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Title: **Factors that influence listing prices and selling prices of owner-occupied residential properties in Germany**

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Introduction

Many indicators and indices related to real estate markets are either based on listing prices or selling prices whereas the latter are usually related to private data. Therefore, the relationship between these two could hardly be investigated. The research in this work aims to enlarge the existing body of knowledge in this area in that it analyzes the empirical relationship between listing prices and selling prices of owner-occupied residential properties. Both data sources – listing prices and selling prices – have pros and cons regarding the four criteria for real estate market data quality: availability, topicality, accuracy and spatial depth.

Availability is (free) access to data without any restrictions. Topicality relates to the time between action and measurement. Early available data have more relevance, which is of importance especially in more dynamic real estate markets. Accuracy seeks to minimize the bias between selling price and other values, e.g. listing price or appraisals. Spatial depth is the amount of relevant properties in a specific area for specific purposes. The more relevant properties are available the better is the quality of local real estate market analyses.

Listing prices have some advantages which have made them a common data source for German real estate market analyses. These data are mostly available at no direct cost. The key advantage of listing prices is the ease for everyone to collect them from newspapers and brokerage web sites. Besides, there are specialized data providers (e.g. IDN ImmoDaten GmbH with data of more than 204 million listing prices) who collect and sell these data to

commercial or official institutions. Moreover, listing prices have mostly a very high spatial depth, due to the numerousness of listing prices. Further, listing prices are generally available in real time because they are released shortly after data entry. Nevertheless, the great disadvantage of listing prices is insufficient accuracy. The listing prices are rarely identical with selling prices which is only for some analyses negligible. In most cases, however, the bias must be estimated and proper allowance has to be made for it. In contrast, selling prices are generally unbiased (Note: selling prices are not identical with market prices in some cases, compare sales between relatives) and therefore attain the highest possible accuracy in real estate markets.

Moreover, selling prices are also available in real time, similar to listing prices. The spatial depth of these data is very high because every sale contract of real estate is recorded in Germany as in most other countries. Due to law requirements, every selling price has to be notified to the Expert Committee for property valuation (`Gutachterausschuss´), an official appraisal institution. That means every single transaction can theoretically be used for analyses. Generally, however, the Expert Committee does not pass selling prices to other users because of legal restrictions. Therefore, selling prices are hardly available in Germany (as in other countries) even for scientific research purposes.

To sum up, the most suitable data source for real estate markets analyses is not readily available. On the other hand, listing prices are by far the most freely available data source but these are biased compared to selling prices. This work aims to analyse these two data sources jointly and to quantify the bias (discount) that applies to listing prices. Moreover, significant factors influencing listing prices and selling prices should be identified. The main result of this work is a better understanding of listing prices due to their importance for the real estate market analyses. Moreover, the research provides unique new insights into the selling behavior of private residential property owners.

Literature Review

The work is based on the price and worth theory. The theory distinguishes between worth, value and price. Worth is a subjective estimation of an economic good, e.g. residential property. This means, that "in any market at any time there are many buyers and sellers, each of whom will have his own personal views, desires and judgements on what the commodity in question is worth" (Mackmin und Emary 2000). Value, in contrast, is an objective estimation of an economic good (Baum et al. 1996). *RICS (2009)* defines the market value as "the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arm's-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without compulsion." Peto et al (1996) amend that value is "the best estimate of the trading price of the building". Price is defined as the "actual observable exchange price in the open market (French 1997). The listing prices are influenced by worth and value (Knight 2002) whereas

the selling price is identical with price. In addition, the worth of a specific property for a specific buyer is identical with his own maximum bid (Kiel und Zabel 1999).

US studies, which are based on AHS (American Housing survey) data, investigated selling prices and owner estimations about the market value of their own property (Goodman und Ittner 1992; Kiel und Zabel 1999; Ihlanfeldt und Martinez-Vazquez 1986; DiPasquale und Somerville 1995). The difference between these two data is comparable to the listing price discount, which is looked at in this study. The AHS based studies conclude, that sellers overestimate the value of their house by 4-14% depending on different variables. They also show that only few characteristics, e.g. time-on-market (Knight 2002), are always significant. In most cases, characteristics are significant only at times, e.g. income. All significant variables of previous AHS based studies are included in this study. The variables are amended with assumed significant variables relating to the provided data of listing prices. The variables of this study could be summarized in six categories:

1) Property variables (e.g. floor space, age of the dwelling structure, furnishing)
2) Socioeconomic variables related to location (e.g. population, age structure, income)
3) Location variables (e.g. school, train station, bus stops, distance to major centres)
4) Internet performance variables (e.g. time-on-market, click rate)
5) Real estate market variables related to location (e.g. sales of residential real estate properties per year)
6) Seller variables (e.g. age, income, education, sale experience)

Thus, the work does not only examine the difference between listing prices and selling prices (listing price discount), but also analyzes, which variables influence the listing price discount to what extent.

Research questions

The listing price discount is an important field of research for the German real estate industry. However, the poor availability of data has impeded research purposes of public and scientific researchers so far. In addition, commercial researchers do not usually publish the methodology of their results if any results are published at all. For that reason, the research questions of this study could not be based on previous results or studies from Germany.

Similarly, European studies in this field of research are not known so far.[1] Thus, the research questions are mainly deducted from the literature review which includes primarily US studies based on AHS data. The study seeks to answer the following research questions:

1) Is the listing price discount influenced by the local real estate market liquidity

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[1] There is only one similar British study (McGreal et al 2009) but the meaning of the listing price is different between Germany and Britain.[1] Germany: The listing price is generally below or equal to the selling price. Britain: The listing price is generally equally below or above to selling price.

a. Is the listing price discount influenced by the city size?

b. Is the listing price discount influenced by the settlement structure?

2) Is the listing price discount influenced by the time-on-market?
   a. Does a longer time-on-market lead to a higher listing price discount?
   b. What does seller or broker do if they fail to sell the property within a given period?

3) Does the type of seller (broker vs. private owner) influence the listing price discount?

4) Do personal characteristics of the seller or buyer influence the listing price discount?
   a. Which types of persons use brokerage websites for selling residential properties?
   b. Is there a difference relating to the listing price discount between private sellers and brokers of ceratin personal characteristics? (income, age, gender, sale experience)
   c. Is there a difference relating to the listing price discount between internet users and nonusers of certain personal characteristics?

5) Do dwelling characteristics influence the listing price discount?
   a. Which dwelling characteristics are of significant influence?
   b. Which location characteristics are of significant influence?

6) Is there a relationship between the absorption of standing residential properties and the listing price discount in local real estate markets?

Data

The data set for this work is obtained from different official and private sources. The listing prices are provided by ImmobilienScout24, which is by far the largest German real estate brokerage website for commercial and residential real estate (Scout24). More than 1.2 million properties (sale/rent) from 70,000 private owners and 40,000 real estate brokers are listed on the website every month. In addition, the website attracts more than 4.5 million visitors, who are searching for new offers and information about real estate markets (Scout24). Several studies testified that ImmobilienScout24 has the greatest significance for both sellers and buyers (Schürt 2010; Faller et al. 2009). Therefore, ImmobilienScout24 is a most reliable source for listing prices in Germany. Beside listing prices ImmobilienScout24 provides further information about dwelling characteristics (e.g. floor space) and performance characteristics of the offered properties (e.g. click rate, time-on-market), which are used to estimate the demand for each property. It has to be noted that self-reported dwelling characteristics feature one major inherent restriction because they cannot be

verified. For that reason, these data have to be examined carefully before analyzing them. Unreliable data are excluded based on reported criteria.

In addition, owner characteristics are considered as relevant predictors. Collecting owner characteristics is hardly possible in Germany, even for scientific research purposes. They are not even available from commercial or official sources due to the data protection act. For that reason, owner characteristics will be obtained from a web survey amongst the users of the brokerage website www.immobilienscout24.de by the University of Kaiserslautern with technical support from ImmobilienScout24.

The selling prices are acquired from official (yet private) appraisal sources (Expert Committees) that collect data on every real estate contract of sale in Germany. Due to the data protection law, there is no legal claim to obtain the selling prices from Expert Committees. However, it is possible to get these data for scientific research purposes by exception. The Expert Committees have different organizational structures in each German federal state. That means, that at first every single Higher Expert committee has to be asked for permission. Thus, collecting the selling prices is extremely time and labor-intensive.

In addition to that, this work calls for further data, which are not available by either the provided data from ImmobilienScout24 or the Expert Committees. Therefore, some data, e.g. demographic indicators, will be collected from official statistics. In rare cases, data will be bought from commercial data providers. The different data sets will be merged with key variables at least. In this way, the data set contains selling price, listing price and further dwelling, owner, demographic, economic and location characteristics for each residential property.

Methodology

Selling prices of residential properties are generally not available in Germany, due to legal restrictions. Thus, the methodology of this work could not relate to previous German studies and experience with analyzing this type of data hardly exists in Germany. For that reason, the methodology is mainly derived from US studies, which are based on AHS data. However, the data of the American studies and the data of this study are only partially comparable. Hence, the methodology and the research design are developed in two steps.

Step one will examine the quality and restrictions of the provided data in one single region. This step will not include every variable, e.g. owner characteristics, due to the high technical and legal requirements. Some significant variables in AHS based studies are also tested for significance, e.g. demographic and location characteristics. The collection of these data for every part of Germany is time and labor-consuming. If these variables show no significance in pretests, they will not be collected for the main investigation, hence saving labor and time. The results of the pretest will be discussed with ImmobilienScout24 and research scientists.

Step two is the main investigation. After the analysis of step one results, the methodology will be adjusted to the detected data and other restrictions.

Pretest and Empirical Results

The data set in the initial part of the study comprises 1,274 transactions of owner-occupied residential properties in rural areas of Rhineland-Palatinate (Germany). The study analyzed every sale contract (N=6,597) of owner-occupied houses (no apartments) in this area between 2007 and 2009. In the end, 20% of all sales contracts (n=1,274) could be matched with listing prices. An OLS regression analysis is applied to identify significant variables. The regression model is mainly derived from similar US studies.

y(ABSOLUTE LISTING PRICE DISCOUNT) = b_0 + b_1(DUMMY_CITY) + b_2(DUMMY_SCHOOL) + b_3(DUMMY_KINDERGARTEN) + b_4(DUMMY_TRAIN STATION) + b_5(TRAVELLING TIME BY BUS TO THE NEXT CITY) + b_6(BUS STOPS) + b_7(TRAVELLING TIME BY CAR TO THE NEXT) + b_8(AMOUNT OF NEW HOUSES 2007-2009) + b_9(POPULATION) + b_{10}(POPULATION 20-35 YEARS) + b_{11}(POPULATION 36-50 YEARS) + b_{12}(POPULATION CHANGE BETWEEN 2005-2009) + b_{13}(POPULATION CHANGE 20-35 YEARS BETWEEN 2005-2009) + b_{14}(POPULATION CHANGE 36-50 YEARS BETWEEN 2005-2009) + b_{15}(PERFORMANCE ON THE IMMOBILIENSCOUT24 WEBSITE) + b_{16}(DUMMY_PURCHASE 2008) + b_{17}(DUMMY_PURCHASE 2009) + b_{18}(DUMMY_TERRACE HOUSE/SEMI-DETACHED HOUSE) + b_{19}(SIZE OF LAND) + b_{20}(STANDARD LAND VALUE) + b_{21}(FLOOR SPACE) + b_{22}(REAL ESTATE MARKET LIQUIDY) + b_{23}(PURCHASING POWER DEVELOPMENT 2005-2009) + b_{24}(AVERAGE PURCHASING POWER 2005-2009) + b_{25}(LISTING PRICE) + b_{26}(AGE OF THE DWELLING STRUCTURE) +U_i
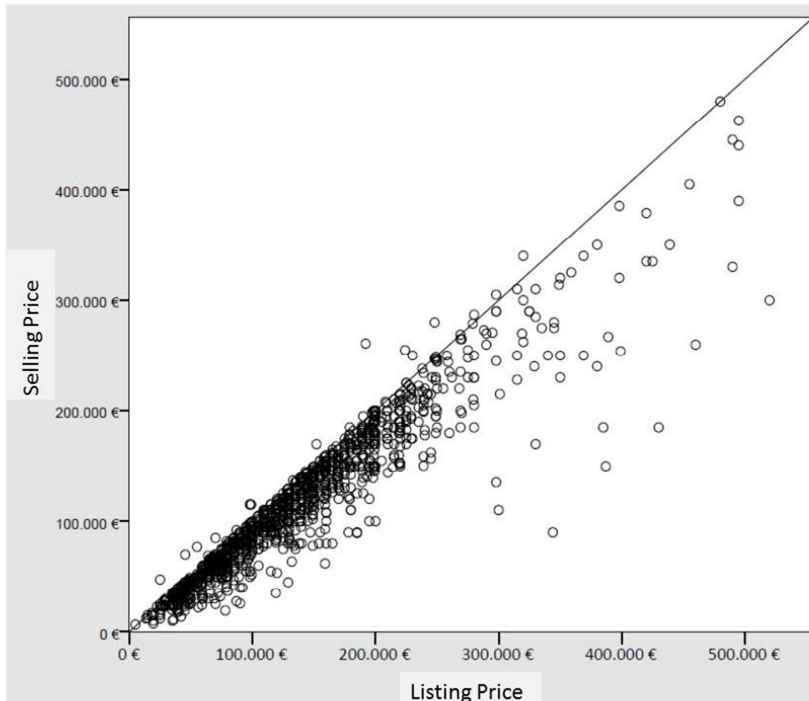

Fig. 1. Listing prices vs. selling prices. Source: ImmobilienScout24, Expert Committees

It is found that, on average, selling prices are -15.2% (-20,605 €) below the stated listing prices. The skewness of the listing price discount (absolute) is higher than the percentage discount. This is related to the fact that the absolute discount increases with the total amount of the listing price, whereas the percentage discount is independent from the total amount of the listing price. The listing price discount of most properties lies within a relatively small range but the total range is very large. The result is a very high kurtosis value of 21.5 for the absolute listing price discount. The pattern for the percentage listing price discount is similar, but less distinctive.

n = 1.274	Listing price discount (absolute)	Listing price discount (percentage)
Mean	- 20,605 €	- 15.2 %
Median	- 13,500 €	- 12.3 %
Std. Dev.	26,368 €	14.4 %
Min.	- 254,000 €	- 75.0 %
Max.	69,000 €	90.0 %
Skewness	-3.597	- 0.663
Kurtosis	21.556	4.292

Table 1: Descriptive Statistics of the listing price discout (absolute und percentage)

Moreover, 10% of the sellers had been forced to reduce the listing price by more than -33.3% (-47,750 €) until a transaction could be realized. This indicates that many sellers overestimate the value of their own property, especially in illiquid real estate markets. Particularly sellers of properties with high listing prices (more than 300,000 €) often had to accept very high discounts in absolute (and relative) terms. Several other studies from the USA or Canada have come to similar conclusions. This indicates that such properties are particularly hard to sell in the investigated area.

Further, it could be assumed that many sellers of owner-occupied houses do not acknowledge differences between the production costs and the market values of their homes. The gap between costs and value is notably distinctive in less demand areas. In contrast to other studies, this work concludes that the difference between listing price and selling price is not related to demographic, economic and most location characteristics. It is assumed, that these results are mainly related to the settlement structure of the investigation area. The rural area with small villages and mid-size cities indicates probably different significant variables like large cities (e.g. Berlin, Munich). For that reason, demographic, economic and some location characteristics will also be included in the main study.

Percentile	Listing price discount (percentage)	Listing price discount (absolute)
Smallest listing price discount	- 75.0%	- 254,000 €
1 %	- 61.3%	- 126,500 €
5 %	- 43.9%	- 65,000 €
10 %	- 33.3%	- 47,750 €
25 %	- 21.7%	- 28,000 €
50 %	- 12.3%	- 13,500 €
75 %	- 5.5%	- 5,000 €
90%	0.0%	0 €
95 %	0.0%	0 €
99 %	9.5%	15,250 €
Largest listing price discount	90%	69,000 €
n= 1,274		
This table gives percentiles of the distribution for the percentage and absolute discount between listing prices and selling prices. Note: The smallest value and largest value of the listing price discount (percentage/absolute) do not relate to the same property.		

Table 2. Distribution of listing price discount

The owner accuracy regression only indicates a strong influence of the absolute amount of the listing price and the age of the dwelling structure. Furthermore, it concludes that listing prices as such are not a perfectly reliable data source. First, it is difficult to match listing price and selling price of one single property because often several listing prices exist for one object. Second, the time-on-market and changes of the listing prices are unknown, yet important to determine the selling price. The same issues applied to many dwelling characteristics like age of the dwelling structure or quality and quantity of building appliances. The results of the pretest are discussed with research scientists and the data provider of the listing prices, ImmobilienScout24. In consequence, the methodology of the main investigation is adjusted.

Adjustments to the methodology and data

The outlined data problems are handled with support by the data provider ImmobilienScout24. Two different measures are taken to solve the data problem and to adjust the methodology. On the one hand the data provided by ImmobilienScout24 have to

be refined. This measure will be reached by a cooperation and discussion about data restrictions with the data provider.

The amount of provided listing prices increases significantly. The pretest handled with 30,000 listing prices, whilst the main investigation will be handling up to 5 million observations. The higher amount of listing prices is related to a modification in the applied methodology. Listing prices and selling prices were merged manually for the pretest on site. This was very time-consuming and cost-intensive and is hardly practicable for large data analyses. For that reason, the main investigation takes a desk-approach for merging listing prices and selling prices. Since this is not possible due to legal restrictions relating to Expert Committee data, the methodology will be adjusted as follows.
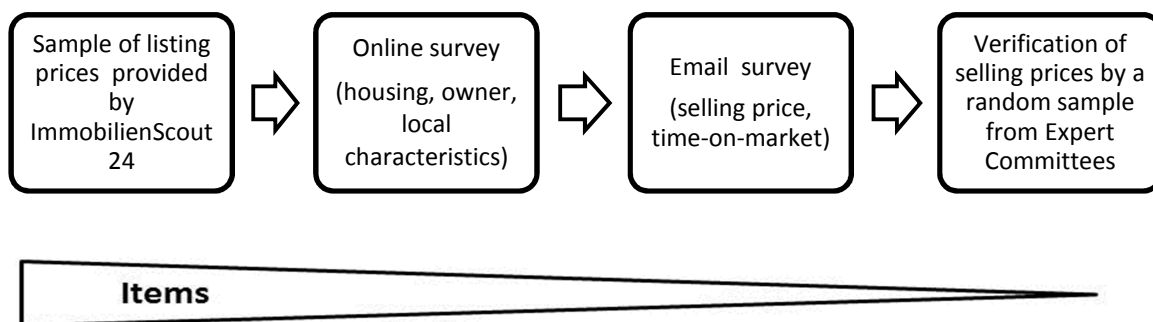

Fig. 2: Methodology

First, ImmobilienScout24 will provide all sale offers of residential properties within the period of investigation. The sample will be derived from the population, e.g. random 5% of all listing prices. Every seller (owner/ broker) from the sample will receive an invitation for an online survey. The first survey collects dwelling, location and owner characteristics from the seller. The sample properties will be marked in the ImmobilienScout24 database. In addition to that, visitors on the website of these particular properties will be sampled and receive an invitation for an online survey. In the end, the data contains dwelling, owner and location characteristics as well as data from other sources, e.g. official statistics. In addition, the seller and potential buyers will be asked, if they agree for a second survey at a later point in time. All people, who agree to take part in the second survey, will be contacted again 6 months beyond. The second survey will basically ask two questions:

1) Did you sell/ buy the property?
2) How much was the effective selling price?

In this way, the data contain information about several types of characteristics, the listing price and the selling price. Reliability will still be an issue as the selling price is self-reported and therefore not verifiable. Therefore, a sample of the self-reported selling prices will be taken. These self-reported selling prices will be compared with the selling prices notified to the respective Expert Committees. It is assumed, that most of the self-reported selling price

will conform to the notified selling price or differ only within a small range. If this sample verifies the self-reported selling prices, all self-reported selling prices can be handled like notified selling prices. In contrast, in the unlikely event that the sample does not meet the self-reported selling prices, all self-reported selling prices would have to be revised on site (same methodology as step one) or a proper adjustment be made to the self-reported selling prices if the differences are non-stochastic.

Scientific experiences about the ´truth´ of self-reported selling prices of owner-occupied residential properties hardly exist in Germany. For that reason, the last step – the verification of self-reported selling prices – is uncertain. Still, there are some issues which must be considered. The implementation of the survey on the website of ImmobilienScout24 is a technical and a legal issue to be solved, especially the allowances of the Data Protection Law. Further, the observed non-response rate of the survey has to be taken into account in analyzing the data. Moreover, the provision of the notified selling prices by the Expert Committees is uncertain. Beside technical and legal issues also some methodological challenges still exist. The pretest showed that regression analyses need to be adjusted. In particular, additional control variables are needed.

Conclusion

The work aims to relate listing prices and selling prices of owner-occupied residential properties in Germany. Especially selling prices are hardly available due to legal restrictions. The selling prices used in a pretest to this study are suitable for most real estate market analyses, but we observe a bias between selling prices and listing prices. The study seeks to improve the understanding of this listing price discount. Further important significant variables will be added to the analyses. The pretest showed that large data sets of listing prices and selling prices could hardly be matched manually. Therefore, ImmobilienScout24 will not only provide listing prices for the extended study, but also support this research with a web survey on their website amongst visitors and sellers. Real estate market analyses will be improved if the study can verify or point out restrictions regarding the reliability of listing prices and self-reported selling prices.

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