



A Hedonic Rent Index for Student Housing in Germany

Survey on 15 Metropolitan and Student Cities for Deutsche
Real Estate Funds in Cooperation with ImmobilienScout24

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Contents

| | |
|----------------------------------|----|
| 1. Introduction | 3 |
| 2. Methods and Data | 4 |
| 3. Results | 5 |
| 4. Conclusion | 11 |
| References | 12 |

JEL Classification:

C43: Index Numbers and Aggregation

E30: General Prices, Business Fluctuations, and Cycles

R11: Regional Economic Activity: Growth, Development, Environmental Issues, and Changes

R31: Housing Supply and Markets

1. Introduction

In recent years, studying in Germany has become increasingly popular for high school graduates such that the number of students starting a degree programme has outnumbered the number of apprentices. As of the winter term 2015/2016, 2.8 million students were enrolled in study programmes in German universities (Federal Statistical Office of Germany, 2016). In relation to the total population, the share of students makes up 3.4 percent. Compared to the United Kingdom with a share of 0.6 percent, for example, the share in Germany is considerably larger and therefore has wide-ranging impact on the general demand structure in German cities as well as on their housing markets. Against the background of an increasing number of students, their financial restrictions, and a general tightening in the German housing market in the metropolitan areas, the market segment of student housing has attracted the increasing attention of policymakers and investors.

As the supply of housing remained on a relatively constant level in the recent period, the increasing number of students consequently led to an excess demand for student accommodation. The number of dormitory spaces available through student services amounts to 234,000, with another 11,300 units currently being planned (Savallis Research, 2016). Hence, only 10 percent of the market is covered by publicly subsidized housing; the remaining 90 percent is served by private landlords, and the trend is rising. In response to the relative supply shortage, more and more private investors have gotten involved in the market, typically offering high-quality one-bedroom apartments of about 30 square metres. From 12,000 apartments in 2010, the number of these accommodations is expected to rise to 41,000 units in 2020. Usually, the apartments are offered at flat rate, including all utilities. The competitive situation in the market segment is further intensified due to retirees, commuters, and young professionals who all demand the same type of accommodation. Thus, the chance to find an affordable home has significantly dropped.

Due to a general lack of transparency in the market for student housing, the Cologne Institute for Economic Research (IW) in cooperation with Deutsche Real Estate Funds (DREF) has developed a hedonic rent index for the private segment of the corresponding market (Deschermeier et al., 2016). The calculation of the rent indices makes use of the databases of the internet platform ImmobilienScout24, which contains a comprehensive set of characteristics describing the included offers. The following chapter contains a short presentation of the empirical framework and the underlying data. The calculated indices will then be illustrated in chapter 3. Subsequently, we will also provide rents for a hypothetical, predefined sample student apartment.

2. Methods and Data

For the construction of real estate indices there is a set of various methodological approaches available which, however, significantly differ in their practicability. Besides the repeated sales method, the typical case method, and the calculation of average prices, which are discussed in detail in Voigtländer et al. (2013, 66), the application of hedonic methods has established itself as common practice in the analysis of real estate markets.

The hedonic approach has the appealing property of taking into account the heterogeneity in the real estate market, whereas other approaches fail to do so. Referring back to the so-called hedonic hypothesis by Brachinger (2003, 2), the approach is based on the assumption that the price of a rental property is functionally dependent on its characteristics. This implies that there exists a mathematical formalization of the rent price for real estate in dependence to its features such as equipment, location, and quality. Each feature is then assigned a so-called shadow price that reflects its individual appreciation so that the rent price equals the sum of all shadow prices for the individual features. A vector formulation of the hedonic regression model is represented by

$$M = \alpha X + \beta T + u$$

where the vector M of dimension $n \times 1$ contains all rent prices in the sample of size n . Vector α consists of the shadow prices for the individual real estate features which are captured in vector X . In order to assess the development of rent prices over time, the regression equation also includes time dummy variables T and the corresponding coefficients β . The single elements of β measure the price change relative to the base period $t = 0$, whereas the actual hedonic rent price index can be obtained subsequent to a trivial mathematical transformation (Cominos et al., 2007, 5). The vector u captures the error terms of the regression.

In the following, the calculation of the rent price index for student housing is conducted by using the database of ImmobilienScout24 in the period from 2010 to the first half of 2016 on a half-yearly basis. The database is compiled of all advertisements for the major metropolitan areas of Berlin, Munich, Hamburg, and Cologne as well as other bigger cities such as Bonn, Bremen, Frankfurt, Hamburg, Leipzig, and Stuttgart. We also reconsidered important student cities like Bochum, Heidelberg, Jena, Kiel, Osnabrueck, and Siegen in order to draw a comprehensive picture of the market segment of student housing. Each observation contains a broad set of information on the rental property for which the corresponding shadow prices are calculated in the regression.

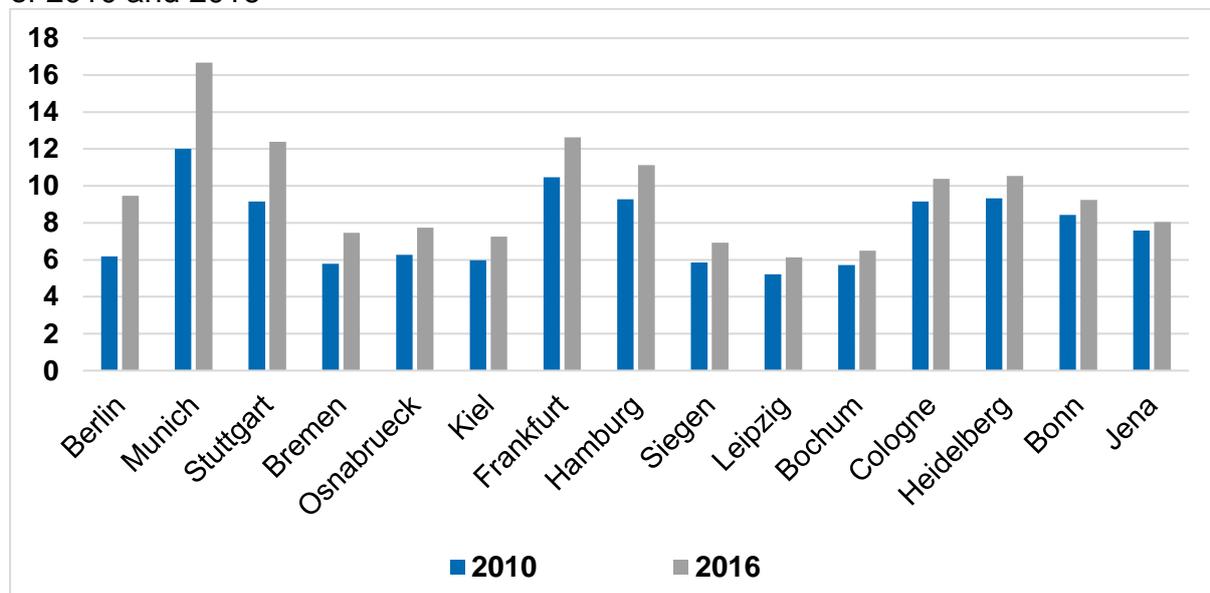
In order to convert the data into a useable format, in a first step, we rectify the provided raw data with respect to duplicates, extreme values, partly missing data, and other non-credible observations (Deschermeier et al., 2014). In a second step, we augment the dataset by some locational information in order to account for the spatial characteristics within the investigated cities. The augmentation follows the procedure described in Deschermeier et al. (2016).

As our analysis focuses on the market segment of student housing, we then restrict the dataset according to the students' budget and their corresponding needs. Hence, all observations in the quality category 'Luxury' are excluded from the dataset. Furthermore, we restrict the sample to the 80 percent cheapest observations in every period and exclude the observations that exceed this threshold.

3. Results

Figure 1 shows the development of average rent prices for student housing for each first half-year in 2010 and 2016. As the results show, rents exhibit upward trends among the entire observation period throughout the investigated cities. The largest growth is registered in the largest German city of Berlin with an increase of 53.0 percent. Hereafter, Munich (38.9 percent) and Stuttgart (35.3) also show significant rent increases since 2010. However, Berlin has caught up to the latter ones, starting from a relatively low rent level of 6.19 euros per square metre. At the lower end of the scale, average prices in Heidelberg (13.0 percent), Bonn (9.7 percent), and Jena (6.0 percent) have increased moderately.

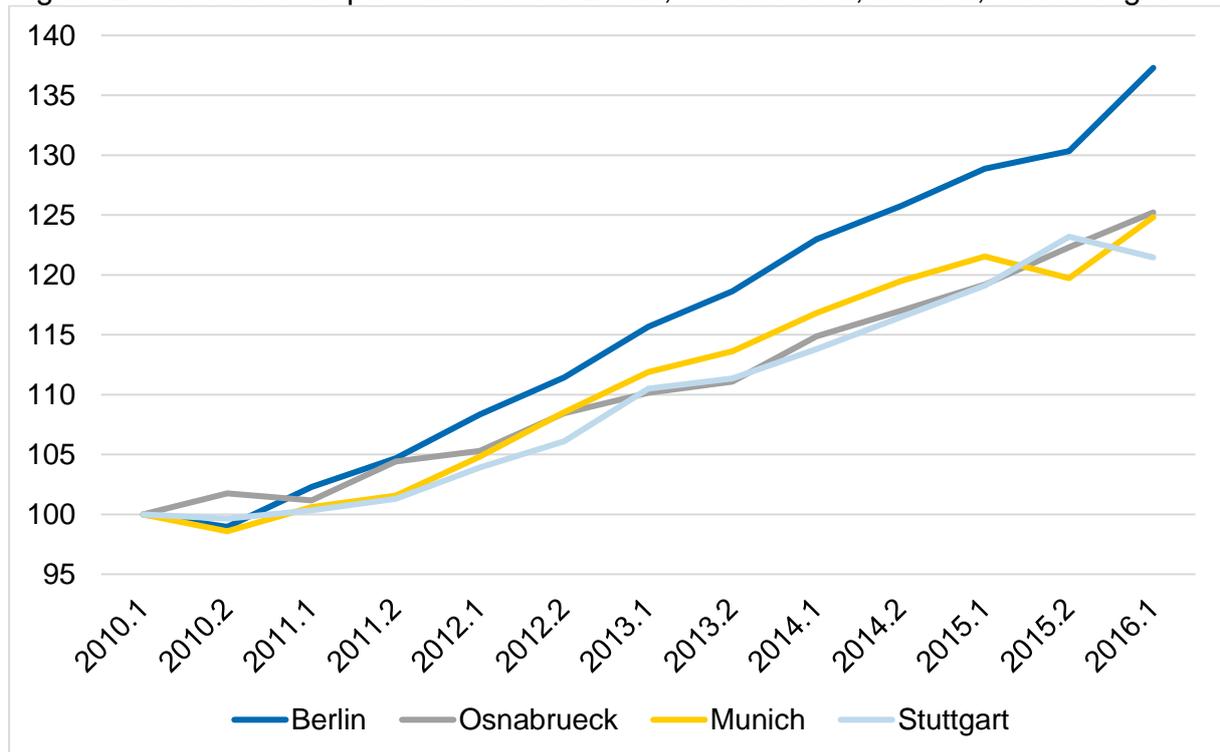
Figure 1 – Average prices for student housing per square metre in the first half-year of 2010 and 2016



Source: Cologne Institute for Economic Research, ImmobilienScout24

The magnitude of the calculated average price shows significant variation in the investigated cities. Munich-based students had to pay the largest amount per square metre in a student apartment in 2010 and 2016, at a cost of 12.00 and 16.70 euros, respectively. Concurrently, students in Leipzig had to pay 5.20 euros in 2010 and 6.10 euros in 2016 for a square metre, showing that the student housing in this city is significantly more affordable.

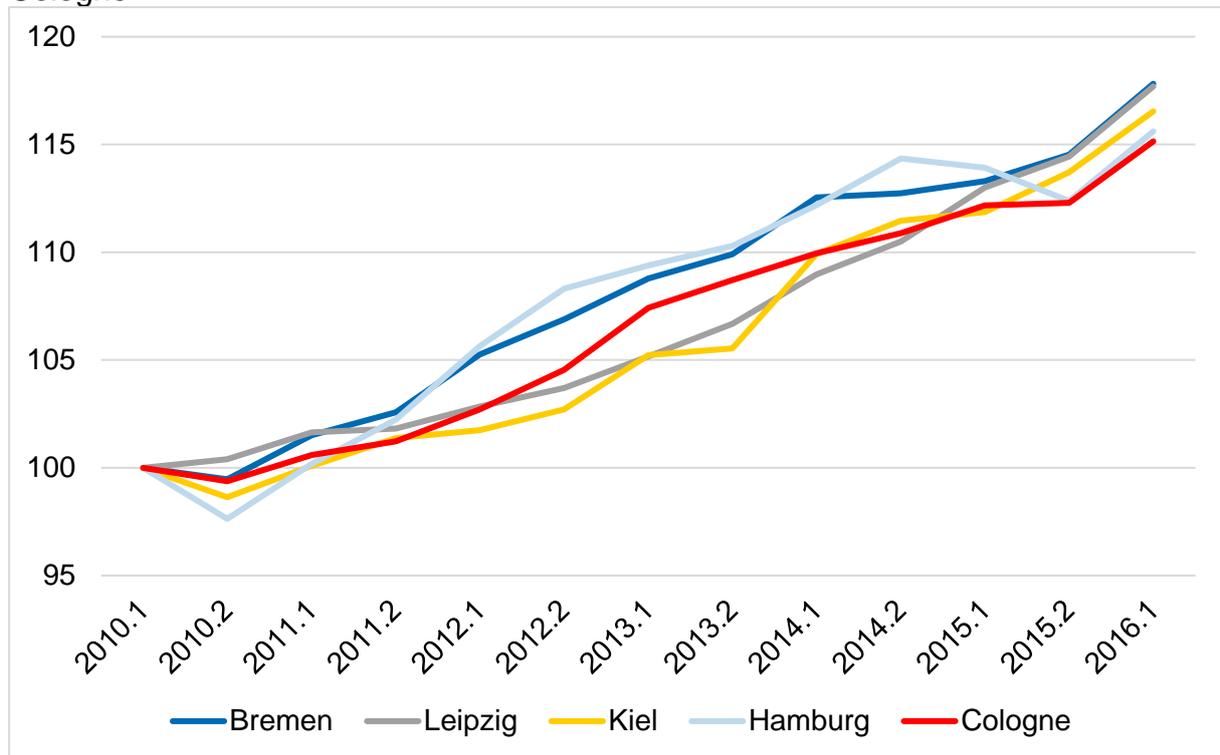
Figure 2 - Hedonic rent price indices for Berlin, Osnabrueck, Munich, and Stuttgart



Source: Cologne Institute for Economic Research

In order to derive a more meaningful statement on the development of the market for student housing, it is reasonable to focus on the patterns of the hedonic indices as depicted in figure 2 for Berlin, Osnabrueck, Munich, and Stuttgart. This subgroup of four locations shows the highest increase in the hedonic indices among all 15 investigated cities. As well as in the evaluation of average prices, Berlin shows the highest rent price growth with an increase of 37.7 percent. The difference in the growth of average prices and the hedonic indices refers back to the methodological superiority of the hedonic approach. As implicitly described in chapter 2, changes in quality are distinguished from changes in prices so that the growth in rents shows the corresponding deviation. Even though the metropolitan areas of Munich and Stuttgart exhibit a high level of rents already, the two cities show an increase of 24.8 percent and 21.4 percent, respectively. The only student city in the top group is Osnabrueck, showing the second-highest growth in rents among all cities, at 25.2 percent.

Figure 3 – Hedonic rent price indices for Bremen, Leipzig, Kiel, Hamburg, and Cologne



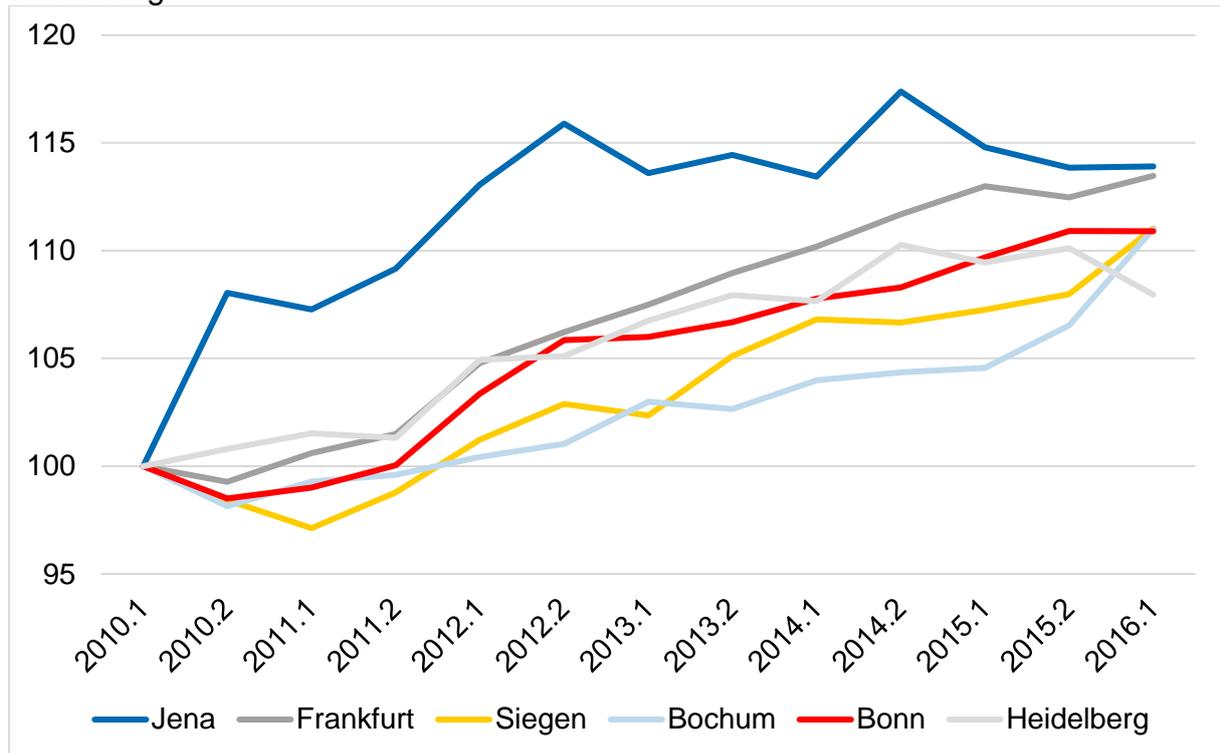
Source: Cologne Institute for Economic Research

Figure 3 depicts the hedonic indices for the cities of Bremen, Leipzig, Kiel, Hamburg, and Cologne. All indices share similar development patterns and growth rates. Following sharp rent price increases of up to 114.5 until 2014, the metropolitan areas in particular showed a slight easing of tension in the market and a corresponding stabilization of rents until the end of 2015. Since then, all cities in the investigated subgroup exhibit a sharp increase again. Thus, the effect of the rent break, which has already been implemented in Bremen, Hamburg, and Cologne, is highly questionable. In total, the price increase in the student cities of Bremen (17.8 percent), Leipzig (17.7 percent), and Kiel (16.5 percent) is just slightly higher than in the metropolitan areas of Cologne (15.2 percent) and Hamburg (15.6 percent).

The results, which are shown in figure 4, reflect the development pattern of the hedonic rent price indices in Jena, Frankfurt, Siegen, Bochum, Bonn, and Heidelberg. While the total growth in rents is moderate in the investigated cities, the behaviour of the indices partly differs from one city to the next. In the beginning of the observation period, rents in Bochum, Bonn, and Siegen showed a decreasing tendency while rent prices in Jena exhibited a sharp upward bend. In the following years, the indices followed a moderate pattern such that the highest increase was 13.9 percent (Jena) and the lowest was 8.0 percent (Heidelberg). The volatile behaviour of the hedonic index in Jena is potentially due to the relatively low number

of observations. For the calculation, just 3,700 observations were available for the entire observation period. Frankfurt, as the biggest city in this subgroup, exhibits the second-highest rent increase among the six cities, at 13.5 percent. For the sake of completeness, the student cities of Bochum (11.0 percent), Bonn (10.9 percent), and Siegen (11.0 percent) show a moderate growth in rent prices since 2010.

Figure 4 – Hedonic rent price indices for Jena, Frankfurt, Siegen, Bochum, Bonn, and Heidelberg



Source: Cologne Institute for Economic Research

In order to provide comparability and an overview of the results for tenants, landlords, and investors, we calculate hypothetical monthly rents for a predefined student apartment. The calculation, which is based on the previously presented regression model, incorporates a sample apartment corresponding to the characteristics as comprehensively shown in table 1. In principle, these characteristics – such as living space of 30 square metres, ‘normal’ quality, and located 1.5 kilometres away from the university – have been selected in order to reflect student needs regarding housing. Besides the basic rent, other utilities – such as electricity, public broadcaster fee, telecommunications, and other expenses related to accommodation costs – are considered in the monthly rent. Hence, the calculated amount can be regarded as an all-inclusive rent.

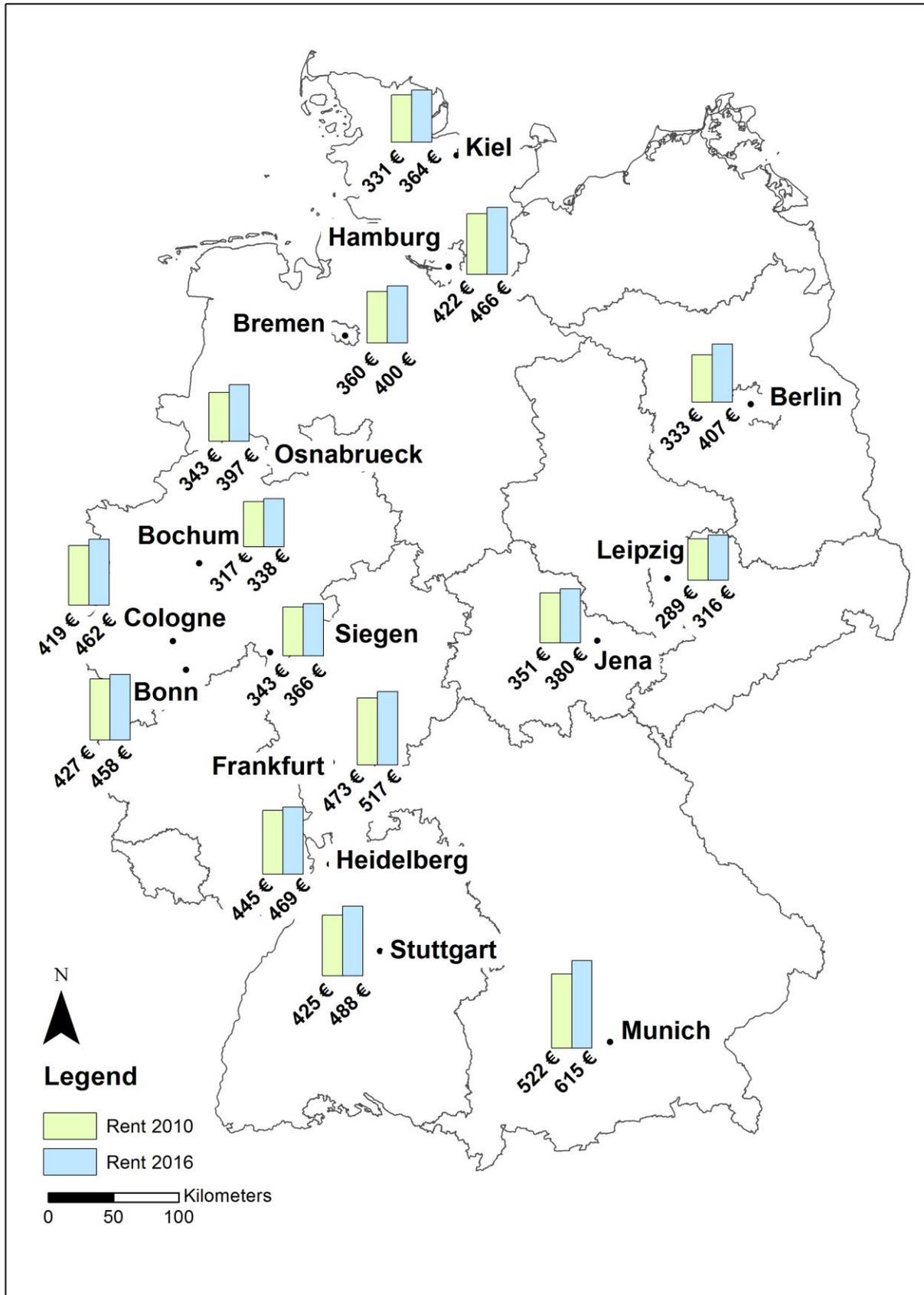
Table 1 – Predefined characteristics of the student apartment

| | |
|-----------------------------|------------------|
| Living space | 30 square metres |
| Year of construction | 1995 |
| Distance to university | 1.5 kilometres |
| Quality | Normal |
| Built-in kitchen | Yes |
| Furnished | No |
| Heating costs and utilities | Yes |
| Additional costs: | |
| • Electricity | 20.00 euros |
| • Public broadcaster fee | 17.50 euros |
| • Telecommunications | 25.00 euros |
| • Miscellaneous expenses | 10.00 euros |

Source: Cologne Institute for Economic Research

Figure 5 depicts the hypothetical monthly rents in the first half of 2010 and 2016 for the predefined student apartment for all investigated cities. While Leipzig students were obliged to pay 289 euros in 2010, students in Munich had to pay 522 euros for the same apartment and were thus subject to a significantly higher cost burden. In Berlin, as the city with the highest total number of students, rents were fairly low in 2010, at 333 euros. Since then, rents increased significantly in the capital such that students were paying 407 euros in the first half of 2016. However, the rent level is still considerably lower than in the cities of Munich (615 euros), Frankfurt (517 euros), and Heidelberg (469 euros). In the first half of 2016, Leipzig is still the location with the lowest rent price level, at 316 euros for the student apartment.

Figure 5 – Monthly rents for a student apartment in the first half of 2010 and of 2016



Source: Cologne Institute for Economic Research

4. Conclusion

The situation of students in the German housing market is very difficult. The number of students is increasing, but supply in German metropolises is just slowly catching up. In addition, students compete with other small households, such as pensioners, young professionals, and commuters who need housing only for workweeks. Consequently, prices for student housing are not only increasing but increasing at a higher pace than the rest of the market. For students, this development is a special challenge as their income is fixed and generally independent of the current economic upswing in Germany.

Thus, there are multiple opportunities for investors who can supply mid-priced housing for students. Given the current demographic situation, demand will increase at least until the mid-2020s. However, some scepticism is justified if luxury apartments are to be an attractive investment in the long run, since students (and their parents) are very price-conscious. The need for affordable housing, by contrast, will be high even after demand has reached its peak.

The results of the student price index by IW and DREF show that not only big cities like Berlin and Munich are attractive, but also typical student cities like Osnabrueck, Kiel, and Bremen. Therefore, investors should widen their view when analyzing the German market for student housing.

From now on, IW and DREF will analyze the market for student homes on a bi-annual basis.

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