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**Calculation of habitable dwelling surfaces – an empirical  
analysis for the agglomerations of Munich and Sydney**

**An empirical project carried out in an exemplary manner for an Australian and  
a German conurbation**

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**Abstract:** In many countries the calculation of habitable dwelling surface is characterised by a chaotic variety of calculation variants hardly comprehensible for the end user - sometimes not even reproducible for the expert.

Therefore dossiers were analysed on the basis of a random choice in order to determine the method according to which the habitable dwelling surface was measured and to find out whether customers can scrutinize the calculations. The paper compares Sydney and Munich, where in both cases property prices are situated at the high end of the market.

## Starting point

In many countries the entire field of the calculation of habitable dwelling surface is characterised by a chaotic variety of calculation variants. These methods are hardly comprehensible for the end user - sometimes not even reproducible for the expert. Therefore dossiers were analysed on the basis of a random choice in order to determine the method according to which the habitable dwelling surface was determined.<sup>1</sup>

The “calculation of dwelling surfaces” is by far not a specifically Australian or German issue but occurs in numerous countries; a few examples:

- In Hong Kong, a share of the Resident’s Club is occasionally added to the dwelling surface, resulting in double-digit increases of the habitable dwelling surface.
- In Australia, garages which are adjacent to the house (and perhaps linked by a door) are sometimes added to the dwelling surface.
- And also in Australia the overhang of the roof is often included in the habitable dwelling surface.
- In Spain, the equivocal particularity exists to add the square meters of the entire gross usable floor space of the corresponding storey.
- In Spain, also the pool surface is added to the habitable dwelling surface.

*Are there other international examples?????*

## Research design

Sydney and Munich were analysed, because the price level for housing – both, owner-occupied and rental dwellings – is the highest of all Australian and German agglomerations. Therefore surface deviations have the strongest financial impact.

The authors have a manifest interest in extending this study to other regions, and they would be glad to meet a corresponding interest of his colleagues from other universities.

## Research Methodology (Australia)

The Australian residential property market comprises – like the German - three main sectors:

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<sup>1</sup> This paper follows up on papers presented at the 11th Annual Conference of the Pacific Rim Real Estate Society (PRRES) in Melbourne and at the 21th American Real Estate Society (ARES) annual meeting in Santa Fe, New Mexico.

- Sale of established residential properties
- Sale of vacant residential land for owner construction of new dwelling by a project home builder or a master builder
- Land and new house packages sold by project home builders

While most existing residential properties tend to be sold on the basis of the number of rooms in the house, new residential project homes are advertised and sold on both the number of rooms and the area of the dwelling.

A review of sales brochures to valuation reports has revealed that there can be a considerable variation between the area quoted in project home advertising to the actual physical main living area of that particular residential property from a valuation perspective.

This Australian study of residential property measurement has been based on the Sydney project home construction and sales market, to determine the various methods used by builders to calculate building areas for sales purposes and the accuracy of these measurements.

To facilitate this comparison, twenty (20) of the leading project home builders in Sydney were surveyed. This involved obtaining sales brochures from each of these builders from their display villages, reviewing the plans, diagrams and measurements stated on this promotional material and then physically measuring the property to standard residential valuation procedures to calculate the actual main living area of each of the selected houses.

A review of the material from these builders (refer to Table ????) shows that a number of ways these builders determine the area of the residential house for sales and promotion purposes. In each case, the promotional material would contain at least one overall measure of building area, with some builders supplying a full range of building area measurements.

Each of the advertising material provided contained a floor diagram of the house, with varying levels of external and internal room measurements. The following provides a brief description of the various methods used by these project home builders to advertise and represent the size of the houses they were building or selling:

### **Overall Dimensions**

This measure of dwelling area comprised the project builder providing the external linear measurement of the longest side of the house and the longer of the front or rear external measurement. This method resulted in a larger perceived house area as all setbacks were included.

### **Plan to Standard Scale**

All brochures were checked to determine if the plans of the houses were drawn at the standard scale of 1:100, or were to a scale that made comparisons of areas or the actual overall measurement of the house difficult. Only plans drawn at a standard scale could be accurately measured to determine the main living area if the external measurements were not shown on the plan.

### **Full Internal or partial room dimensions**

Most of the house plans shown in the advertising material had internal measurements for the main rooms in the house. However, in all cases, not all room dimensions were included on the plans.

### **Total dwelling Area (Imperial or metric areas)**

A review of the sales material included an overall figure for the area of the house, either in the imperial measurement of “squares” or “m<sup>2</sup>”.

### **Building Area Break-up**

It was noted in several of the plans and advertising material that not only was the stated overall area of the house given, but this total area was divided into the main living area, garages, patios, roof spaces and verandas, all on a m<sup>2</sup> basis.

### **Research Methodology (Germany)**

The dossiers were selected by random choice. The types of objects chosen for this analysis were single-family detached houses, semi-attached houses and terraced houses, because this choice enables to cover the largest spectrum of specifics for the calculation of the habitable dwelling surface. Namely with single-family detached houses, the most various problems arise that can also be detected in fairly similar forms in condominium, terraced houses and semi-attached houses. Especially for single-family detached houses, the basements, attic floors – especially in connection with surfaces under ceilings lower than the 2-meter-line -, balconies and patios / terraces need to be considered for the calculation of the habitable dwelling surface.

143 dossiers have been analysed for this study<sup>2</sup>. In order to sort out atypical objects likely to inadequately distort the results of the study, a range was fixed for both, the dwelling surface and the purchase price, beyond which the studied properties were not eligible for the study.

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<sup>2</sup> The German leg of the research project was carried out with assistance of GIF – Society for the Economic Research in Real Estate Business by the author in an exemplary manner for one German conurbation – the agglomeration of Munich.

Subject of the research project are the brochures and dossiers of developers, real estate brokers and other enterprises working in the real estate business. The vendors had been requested to send in these documents which were then submitted to a document analysis. In connection with the analysis of documents or dossiers, documents provided by a third person about a relevant thematic issue – i. e. sales documents in this special case – are evaluated systematically.<sup>3</sup> This method is particularly suitable for the preparation and analysis of individual cases in which the calculation of the habitable dwelling surface is envisaged.

Document analysis was chosen, because other – empirical – methods and processes (e. g. written questionnaires, participating observation) are afflicted with considerable problems concerning their validity and reliability, or they are simply not feasible.<sup>4</sup>

It is obvious that this does not enable to directly identify the actual dwelling surface. The empirical process concentrates much more on the document analysis of the sales brochures with the priority of assessing the methodology of the calculation of surfaces, its transparency as well as the inclusion or exclusion of certain surfaces.

To avoid distortions, the owners respectively real estate companies were not informed about the purpose of the request for their dossier / brochure for a research project. They probably would not have sent in documents at all or only reduced dossiers or sugarcoated brochures.

The analysis of the actual habitable dwelling surface on site would have required the approval of the owner respectively the selling real estate company, which would have been difficult to obtain, given the thematic purpose of the research, even with the promise of absolute anonymity, this might lead to the tricky situation that property companies with a “good conscience” would consent to such a study and the others might decline.

In order to render a well-balanced picture of the actual situation regarding the calculation of habitable dwelling surfaces, only dossiers / brochures over a period of three years could be considered for the study. This means that a part of the analysed sales documents had been drafted, before the new regulation for the calculation of dwelling surfaces (*Wohnflächenverordnung - WoFV*) entered into force.

## **Building Measurement Standards (Australia)**

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<sup>3</sup> Cf. Gerth, W. (1975), Fallstudien, in: Friedrich/Hennig (Hrsg. 1975), 539

<sup>4</sup> Cf. Hellstern (1984), Verwaltungsvollzugsdaten und Aktenanalyse - ein tragfähiger Zugang zum Verständnis der Verwaltungswelt, 201. For Hellstern the evaluation of dossiers and administrative enforcement acts have shown to be an indispensable source of information for the implementation- and evaluation-studies.

The actual quoting of building areas in Australia is regulated in the commercial, industrial and retail property sectors, with a standard of measurements for the calculation of net lettable areas for leased premises (Property Council of Australia, 1997; BOMA, 1996). These standards provide a comprehensive guide to the measurement and calculation of occupiable building areas for commercial building sale and leasing purposes; however, these measurement standards do not apply to residential property.

In addition to the BOMA measurement guides the following definitions of measurement are commonly used in commercial, industrial and retail construction (National Public Works Cost Control Manual):

- **Fully Enclosed Covered Area (FECA)**

FECA building measurements includes all building areas, including garages, basements, floored roof areas, plant rooms and any other area considered to be fully enclosed by full height walls.

- **Unenclosed Covered Area (UCA)**

This standard of measurement includes all building areas, including garages, basements, floored roof areas, unenclosed galleries and any trafficable areas even if not fully enclosed by full height walls

- **Usable Floor Area (UFA)**

UFA comprises all floor area measured at floor level from the general inside face of walls of all interior spaces related to the primary function of the building.

Although the standards for measuring commercial, industrial and retail property in Australia is standardised for builders, investors and tenants, the same is not the case in relation to the sale and advertisement of residential properties for sale, sale on completion or lease. Measurement of residential property for valuation purposes has been standardised and involves the calculation of gross building area from external wall to external wall, with the requirement that the area of the individual components of the residential property be calculated separately into main living area, garages, patios, verandahs, storage areas and balconies (API, 1997, API 2004).

## **Building Measurement Standards (Germany)**

In Germany - like in a Australia - there is not a single measuring standard; on the contrary a least three measuring standards are used:

- **DIN 277 (German Industry Standard DIN 277)**

The DIN 277 is not designed for the specific aspects of the calculation of dwelling surfaces but much more for the needs of the commercial real estate business, architects and developers.<sup>5</sup>

- **DIN 283 (German Industry Standard DIN 283)**

Until 1983, the calculation of the dwelling surface was regulated, in Germany, by the German Industry Standard DIN 283. When this DIN 283 was abrogated, a lot of confusion arose.<sup>6</sup>

- **Second Rent Calculation Regulation (II. Berechnungsverordnung)**

Then the DIN 283 which was officially no more in force continued to be used, whereas, simultaneously, the Second Rent Calculation Regulation (II. Berechnungsverordnung) applied. Despite the fact that the Second Rent Calculation Regulation was only binding for social housing it was also quite often used for other housing projects as well.

- **Public Housing Funding Act (Wohnraumfördergesetz)**

At the beginning of 2004 the Second Rent Calculation Regulation was replaced by the Federal Public Housing Funding Act (Wohnraumfördergesetz), which also applies only to social housing.

A legally binding method to calculate the dwelling surface does not exist – similar to the commercial real estate business, where, in spite of the laudable efforts of the GIF – Society for the Economic Research in Real Estate Business (Gesellschaft für Immobilienwirtschaftliche Forschung e.V.) most diverging calculation methods are used, e. g. according to BGF (*Bruttogeschoßfläche* - gross residential surface).

## Results

The study revealed considerable deviations for the offered habitable dwelling surface and the overall usable floor space:

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<sup>5</sup> Sailer, E., Kippes, S., Rehkugler, H. (Hrsg. 2003), Handbuch für Immobilienmakler und Immobilienberater, München 2003, 142, 485 - 500

<sup>6</sup> cf. Noack, B., Westner, M. (2003), Betriebskosten in der Praxis, Freiburg 2003, 68



- There is neither in Australia nor in Germany a legally binding framework for calculating usable floor space.
- Fairly often, it was not even or not precisely distinguished between the habitable dwelling surface and the gross usable floor space.
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- Often it is not clear which method was used for the calculation of surfaces or which surfaces actually were included in this calculation.
- .....**More general things??????**

Table 1: shows that in 15% of the cases in Sydney the brochure didn't state the size of the dwelling (either in m<sup>2</sup> oder square feet). In the Munich sample all brochures stated the size.

	States the size of the dwelling	Doesn't state the size of the dwelling
Sydney	85 %	15 %
Munich	100 %	0 %

Table 1: Do the brochures state the size of the dwelling?

Furthermore it was analyzed (table 2) to which extent floor plans help to figure out the size of the dwelling. So it was analyzed if they were either up to scale or if they contained the size of the rooms.

## How many floor plans contained m<sup>2</sup> or square foot information concerning the size of the different rooms?

<i>Do the floor plans help to figure out the size of the dwelling?</i>	<i>Yes</i>	<i>No</i>
<i>Sydney</i>	<i>10 %</i>	<i>90 %</i>
<i>Munich</i>	<i>???</i>	<i>???</i>

Table 2: Do floor plans help to figure out the size of the dwelling?

From Table 3, it can be seen that 90% of project home builders in Sydney surveyed provided a stated building area, with the 10% of builders not supplying customers with an overall building area only providing overall dimensions or partial room dimensions to allow comparisons with other project homes. Compared to this in 26,8 of the Munich brochures of builders and real estate agents<sup>7</sup> there was a clear and reproducible statement of surfaces.

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<sup>7</sup> The hypothesis was verified in how far the method of calculation of the habitable dwelling surface can be verified easier in the developers' dossiers than in those of real estate brokers. Hypothesis: "There are differences between developers and real estate agents regarding the reproducibility of dwelling size calculations."

The idea on which this hypothesis was based is that the brochures of developers mainly refer to new homes, whereas the main activity of real estate brokers concentrates on the existing dwellings for which the owners often do not have consistent surface data and where no new calculations of the habitable dwelling surface are made. The Munich sample showed that the calculation of the dwelling surface is comprehensible and reproducible in 32,4 percent of the developers' dossiers compared with only 25 percent in those of real estate brokers, thus more often. But the statistical analysis revealed that this difference is not significant. Kippes, S. (2005a), Comparison of the calculation of

clear and reproducible statement of surfaces?	Yes	No
Sydney	10 %	90 %
Munich	26,8 %	73,2 %

Table 3: Stated building area provided?

There were only two builders in the Sydney who provided their house plans to a standard scale, and in both cases these builders also provided a range of measurements to determine and check the overall size of the dwelling. All other plans were drawn to non-standard scales making the measurement of the main living area from the plans provided very difficult.

Only 30% of the builders of the Sydney sample surveyed provided promotional material that stated the areas for the main components of the house, rather than a stated overall area. In such cases the individual measurements included:

- Main living area
- Garage
- Patio
- Verandahs
- Voids
- Storage

In all other cases the dimensions and areas stated included all these separate areas under the stated building area of the house.

Table 4 also shows that when the stated areas of the houses were compared to the actual physical measurement of the house, only 25% of the builders had main living areas as stated in their promotional material. In all other cases, there was a slight error of less than 5%, or the stated area comprised building components other than main living areas.

main living areas as stated in their promotional material?	Yes	No
Sydney	85 %	15 %

Table 4: Main living areas as stated in their promotional material

## Recommendations

Thus, the following recommendations for further action are resulting from Australian/German-study:

- Property companies should state on which system their calculation is based.
- Whenever there is a deviation from possible standard methods, it has to be stated clearly, why and which surfaces
- without obliging the customer to sum up all individual positions and assess properly, which surfaces exactly are part of the calculation and which are not. And then, it should be distinguished between habitable dwelling surface and gross usable floor space.
- The real estate business should agree upon a reasonable regulation or a “Code of Conduct“ and not to wait until the legislator detects another need for action.
- The private customer will agree with nearly any calculation method if only he gets comparability. He does not want to carry out these unusual calculations himself, and he does not want to run into a situation where he has to charge the architect to recalculate or even to check the measurements again on site.
- International Investors would be more than happy to have some sort of a framework which would allow them to compare floor dimensions on an international basis.
- It would be worth be effort to follow these result up with research into:

- which legal framework applies in other countries
- and to which degree property companies adhere to these regulations.

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