because there are in need for multi-family houses.
Office Market

![Graph showing trends in office market]

- vdp office buildings capital value index
- vdp office buildings rent index
- vdp office buildings cap rate index
Institutional Investment in German Commercial Real Estate 1980-2013, Bill. Euro

Source: BVI, BAFin, Bundesverband Deutscher Leasing-Gesellschaften, Bankhaus Ellwanger & Geiger, Deutsche Bundesbank, Auswertungen Loipfinger, Scope, FERI, BulwienGesa
Vacancy Rate in Top 5 Office Markets

Source: gif e.V.
Summary

• **Demand:** Due to good economic conditions demand for office space will increase further in 2014.

• **Supply:** Construction activity rises slightly. Vacancy rates are declining.

• **Yields / Rents:** High demand for core properties in the Top 5 led to further yield compression on office properties. Stable outlook for prime and average rents in German office markets.
Retail Buildings

- vdp Retail buildings capital value index
- vdp Retail buildings rent index
- vdp Retail buildings cap rate index

(c) vdpResearch 2014
Sales Floor Space, Retail Revenue, Productivity per unit of sales space

Source: HDE
Summary

- **Supply:** Sales space will expand up to six million sq m by the end of 2020.

- **Demand:** Still growing demand for sales floor space from international chains. Especially in prime locations in Metropolitan areas.

- **Yields / Rents:** Rents in prime locations tend to rise further. Rents in secondary locations are under pressure due to structural changes in consumer demand. As a result of the strong demand for core product prime yields are declining.
Summary Real Estate Market

• A unique feature of the vdp transactions database is the fact that besides the transaction price the database also contains the price building characteristics.

• Due to new participating banks the database will increase at a higher rate.

• All vdp price indices are published quarterly, six weeks after end of the preceding quarter on the vdp and vdpResearch websites.
Reasons for the price development

• Demand
  • demographic trends
  • household incomes
• Supply
  • construction activity
  • vacancy
• Financing conditions
  • mortgage interest rates

• financing structure?
vdp residential property survey

- Data collection by vdp among the member banks in regular intervals
- Stratified random sample
- Sample size 2012: 736 transactions of owner occupied single family houses
- Query structure:
  - Property details
  - Costs and loan details
  - Income situation of the households
vdp survey and total market transactions – comparison by settlement structure

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Metroplises and large cities</td>
<td>17 %</td>
<td>20 %</td>
<td>17 %</td>
</tr>
<tr>
<td>Surrounding districts</td>
<td>48 %</td>
<td>48 %</td>
<td>50 %</td>
</tr>
<tr>
<td>Rural areas</td>
<td>38 %</td>
<td>32 %</td>
<td>33 %</td>
</tr>
</tbody>
</table>

Sources: Association of German Pfandbrief Banks, calculations by vdpResearch on basis of data provided by regional expert committees for property valuation.
## Results (I)

### Property and financing data 2009 and 2012

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Living area (m²)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>141</td>
<td>147</td>
</tr>
<tr>
<td>new buildings</td>
<td>146</td>
<td>158</td>
</tr>
<tr>
<td>existing buildings</td>
<td>138</td>
<td>143</td>
</tr>
<tr>
<td><strong>Property value (EUR)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>258,000</td>
<td>279,000</td>
</tr>
<tr>
<td>new buildings</td>
<td>317,000</td>
<td>351,000</td>
</tr>
<tr>
<td>existing buildings</td>
<td>230,000</td>
<td>254,000</td>
</tr>
<tr>
<td><strong>Share of borrowed funds</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>74%</td>
<td>71%</td>
</tr>
<tr>
<td>new buildings</td>
<td>70%</td>
<td>67%</td>
</tr>
<tr>
<td>existing buildings</td>
<td>76%</td>
<td>72%</td>
</tr>
<tr>
<td><strong>Monthly net household income (EUR)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>3,800</td>
<td>4,100</td>
</tr>
<tr>
<td>new buildings</td>
<td>3,900</td>
<td>4,300</td>
</tr>
<tr>
<td>existing buildings</td>
<td>3,700</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>Debt burden ratio</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>27%</td>
<td>23%</td>
</tr>
<tr>
<td>new buildings</td>
<td>30%</td>
<td>26%</td>
</tr>
<tr>
<td>existing buildings</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td><strong>House price – income ratio</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overall</td>
<td>5.6:1</td>
<td>5.7:1</td>
</tr>
<tr>
<td>new buildings</td>
<td>6.7:1</td>
<td>6.8:1</td>
</tr>
<tr>
<td>existing buildings</td>
<td>5.1:1</td>
<td>5.2:1</td>
</tr>
</tbody>
</table>

Source: vdp residential property survey
## Results (II)

### Residential property financing by income quartile

<table>
<thead>
<tr>
<th>Year</th>
<th>Monthly net household income in Euro</th>
<th>up to 2,668</th>
<th>2,669-3,532</th>
<th>3,533-4,810</th>
<th>4,811 and more</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Property value (EUR)</td>
<td>198,000</td>
<td>232,000</td>
<td>290,000</td>
<td>395,000</td>
</tr>
<tr>
<td></td>
<td>Share of borrowed funds</td>
<td>70%</td>
<td>75%</td>
<td>73%</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>Debt burden ratio</td>
<td>30%</td>
<td>26%</td>
<td>24%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>House price – income ratio</td>
<td>7.8:1</td>
<td>6.2:1</td>
<td>5.8:1</td>
<td>4.8:1</td>
</tr>
<tr>
<td>2009</td>
<td>Property value (EUR)</td>
<td>171,000</td>
<td>216,000</td>
<td>251,000</td>
<td>393,000</td>
</tr>
<tr>
<td></td>
<td>Share of borrowed funds</td>
<td>74%</td>
<td>77%</td>
<td>76%</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>Debt burden ratio</td>
<td>34%</td>
<td>30%</td>
<td>27%</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>House price – income ratio</td>
<td>7.0:1</td>
<td>6.4:1</td>
<td>5.8:1</td>
<td>4.8:1</td>
</tr>
</tbody>
</table>

Source: vdp residential property survey
## Results (III)

<table>
<thead>
<tr>
<th>Fixed-rate periods and interest rates</th>
<th>Fixed-rate period</th>
<th>vdp sample 2012 (Jan. – Jun.)</th>
<th>vdp-sample 2009 (Jan. – Jun.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;= 1 year</td>
<td>&gt;1&lt;=5 years</td>
<td>&gt;5&lt;=10 years</td>
</tr>
<tr>
<td>Interest rate</td>
<td>3.5%</td>
<td>3.2%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Share of volume</td>
<td>3.0%</td>
<td>7.2%</td>
<td>52.2%</td>
</tr>
</tbody>
</table>

Source: vdp residential property survey
Results (IV)

Financing structure 1995 - 2012

Source: vdp residential property survey
Summary Finance Structure

- vdp survey reflects the price development in the residential property market
- House price – income ratio rose slightly
- Share of borrowed funds declined despite extremely low mortgage interest rates
- Debt burden ratio decreased
- Tendency to longer fixed interest rate periods
- Residential mortgage lending practices do not tend to be riskier over the period from 2009 to 2012