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Research Report

**Documentation of German real estate market data:
Sample of real estate advertisements on the internet
platform ImmobilienScout24, 2007-2013**

RWI Materialien, No. 80

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RWI – Leibniz-Institut für Wirtschaftsforschung, Essen

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Materialien

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Martin Micheli and
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Documentation of German Real Estate Market Data

Sample of real estate advertisements on the
internet platform ImmobilienScout24

2007-2013

Impressum

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Abstract

This data report presents a dataset on residential real estate prices in Germany provided by ImmobilienScout24 and introduces real estate price indices of labor market regions. The dataset consists of online adverts of houses and apartments that are available for rent or sale. The dataset complements already existing datasets in two ways: First, it is available almost without any time lag, allowing the analysis of most recent developments. Second, the high market share of ImmobilienScout24 results in a high number of observations, which gives the opportunity to use the data for analyses on a small regional scale.

Documentation of German Real Estate Market Data

- **Abstract 3**

- 1. Introduction 7**

- 2. Data Description 8**

- 2.1 Identifier 9**

- 2.2 Structural Characteristics 9**

- 2.3 Locational Characteristics 14**

- 2.4 Time-related Characteristics 17**

- 3. Real Estate Price Index for German Labor Market Regions 18**

- 4. Summary and Data Access 19**

Figures 1 Average annualized percentage change of apartment prices compared to previous quarter 20

Figures 2 Average annualized percentage change of house prices compared to previous quarter 21

- 5. Appendix 23**

Table 1 Number of observations per wave for the different market segments 23

Table 2 Descriptive statistics, apartments for rent 26

Table 3 Descriptive statistics, houses for rent 28

Table 4 Descriptive statistics, apartments for sale 30

Table 5 Descriptive statistics, houses for sale 32

Documentation of German Real Estate Market Data

1. Introduction

The research data center (FDZ) Ruhr at the RWI provides monthly housing price indices for German labor market regions. These indices are derived at the FDZ Ruhr. This report describes the original dataset and the estimation of the indices. The indices are based on a dataset on German real estate prices, provided by ImmobilienScout24. The dataset entails information of real estate offerings on prices as well as on various characteristics that determine the value of a property. It is provided on a monthly basis. The present dataset covers January 2007 to December 2013. Table 1 reports the number of observations for four major categories of the German residential real estate market, i.e. houses for sale, apartments for sale and apartments for rent as well as houses for rent.¹

ImmobilienScout24 is the largest internet platform on real estate in Germany. It gives real estate owners the opportunity to advertise their objects for a fee.² The platform is open to private and commercial entities. While the platform also allows advertisement of commercial properties, the present dataset only includes residential real estate. It distinguishes between houses and apartments and features the rental market as well as the market with objects for sale. ImmobilienScout24 has a self-reported market share of about 50% of all real estate objects offered for sale or rent in Germany (Georgi and Barkow 2010).

To advertise an object, the owner has to fill out a questionnaire asking for different characteristics of the property. While there are no mandatory fields in the questionnaire, the price at which the owner is willing to sell or rent out the object is always indicated except for very few cases. However, the advertised price is not binding, i.e. the data does not comprise transaction prices. In addition to the price, advertisers are free to include further object-specific characteristics. This helps to present an object adequately, and ideally, it increases the chance of selling at a favorable price.

Furthermore, advertisers have the opportunity to temporarily set an object as inactive. This may be reasonable when a prospective buyer has committed to buy an object but the deal has not yet been finalized. While inactive, objects will not be included in queries of potential buyers and will thus not be included in the dataset, which only consists of actually advertised objects.

¹ Houses for rent are a very small sub-segment of the residential real estate market. However, for the purpose of completeness we include this segment in the data report.

² Home owners can do this via the internet address: <http://www.immobilienscout24.de/de/an-bieten/immobilien-inserieren.jsp>. The fee varies for single offers between 49€ and 399€.

Documentation of German Real Estate Market Data

This unique dataset has many advantages compared to other house price data. First, the data is almost immediately available. Information on all objects offered on the platform ImmobilienScout24 within a specific month is made available right at the beginning of the next month to the FDZ Ruhr. Therefore, it is only the time needed to construct the indices. This is in stark contrast to transaction data, where data availability is subject to substantial time lags. One example that takes advantage of this timely information is the real estate price index IMX in Bauer et al. (2013a). Due to the data availability, the IMX can identify the most recent price developments on the German real estate market.

In addition, due to the high market share of ImmobilienScout24, the dataset consists of a substantial number of observations. This allows for analyzing small-scale housing markets, such as the investigation of the effect of policy intervention on local house prices (e.g. RWI 2013) and house price responses to location-specific shocks (e.g. Bauer et al. 2013b).

The FDZ Ruhr generates price indices for apartments and houses based on these data. Those price indices are provided for labor market regions and can be derived on a monthly basis. These data are available for economic analyses. The raw data are presented in the next section. Section 3 describes the production of the price indices. Finally, data access and quality are discussed in section 4.

2. Data Description

In this section, we introduce the different variables of the dataset. This includes the objects' identifier variable, a measure for the price, the rent or the sale price, object-specific characteristics as well as information on the properties' locations. Descriptive statistics for the four segments of the German residential real estate market are reported in Tables 2 – 5 in the appendix.

2. Data Description

2.1 Identifier

Label	Property ID
Name	obid
Data type	Long integer, numerical
Description	Each property is uniquely identified by an artificial ID number. IDs are property-specific and do not change over time even if the object is temporarily withdrawn from the pool of advised real estates and offered again at a later time.
Data quality	Unique identifier

2.2 Structural Characteristics

Label	Object category
Name	ok2id
Data type	Integer, numerical
Description	<p>The artificial category number indicates which object category a property belongs to. Each property is assigned exactly one category number. There are 110 different categories. However, in the dataset at hand, only 23 of them are filled. These are:</p> <p>“ok2id”=0, no information “ok2id”=3, top floor “ok2id”=6, loft “ok2id”=7, maisonette “ok2id”=8, penthouse “ok2id”=14, farmhouse “ok2id”=15, bungalow “ok2id”=17, semi-detached house “ok2id”=21, multi-family home “ok2id”=24, villa “ok2id”=25, terraced house “ok2id”=40, terrace flat “ok2id”=113, other “ok2id”=117, floor apartment “ok2id”=118, apartment “ok2id”=119, special Object “ok2id”=122, detached house “ok2id”=123, mid-terrace house “ok2id”=124, terraced corner house “ok2id”=125, castle “ok2id”=126, other object “ok2id”=127, mezzanine “ok2id”=128, basement</p>
Data quality	

Documentation of German Real Estate Market Data

Label	Object condition
Name	ozid
Data type	Byte, numerical
Description	<p>The artificial condition number indicates the condition of a property. Each property is assigned exactly one out of 11 possible numbers. The condition numbers are assigned consecutively and range between 0 and 10:</p> <ul style="list-style-type: none">• 0, no information• 1, first occupation• 2, as new• 3, renovated• 4, in need for renovation• 5, modernized• 6, by arrangement• 7, cared• 8, first occupancy after modernization• 9, redeveloped• 10, dilapidated
Data quality	
Label	Object type
Name	ittyp
Data type	Byte, numerical
Description	<p>The artificial type number indicates the type of a property. This dataset consists of four different types with</p> <p>0, apartment, offered for rent, 1, house, offered for rent , 2, apartment offered for sale, 3, house offered for sale.</p>
Data quality	

2. Data Description

Label	Living space
Name	wohnflaeche
Data type	Float, numerical
Description	Living space in square meters.
Data quality	The precision of entries varies between natural numbers and numbers with two decimal places. If users enter more than two decimal places, numbers are rounded to two decimal places.
Label	Offer price
Name	kaufpreis
Data type	Double, numerical
Description	Price at which the owner advertises to sell the object. Prices are expressed in Euro.
Data quality	This information is available for almost all objects offered for sale. From the total of 19 040 783 observations of objects offered for sale only 587 observations exhibit missing information. It is not available for objects offered for rent.
Label	Base rent
Name	mietekalt
Data type	Float, numerical
Description	Price at which the owner is willing to rent out the object. The rent covers expenses for the living space only. Amenities as well as expenses for heating or fees such as for garbage disposal are not included. Prices are expressed in Euro.
Data quality	This information is available for almost all objects offered for rent. From the total of 10 932 063 observations of objects offered to be rent out there are only 291 observations with missing information. It is not available for objects offered for sale.
Label	Year of construction
Name	baujahr_original
Data type	Integer, numerical
Description	Year in which the object was built.
Data quality	Observations that lie in the future are not necessarily faulty entries, potentially indicating that an object is still under construction. Information on the year of construction is available for all observations.

Documentation of German Real Estate Market Data

Label	Age of the property in years
Name	objekt_alter
Data type	Integer, numerical
Description	The age of the property in years.
Data quality	This variable is calculated as the difference of the year of construction and the year the object is advertised on the internet platform. Due to this calculation and the fact that the age is given in years, objects increase in age in January only.
Label	Floor
Name	etage
Data type	Integer, numerical
Description	Apartment-specific variable indicates the floor the apartment is located in.
Data quality	This variable exhibits a non-negligible number of missing values.
Label	Cellar
Name	keller
Data type	String
Description	This variable indicates if an object has a cellar or a cellar room. "J" yes, "N" no, "." missing
Data quality	This variable exhibits a non-negligible number of missing values.
Label	Elevator
Name	aufzug
Data type	String
Description	This variable indicates if an object has an elevator. "J" yes, "N" no, "." missing
Data quality	This variable exhibits a non-negligible number of missing values. A meaningful number of observations are available for apartments only.

2. Data Description

Label	Garden
Name	garten
Data type	String
Description	This variable indicates the presence of a garden. “J” yes, “N” no, “.” missing
Data quality	This variable exhibits a non-negligible number of missing values. A meaningful number of observations are available for apartments only.
Label	Balcony
Name	balkon
Data type	String
Description	This variable indicates the presence of a balcony. “J” yes, “N” no, “.” missing
Data quality	This variable exhibits a non-negligible number of missing values. A meaningful number of observations are available for apartments only.
Label	Built-in kitchen
Name	einbaukueche
Data type	String
Description	This variable indicates the presence of a built in kitchen. “J” yes, “N” no, “.” missing
Data quality	This variable exhibits a non-negligible number of missing values. A meaningful number of observations are available for apartments and houses for rent only.
Label	Number of rooms
Name	zimmeranzahl
Data type	Float
Description	Number of rooms, excluding kitchen, bath or corridors.
Data quality	In several cases, “zimmeranzahl” is not a natural number, which is not necessarily due to a faulty entry. In Germany there is the concept of half rooms. Following the DIN 283 norm, a half room is defined as a room with a size between 6 and 10 square meters. While this definition is outdated, it is still frequently in use.

Documentation of German Real Estate Market Data

Label	New construction
Name	bzust
Data type	String
Description	This variable indicates if an object has been newly built. It takes the value "N" for newly build objects "B" for objects that have been in the housing stock previously
Data quality	An object is defined as newly build if the construction has been completed since the previous year or if it is still under construction. Due to this technical definition, each year in January a substantial share of observations change from newly build to stock.
Label	rented
Name	kaufvermietet
Data type	String
Description	This variable indicates if an object for sale is already rented out. It takes the value "J" yes, "N" no, "." missing or not applicable
Data quality	Objects advertised for rent are assigned a missing value automatically.
Label	Lot size
Name	grundflaeche
Data type	Float, numerical
Description	Indicates an object's lot size in square meters.
Data quality	This variable is most relevant for houses.

2.3 Locational Characteristics

Information on the community affiliation of an object is coded using the variables blid, skid and bgid. The community can only be uniquely identified using all three variables. This is because in each federal state, districts are numbered starting from "one". The same holds true for the numbering of municipalities within a district. The identification of federal states, districts and municipalities is according to an ImmobilienScout24-specific identification scheme. Further information is available upon request.

2. Data Description

Label	Federal State ID
Name	blid
Data type	Byte, numerical
Description	<p>Each German federal state is attributed to a specific number. For each object, this number identifies the state it is located in.</p> <ul style="list-style-type: none">• 1 Baden-Wuerttemberg• 2 Bavaria• 3 Berlin• 4 Brandenburg• 5 Bremen• 6 Hamburg• 7 Hesse• 8 Mecklenburg-Western Pomerania• 9 Lower Saxony• 10 North Rhine-Westphalia• 11 Rhineland-Palatine• 12 Saarland• 13 Saxony• 14 Saxony-Anhalt• 15 Schleswig-Holstein• 16 Thuringia
Label	District ID
Name	skid
Data type	Byte, numerical
Description	<p>Each district is attributed to an ID, identifying the district (Kreis) within the federal state.</p>
Data quality	
Label	Municipality ID
Name	bgid
Data type	Integer, numerical
Description	<p>Each municipality is attributed to an ID, identifying the municipality within the district.</p>
Data quality	

Documentation of German Real Estate Market Data

Label	Residential quarter ID
Name	quartid
Data type	Double, numerical
Description	Each single residential quarter is attributed to a unique ID number. In contrast to the variables “skid” and “bgid”, “quartid” unambiguously identifies the residential quarter without consulting additional variable information.
Data quality	
Label	Geographic X coordinate
Name	geox
Data type	Long, numerical
Description	Denotes the geographic X coordinate of the object's location.
Data quality	The projection is specific to ImmobilienScout24 and based on WGS1984. The projection file is available upon request.
Label	Geographic Y coordinate
Name	geoy
Data type	Long, numerical
Description	Denotes the geographic Y coordinate of the object's location.
Data quality	The projection is specific to ImmobilienScout24 and based on WGS1984. The projection file is available upon request.
Label	Zip code
Name	plz
Data type	string
Description	This is a string variable, nevertheless only consisting of numbers. It gives the postal code of the city the object is located in.
Data quality	

2. Data Description

2.4 Time-related Characteristics

Label	Month
Name	monat
Data type	Long, numerical
Description	This is a numerical variable, which refers to the month during which an object is advertised. If an object is advertised at least at some point in time during a certain month, this advertisement is included in the respective wave. If an advertisement is updated during a specific month, only the last update is recorded and enters the dataset. The variable “monat” consists of six digits, the first four representing the year, the last two denoting the month. For instance, if an object has been advertised during February 2009, the variable “monat” will take on the value “200902”.
Data quality	Only those offers that are advertised on the platform during the respective month are covered in the monthly wave. Therefore, this variable is available for all observations.
Label	Period of advertisement/ Advertisement duration
Name	verweildauer
Data type	Byte, numerical
Description	“verweildauer” gives the number of months an object has been advertised. If an advertisement observed in month t is not removed from the platform (or set as inactive) in month t+1, this advertisement enters the data set again. If the advertisement has not been changed during that time, exactly the same observation appears again in the dataset – except for the variables “monat” and “verweildauer” which both increase by one. If an advertisement newly enters the platform, “verweildauer” is set equal to one. If an object is advertised in several months which do not follow in sequence, i.e. if an object has been removed from the platform or set as inactive in between, “verweildauer” continues counting if the object is set as active again.
Data quality	

Documentation of German Real Estate Market Data

3. Real Estate Price Index for German Labor Market Regions

Based on the dataset presented in this report we estimate real estate price indices for labor market regions in Germany for the time period January 2007 to December 2013.³ These indices have first been introduced by Budde and Micheli (2013). While administrative boundaries are arbitrary considering the area in which people live and move on a daily basis, regional labor markets are based on commuting flows. Thus, they depict more adequately the region people consider as a single region. Therefore, the real estate price indices are computed on the regional labor market level.

In the construction of the indices we heavily rely on Bauer et al (2013a). We first estimate a hedonic price function of the form

$$P = X\beta + T\tau + \varepsilon \quad (1)$$

In equation (1), vector P consists of the logarithmic transformation of the advertised prices of the different objects, either the price for objects offered for sale or the rent if the object is in the rental market. The Matrix X consists of object-specific characteristics which influence real estate prices via their respective marginal effects, referred to as imputed prices, captured in β . The matrix T captures information on when the object has been advertised, τ contains the estimated time effects we use to construct the index. Additionally, we allow for time invariant fixed effects on the municipality level. ε is a vector of error terms. We estimate equation (1) using robust standard errors.

For apartments, we control for the following object-specific characteristics: Age of the property, log of living space, number of rooms, presence of a cellar, elevator, garden, balcony and build-in-kitchen and whether the object is rented out (we control for the three categories characteristic is present, is not present and no information) as well as the object condition (11 categories) and the object category (11 categories). Additionally, we add the time-span the object has been advertised and whether the object has been already advertised in January 2007 and whether or not the object is still under construction as control variables.

³ As the descriptive statistics (Tables 2-5 in the appendix) suggest, the dataset includes several extreme observations that are suggestive of being false entries. This is why we exclude observations if one of the following conditions is fulfilled: For houses, we exclude objects with a lot size of 0 or missing and objects with 10 000 m². Additionally, we exclude objects with a stated room number of 0 or with 11 or more rooms; objects with an offer price of less than 5 000 or more than 5 million Euros, objects that will not be completed within the next two years, objects with less than 10 or more than 400 m² of living space as well as objects that were categorized as castles.

3. Real Estate Price Index for German Labor Market Regions

In the hedonic price regression of houses we control for the age of the property, the log of living space and lot size, the number of rooms, the presence of a cellar (analogously to the procedure for apartments with three categories), the object's condition (11 categories), the object's category (12 categories), the duration the object has been advertised and if the object has been advertised in January 2007 as well as if the object is still under construction. The changes in apartment prices according to the index construction are presented in Figure 1, the changes in price indices for houses in Figure 2.

4. Summary and Data Access

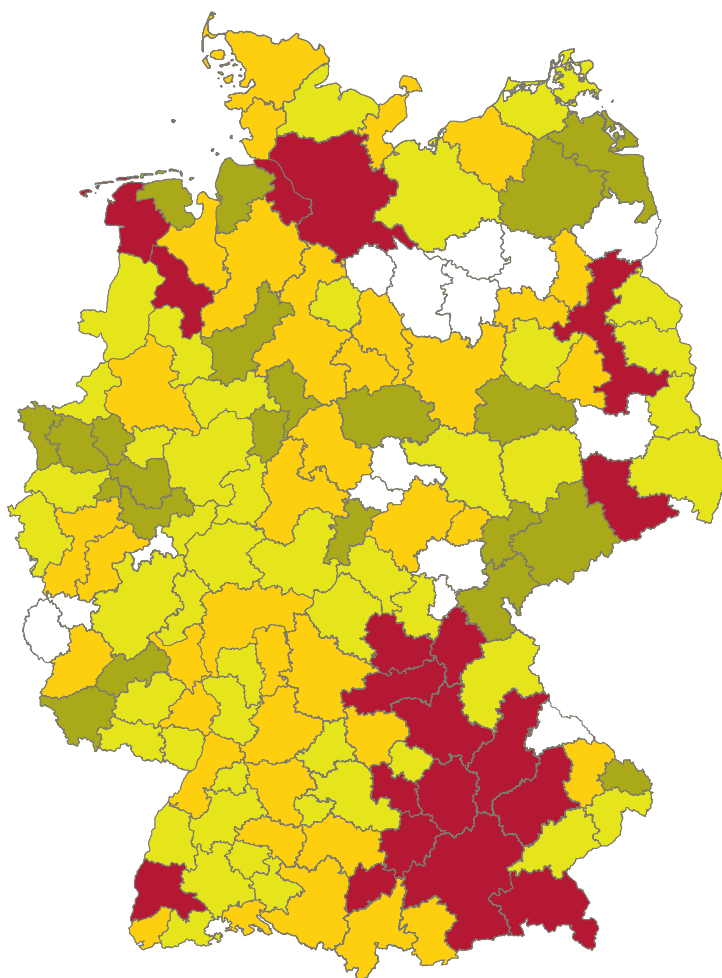
The FDZ Ruhr uses a unique dataset provided by ImmobilienScout24, Germany's biggest internet platform for real estate offers. Based on these data, price indices can be estimated on a small regional level and on a monthly basis. The indices are based on offer prices rather than transaction prices. In particular, regarding sales these prices can differ. However, Dinkel and Kurzrock (2012) show for rural areas in Rhineland-Palatine that besides a constant price markup there are no systematic differences. For a further discussion see Cotteleer and Kooten (2012) and Ma and Swinton (2012). Furthermore, the additional variables are based on the information given by the seller or the landlord. This should be borne in mind with regard to data quality.

However, the indices are advantageous to existing indices since they are available quickly and for a reasonable regional unit: labor market regions. The FDZ Ruhr provides these unique indices for Germany for economic research. They are updated regularly and available for researchers as scientific use files (SUF) upon request. The raw data will be available under special conditions for on-site use at the FDZ Ruhr. For this purpose, the FDZ Ruhr provides separate workplaces for guest researchers.

Documentation of German Real Estate Market Data

Figure 1

Average annualized percentage change of apartment prices compared to
previous quarter
2010-2013, in %



Figures in %

■ 6.7 - 9.9

■ 4.6 - 6.6

■ 2.4 - 4.5

■ -1.3 - 2.3

□ not reported

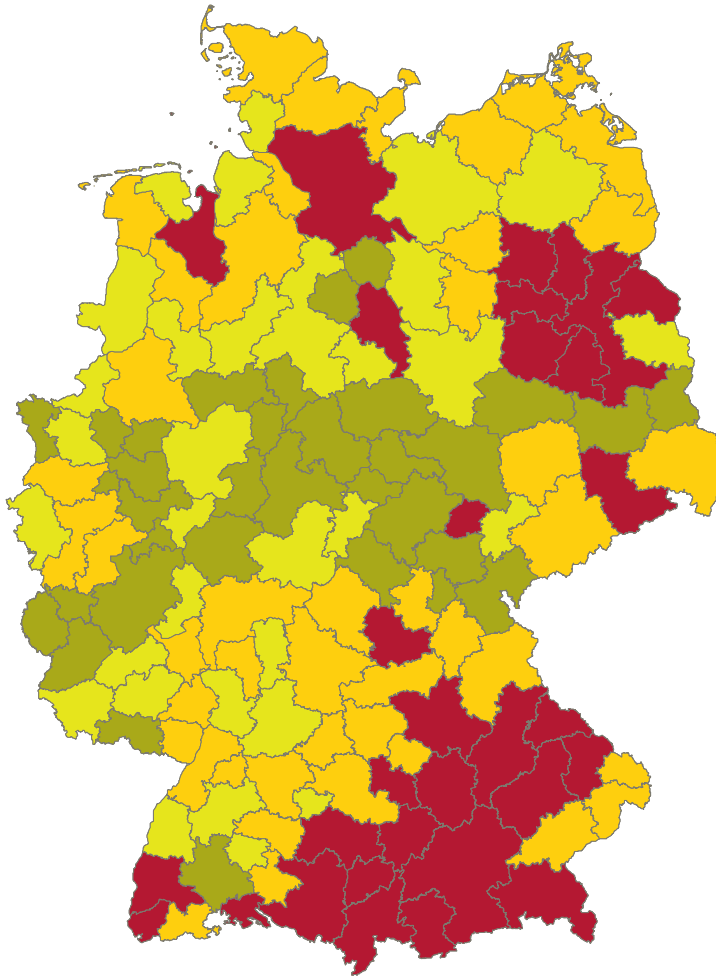
Source: Budde and Micheli (2013), for missing values price changes are not reported due to the number of observations in these labor market regions.

4. Summary and Data Access

Figure 2

Average annualized percentage change of house prices compared to previous quarter

2010–2013, in %



Figures in %

4.2 - 7.5

2.7 - 1.4

1.4 - 2.6

-1.0 - 1.3

not reported

Source: Budde and Micheli (2013).

Documentation of German Real Estate Market Data

References

Bauer, T.K., S. Feuerschütte, M. Kiefer, P. an de Meulen, M. Micheli, T. Schmidt and L.H. Wilke (2013a), Ein hedonischer Immobilienpreisindex auf Basis von Internetdaten: 2007–2011. *AStA Wirtschafts-und Sozialstatistisches Archiv* 7 (1–2): 5–30.

Bauer, T.K., Braun, S. and M. Kvasnicka (2013b), Distant event, local effects? Fukushima and the German housing market. *Ruhr Economic Papers* #433.

Budde, R. and M. Micheli (2013), Monitoring regionaler Immobilienpreise. *RWI Konjunkturberichte* 64 (4), 31–43. Essen: RWI.

Cotteleer, G. and G.C. van Kooten(2012), Expert opinion versus actual transaction evidence in the valuation of non-market amenities. *Economic Modelling* 29(1): 32–40.

Dinkel, M. and B.-M. Kurzrock (2012), Angebots- und Transaktionspreise von selbstgenutzten Wohneigentum im Ländlichen Raum. *Zeitschrift für Immobilienökonomie* 1/2012: 5–25.

Georgi, S. and P. Barkow (2010), Wohnimmobilien-Indizes: Vergleich Deutschland – Großbritannien [Residential real estate indices – A comparison between Germany and the UK]. ZIA Projektbericht.

Ma, S. and S.M. Swinton (2012), Hedonic valuation of farmland using sale prices versus appraised values. *Land Economics* 88(1): 1–15.

RWI (2013), Regionalökonomische Effekte des Emscherumbaus – Endbericht. RWI Projektbericht. Essen: RWI.

5. Appendix

5. Appendix

Table 1

Number of observations per wave for the different market segments

Wave	Apartments for rent		Apartments for sale		Houses for rent		Houses for sale	
	Obs.	%	Obs.	%	Obs.	%	Obs.	%
Jan-07	118,322	1.16	107,680	1.24	9,380	1.21	122,305	1.18
Feb-07	119,730	1.18	105,747	1.22	9,063	1.17	122,465	1.18
Mar-07	126,404	1.24	113,594	1.31	9,302	1.2	131,861	1.27
Apr-07	118,696	1.17	112,581	1.3	8,745	1.13	130,834	1.26
May-07	119,502	1.18	112,931	1.3	8,882	1.15	131,762	1.27
Jun-07	115,945	1.14	111,952	1.29	8,658	1.12	129,827	1.25
Jul-07	115,314	1.14	111,899	1.29	8,470	1.09	128,109	1.24
Aug-07	110,632	1.09	110,124	1.27	7,927	1.02	124,562	1.2
Sep-07	103,460	1.02	109,515	1.26	7,859	1.02	125,083	1.21
Oct-07	105,917	1.04	112,673	1.3	8,434	1.09	129,256	1.25
Nov-07	108,472	1.07	114,777	1.32	8,325	1.08	131,244	1.27
Dec-07	99,071	0.98	109,751	1.27	7,724	1	125,237	1.21
Jan-08	112,543	1.11	116,177	1.34	8,854	1.14	134,372	1.3
Feb-08	107,049	1.05	113,994	1.31	8,248	1.07	130,848	1.26
Mar-08	107,442	1.06	115,905	1.34	8,371	1.08	132,569	1.28
Apr-08	114,225	1.12	119,362	1.38	8,650	1.12	139,604	1.35
May-08	116,918	1.15	120,901	1.39	8,377	1.08	142,515	1.37
Jun-08	119,940	1.18	124,096	1.43	8,544	1.1	144,098	1.39
Jul-08	119,868	1.18	124,748	1.44	8,494	1.1	143,621	1.39
Aug-08	111,508	1.1	122,037	1.41	8,023	1.04	140,815	1.36
Sep-08	111,431	1.1	124,701	1.44	8,193	1.06	144,570	1.39
Oct-08	114,165	1.12	128,160	1.48	8,665	1.12	149,167	1.44
Nov-08	115,183	1.13	125,011	1.44	9,162	1.18	144,558	1.39
Dec-08	105,647	1.04	115,321	1.33	8,515	1.1	135,130	1.3
Jan-09	115,627	1.14	118,256	1.36	9,191	1.19	137,099	1.32
Feb-09	117,202	1.15	114,523	1.32	8,797	1.14	132,533	1.28
Mar-09	122,055	1.2	117,932	1.36	9,433	1.22	137,900	1.33

Documentation of German Real Estate Market Data

Wave	Apartments for rent		Apartments for sale		Houses for rent		Houses for sale	
	Obs.	%	Obs.	%	Obs.	%	Obs.	%
Apr-09	118,563	1.17	111,935	1.29	9,212	1.19	133,540	1.29
May-09	122,344	1.2	109,767	1.27	9,307	1.2	132,450	1.28
Jun-09	126,306	1.24	107,073	1.23	9,353	1.21	130,040	1.25
Jul-09	131,425	1.29	110,680	1.28	9,241	1.19	132,674	1.28
Aug-09	124,876	1.23	103,982	1.2	8,866	1.15	124,845	1.2
Sep-09	122,568	1.21	108,509	1.25	9,067	1.17	129,151	1.25
Oct-09	128,375	1.26	113,904	1.31	9,481	1.23	135,189	1.3
Nov-09	127,981	1.26	110,494	1.27	9,634	1.25	131,269	1.27
Dec-09	119,101	1.17	97,149	1.12	8,907	1.15	115,635	1.12
Jan-10	128,784	1.27	103,075	1.19	9,527	1.23	123,643	1.19
Feb-10	128,038	1.26	99,993	1.15	8,958	1.16	119,442	1.15
Mar-10	136,773	1.35	105,472	1.22	9,484	1.23	125,112	1.21
Apr-10	130,654	1.29	101,654	1.17	8,757	1.13	122,198	1.18
May-10	131,502	1.29	102,276	1.18	8,897	1.15	122,009	1.18
Jun-10	133,969	1.32	99,563	1.15	8,955	1.16	120,581	1.16
Jul-10	135,880	1.34	97,158	1.12	9,057	1.17	117,635	1.13
Aug-10	134,061	1.32	96,357	1.11	8,785	1.14	115,919	1.12
Sep-10	127,288	1.25	96,114	1.11	8,765	1.13	116,550	1.12
Oct-10	129,039	1.27	97,084	1.12	8,913	1.15	116,238	1.12
Nov-10	130,657	1.29	97,095	1.12	9,009	1.16	115,554	1.11
Dec-10	120,293	1.18	88,598	1.02	8,102	1.05	108,326	1.04
Jan-11	127,548	1.26	89,440	1.03	8,623	1.11	106,683	1.03
Feb-11	121,278	1.19	89,586	1.03	8,136	1.05	105,460	1.02
Mar-11	127,802	1.26	94,046	1.08	8,296	1.07	110,475	1.07
Apr-11	120,919	1.19	90,899	1.05	7,795	1.01	109,981	1.06
May-11	124,417	1.22	92,744	1.07	8,181	1.06	113,012	1.09
Jun-11	115,549	1.14	88,899	1.02	7,606	0.98	108,772	1.05
Jul-11	118,029	1.16	90,490	1.04	7,921	1.02	110,175	1.06
Aug-11	120,929	1.19	90,793	1.05	8,054	1.04	112,479	1.08
Sep-11	114,533	1.13	90,447	1.04	8,493	1.1	113,292	1.09

5. Appendix

Wave	Apartments for rent		Apartments for sale		Houses for rent		Houses for sale	
	Obs.	%	Obs.	%	Obs.	%	Obs.	%
Oct-11	115,261	1.13	90,383	1.04	8,709	1.13	113,685	1.1
Nov-11	118,808	1.17	90,984	1.05	9,040	1.17	112,820	1.09
Dec-11	106,446	1.05	84,291	0.97	8,445	1.09	106,165	1.02
Jan-12	121,695	1.2	88,189	1.02	9,434	1.22	109,263	1.05
Feb-12	113,317	1.12	86,455	1	8,754	1.13	107,524	1.04
Mar-12	117,888	1.16	91,687	1.06	9,257	1.2	114,553	1.1
Apr-12	115,430	1.14	91,764	1.06	8,963	1.16	118,159	1.14
May-12	117,530	1.16	93,586	1.08	9,061	1.17	116,556	1.12
Jun-12	115,685	1.14	93,257	1.08	9,145	1.18	116,669	1.13
Jul-12	119,006	1.17	94,222	1.09	9,512	1.23	117,718	1.14
Aug-12	98,009	0.96	82,144	0.95	7,885	1.02	102,677	0.99
Sep-12	118,772	1.17	93,062	1.07	9,819	1.27	116,208	1.12
Oct-12	122,672	1.21	95,364	1.1	10,474	1.35	118,431	1.14
Nov-12	129,794	1.28	96,971	1.12	10,834	1.4	118,460	1.14
Dec-12	112,167	1.1	90,492	1.04	9,813	1.27	111,606	1.08
Jan-13	131,923	1.3	98,346	1.13	11,404	1.47	118,200	1.14
Feb-13	128,563	1.27	94,800	1.09	10,873	1.41	115,281	1.11
Mar-13	127,950	1.26	98,753	1.14	11,227	1.45	120,608	1.16
Apr-13	130,119	1.28	99,597	1.15	11,416	1.48	121,970	1.18
May-13	128,775	1.27	98,034	1.13	11,257	1.46	120,991	1.17
Jun-13	131,976	1.3	98,815	1.14	11,564	1.49	123,643	1.19
Jul-13	134,060	1.32	99,475	1.15	11,693	1.51	124,058	1.2
Aug-13	130,523	1.28	99,351	1.15	11,374	1.47	124,221	1.2
Sep-13	132,210	1.3	102,278	1.18	11,806	1.53	125,838	1.21
Oct-13	134,050	1.32	105,757	1.22	12,457	1.61	126,702	1.22
Nov-13	134,539	1.32	106,988	1.23	12,441	1.61	127,430	1.23
Dec-13	119,842	1.18	99,775	1.15	11,270	1.46	117,217	1.13
Total	10,158,759	100	8,674,444	100	773,595	100	10,366,926	100

Documentation of German Real Estate Market Data

Table 2
Descriptive statistics, apartments for rent

	Mean	Median	Min	Max	SD	% missing
Base rent	672	415	0	1*109	357,522	0.0024
Living space	352	70	0	1*108	152,157	0.0024
Age of property	43.02	37	-3	143	32.30	0
Floor	2.27	2	-3	999	5.03	20.16
Number of rooms	2.73	3	0	9999.99	7.48	0.0001
	Yes		No		No information	
	Observations	Percent	Observations	Percent	Observations	Percent
Cellar	4,638,872	45.66	3,015,254	29.68	2,504,633	24.65
Elevator	1.954,788	19.24	4,158,158	40.93	4,045,813	39.83
Garden	1,853,525	18.25	3,700,744	36.43	4,604,490	45.33
Balcony	6,727,139	66.16	1,758,187	17.31	1,679,433	16.53
Built-in-kitchen	3,168,955	31.19	3,268,475	32.17	3,721,329	36.63
	Yes		No			
	Observations	Percent	Observations	Percent		
New construction	311,846	3.07	9,846,913	96.93		
Object category	Observations			Percent		
No information	2,177,241			21.43		
Top floor	1,190,914			11.72		
Loft	27,044			0.27		
Maisonette	389,703			3.84		

5. Appendix

Penthouse	72,929	0.72
Terrace flat	173,627	1.71
Other	142,293	1.40
Floor apartment	1,187,221	11.69
Apartment	4,598,141	45.26
Mezzanine	138,714	1.37
Basement	60,932	0.60
Object condition	Observations	Percent
No information	2,799,515	27.56
First occupation	366,907	3.61
As new	1,039,384	10.23
Renovated	1,191,331	11.73
In need for renovation	107,611	1.06
Modernized	659,567	6.49
By arrangement	181,701	1.79
Cared	2,738,977	26.96
First occupancy after modernization	367,391	3.62
Redeveloped	706,224	6.95
Dilapidated	144	0.0014

Documentation of German Real Estate Market Data

Table 3
Descriptive statistics, houses for rent

	Mean	Median	Min	Max	SD	% missing
Base rent	1209	995	0	2,800,000	4745	0.0057
Living space	540	140	0	100,000,000	196931	0.0057
Lot size	1314	350	0	100,000,000	271240	12.12
Age of property	26.78	17	-3.	143	26.84	0
Number of rooms	5.22	5	0	4000	8.37	0.0008
	Yes		No		No information	
	Observations	Percent	Observations	Percent	Observations	Percent
Cellar	334,390	43.23	224,492	29.02	214,713	27.76
Built-in-kitchen	342,095	44.22	174,801	22.60	256,699	33.18
	Yes		No			
	Observations	Percent	Observations	Percent		
New construction	65,170	8.42	708,425	91.58		
Object category	Observations		Percent			
No information	69,165		8.94			
Farmhouse	5,596		0.72			
Bungalow	16,707		2.16			
Semi-detached house	216,353		27.97			
Multi-family home	12,379		1.60			
Villa	16,012		2.07			
Terraced house	50,909		6.58			

5. Appendix

Special Object	14,739	1.91
Detached house	238,336	30.81
Mid-terrace house	81,684	10.56
Terraced corner house	45,136	5.83
Castle	77	0.01
Other object	6,502	0.84
Object condition	Observations	Percent
No information	153,145	19.80
First occupation	70,697	9.14
As new	145,735	18.84
Renovated	76,929	9.94
In need for renovation	9,927	1.28
Modernized	42,264	5.46
By arrangement	11,649	1.51
Cared	228,538	29.54
First occupancy after modernization	17,404	2.25
Redeveloped	17,230	2.23
Dilapidated	77	0.01

Documentation of German Real Estate Market Data

Table 4
Descriptive statistics, apartments for sale

	Mean	Median	Min	Max	SD	% missing
Offer price	171503	125000	0	15,600 mill.	7,560,006	0.0025
Living space	688.89	77.24	0	100,000,000	220229	0.0049
Age of property	32.13	24	-3	143	30.98	0
Floor	2.12	2	-4	999	6.40	35.25
Number of rooms	3.01	3	0	9999.99	16.69	0
	Yes		No		No information	
	Observations	Percent	Observations	Percent	Observations	Percent
Cellar	3,547,602	40.90	2,5042,280	28.87	2,622,562	30.23
Elevator	2,403,810	27.71	2,105,920	24.28	4,164,714	48.01
Garden	1,865,922	21.51	1,778,749	20.51	5,029,773	57.98
Balcony	6,393,349	73.70	709,625	8.18	1,571,470	18.12
Built-in-kitchen	2,824,540	32.56	1,849,313	21.32	4,00,591	46.12
	Yes		No			
	Observations	Percent	Observations	Percent		
New construction	1,203,750	13.88	7,470,694	86.12		
Object category	Observations		Percent			
No information	2,297,261		26.48			
Top floor	887,474		10.23			
Loft	40,481		0.47			

5. Appendix

Maisonette	530,345	6.11
Penthouse	172,707	1.99
Terrace flat	233,383	2.69
Other	134,256	1.55
Floor apartment	1,080,974	12.46
Apartment	3,157,252	36.40
Mezzanine	112,909	1.30
Basement	27,402	0.32
Object condition	Observations	Percent
No information	2,603,911	30.02
First occupation	1,230,909	14.19
As new	864,774	9.97
Renovated	410,115	4.73
In need for Renovation	241,361	2.78
Modernized	386,470	4.46
By arrangement	54,161	0.62
Cared	2,409,518	27.78
First occupancy after modernization	224,460	2.59
Redeveloped	248,584	2.87
Dilapidated	181	0.0021

Documentation of German Real Estate Market Data

Table5

Descriptive statistics, houses for sale

	Mean	Median	Min	Max	SD	% missing
Offer price	601701.5	229000	0	3.47*1011	2.62*108	0.0035
Living space	878.89	150	0	100,000,000	262950	0.0034
Lot size						
Age of property	36.85	31	-3	143	33.65	0
Number of rooms	6.51	5	0	9999.99	28.81	0.0006
	Yes		No		No information	
	Observations	Percent	Observations	Percent	Observations	Percent
Cellar	3,300,749	31.84	3,675,502	32.45	3,390,675	32.71
	Yes		No			
	Observations	Percent	Observations	Percent		
New construction	1,550,744	14.96	8,816,182	85.04		
Object category	Observations			Percent		
No information	1,117,909			10.78		
Farmhouse	144,932			1.40		
Bungalow	203,212			1.96		
Semi-detached house	1,426,262			13.76		
Multi-family home	1,026,496			9.90		
Villa	287,428			2.77		
Terraced house	381,208			3.68		
Special Object	250,375			2.42		

5. Appendix

Detached house	4,679,718	45.14
Mid-terrace house	420,731	4.06
Terraced corner house	267,534	2.58
Castle	1,229	0.01
Other Object	159,892	1.54
Object condition	Observations	Percent
No information	3,568,227	34.42
First occupation	1,350,421	13.03
As new	992,568	9.57
Renovated	276,233	2.66
In need for renovation	739,759	7.14
Modernized	569,337	5.49
By arrangement	58,136	0.56
Cared	2,541,906	24.52
First occupancy after modernization	30,720	0.30
Redeveloped	236,783	2.28
Dilapidated	2,836	0.03