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**WHERE DO CONSTRUCTION LAND PRICES
GROW FASTEST IN GERMANY?**

PRICE DYNAMICS, VALUE DRIVERS, CLUSTERS

RESEARCH REPORT
FEBRUARY 2019



Where do construction land prices grow fastest in Germany?

Price dynamics, value drivers, clusters

Prices for construction land have risen continuously over the past few years and have gained considerable momentum, particularly in the last five years. They are among the key price drivers on the real estate markets. However, the development differed among various locations. While in many places prices have multiplied, there have even been declines elsewhere. Which factors have the highest impact on price development?

Planning and decisions for future investments are easier if both the range and the factors influencing price development are known. This study examines the influence of market size, region and economic dynamics. The data basis comprises construction land prices of the independent German cities with 100,000 inhabitants or more.



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1. Scarcity-driven price development of construction land in Germany

With a value of approx. 5.5 trillion euros, land for development in Germany is one of the most important economic resources. The total asset value currently corresponds to about five times the market capitalization of all DAX companies (at prices for Dec. 2018), twice the German money supply M1 (cash and demand deposits) and more than 1.5 times Germany's gross domestic product. Even though such assets can only be roughly determined - here by On-Geo (Wirtschaftswoche, 2018) - it is clear that land represents a fundamental and valuable resource for the economic, social and cultural development of a national economy. In terms of value, land not only serves as a capital investment that generates returns, but also generates stability by creating reserves for individuals, companies and the state as well as by securing monetary value as a real countervalue or material asset. Land values usually go hand in hand with the economic strength of cities and regions. On-Geo puts the value of land for the economically strong state of Bavaria at 1.6 trillion euros, for Thuringia at only 34 billion euros. The difference is explained not only by the higher number of inhabitants (approx. factor 6) or the mere

surface area, but also by the economic performance (gross domestic product per inhabitant approx. factor 1.6), the economic structure, land use and other factors. Cologne and Frankfurt am Main have correspondingly high land values of estimated 118 and 117 billion euros, respectively, whereas Leipzig is currently estimated at only 27 billion euros.

What are the reasons for such disproportionately large differences in value? How will land values develop further? Will an adjustment of the underlying socio-economic factors also lead to a levelling of existing value differences? These are questions that concern landowners, investors, users, analysts and municipalities alike. There are numerous theories on price formation. At their core is the interdependency of supply and demand. Scarcities are (mostly) reflected in prices. In densely populated industrial countries such as Germany, the supply of land is naturally very limited. Only slightly more than nine percent of the land area is available for use as construction ground in the narrower sense, e.g. as residential, commercial and other settlement areas. According to the principles

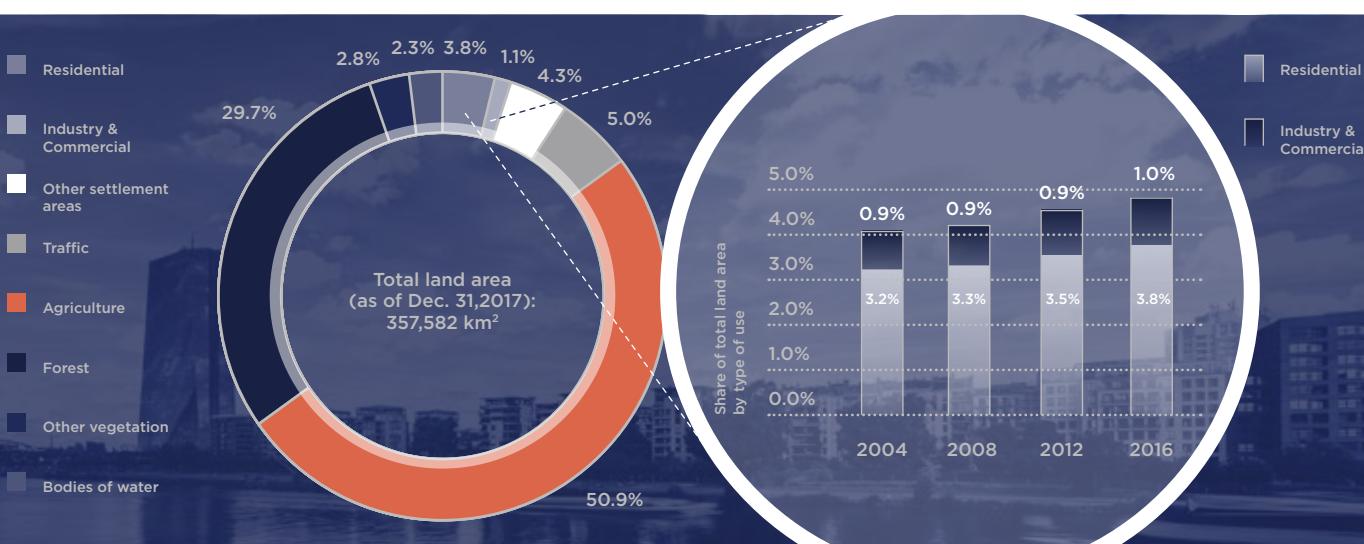


Figure 1: Distribution of land area by type of use (2017, left) and development of land shares by type of use (residential, commercial and industrial use, right) - Germany
Source: Federal Statistical Office; own calculation and illustration

of area development planning (§ 1 BauGB). Numerous other concerns, such as agriculture, forestry or environmental protection, must also be taken into account, so that despite high demand, the proportion of construction land can at best increase only slightly and solely at the expense of other uses. In recent years, however, there has been a minor increase, in particular for residential construction land. A plus of 0.6 percentage points was recorded in the period from 2004 to 2016. By contrast, the share of commercial and industrial space rose only very slightly by just under 0.1 percentage points.

While the supply of space is almost fixed, i.e. it cannot experience any significant increases or decreases, demand is developing very dynamically. In positive economic phases, for

example, there is an increased demand for logistics and office real estate, which cannot always be met immediately due to the lack of a corresponding growth of construction land. On the other hand, vacant real estate does not automatically mean that a demolition of the existing buildings and thus a freeing of construction land will follow. A balance between supply and demand can essentially only be achieved through price. The growth of the economy and the increase in purchasing power therefore regularly lead to an increase in the price of construction land. Contrary to what is generally assumed, however, construction land can also become cheaper in economically weak years, as can be seen in the following illustration, for example after the peak in 2007.

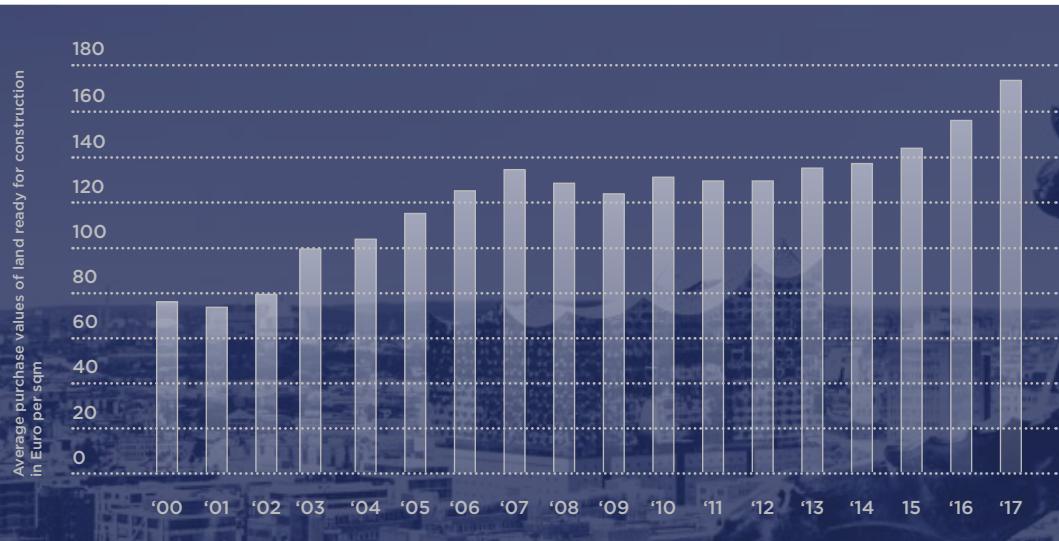


Figure 2: Development of average purchase values of land ready for construction (in Euro per sqm) - Germany
Source: Federal Statistical Office; own illustration

Prices for construction land have been rising for almost ten years. But are these increases significant? Or are they inside the range of normal inflation? The answer can be found in a comparison of different general and industry-related price developments, for example of construction land, construction costs, and

the cost of new construction for different property types and uses. The development of the general consumer price index (CPI) is also an interesting benchmark. Inflation has been relatively steady over a long period. While most price indices have been progressing virtually in parallel and slightly above the CPI since

2010, the price index for construction land stands out visibly. In the period from 2000 to 2017, it grew by almost 67 percent, while the

CPI rose by only 27 percent. The past five years have been particularly dynamic.



Figure 3: Development of construction land prices compared to other price indices in different market phases
Source: Federal Statistical Office; own illustration

The following conclusions can be drawn from the development of the real estate indices:

1. Construction land prices have developed similarly to the CPI during certain periods (e.g. 2000-2006), but can also unfold an extraordinary dynamic and then far outgrow the CPI (period since 2010).
2. Although construction costs have also risen more sharply recently, the rise in the sales

prices of residential and commercial buildings is primarily due to the price development of construction land.

3. The rise in land prices is making especially single-family houses more expensive (Figure 3), as their ratio of floor space to plot area is particularly unfavourable in terms of price. Nevertheless, discussions of price increases for construction land vary greatly from region to region and from sector to sector. It can the-

efore be assumed that the relevance of these increases depends on specific situations and influencing factors. In general, it is also interesting for investors which factors are responsible for price increases and which clusters

can be distinguished in a market. Possible factors are, for example, plot size (volume effect), market size (concentration on centres), region (history, dynamics) and purchasing power (price effect, inflation).

2. Cluster analysis regarding plot size

From an economic point of view, the so-called quantity effect can be explained as the part of the revenue which depends on the sales volume. From a property management point of view, prices cannot be explained purely by the value of a unit of space (in sqm). Rather, each purchase of a plot of land generates certain basic costs (transaction costs) for marketing, negotiation and transaction processing, which are to be allocated accordingly to the larger or smaller area sold. At the same time, it seems plausible that certain discounts are granted when large, contiguous areas can

be marketed more quickly and easily and no unfavourable residual areas are left behind.

Overall, smaller plots are therefore - seen relatively per square metre - more expensive to trade than very large areas (Figure 4). This also explains in part the business model of investors who buy large areas of construction land, raw construction land or expected construction land and later generate a profit margin by dividing them up. In addition, there are of course other price effects, for example from building rights and development.

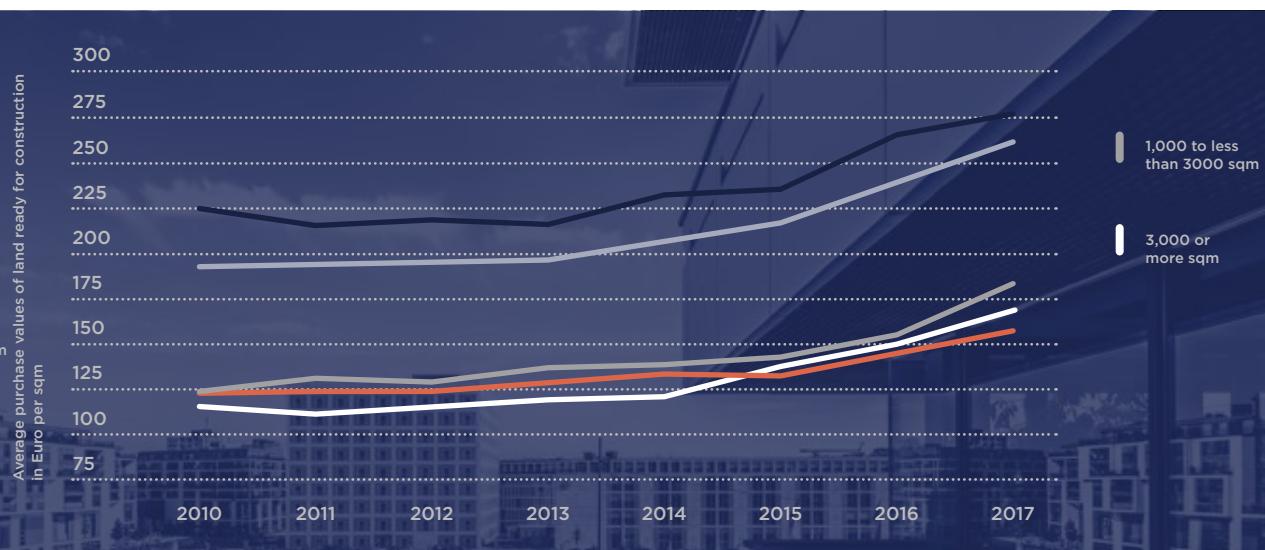


Figure 4: Development of average purchase values of land ready for construction (in Euro per sqm) by plot size class - Germany
Sources: Federal and State Statistical Offices; own illustration

3. Cluster analysis regarding market size

According to earlier studies, the size of the market has already been a decisive factor

for the development of rental prices and the scarcity of housing in large cities (previous re-

search reports at www.empira.ch/en/news). A similar effect can be assumed for the level and development of construction land prices. For this report, the size of a market is defined by the number of inhabitants. Official statistics provide the most recent uniform figures for 2016. On this basis (not adjusted over time although cities may have grown or shrunk during the period under analysis), all 71 district-independent German cities with more than 100,000 inhabitants were divided into three size classes: smaller cities with less than

250,000 inhabitants, medium-sized cities with between 250,000 and 500,000 inhabitants and the largest cities with more than 500,000 inhabitants.

The average purchase values and plot sizes of land ready for construction were also taken from official statistics. This provides the analysis with a source that is uniform throughout the country, even though the information depth is unfortunately reduced for some segments.¹

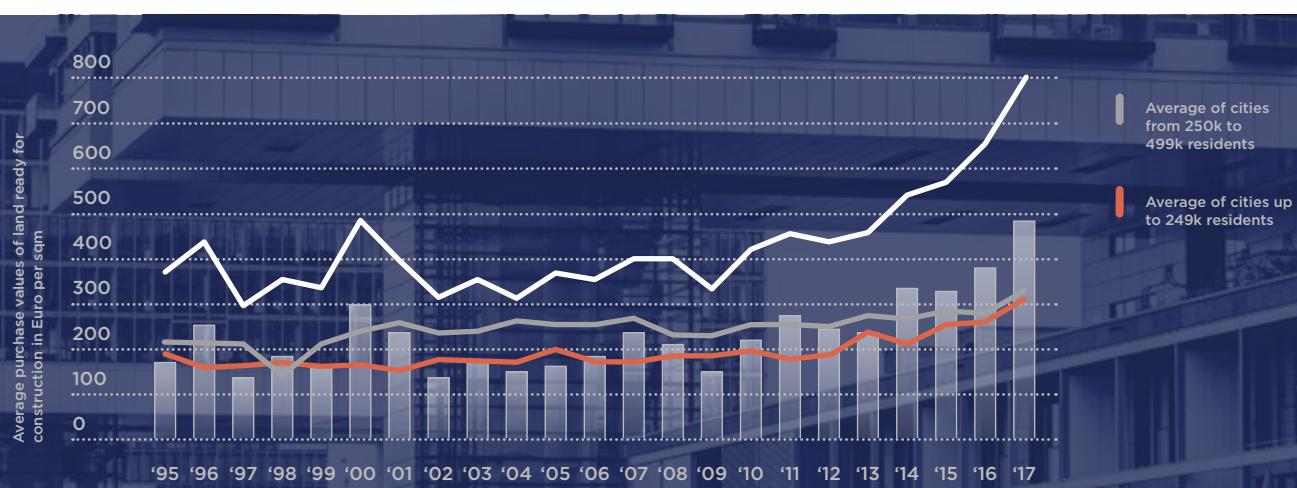


Figure 5: Development of average purchase values of land ready for construction (in Euro per sqm) by population size class and illustration of the spread between the most and least expensive population size classes
Sources: Federal and State Statistical Offices; own calculation and illustration

The evaluation (Figure 5) shows a clear value effect for the major cities. The price development of land ready for construction thus seems to be dependent on the market size (here: population). This applies both to the price level and the price dynamics. The smaller cities have been catching up since 2014. It is conspicuous that the medium-sized cities have not fully followed the general market dynamics in recent years. Looking at the

growth rates of the other clusters, there may be catch-up potential.

The spread between minimum and maximum construction land prices has widened sharply as a result of price increases in large cities, which have been enormous in the years since 2009. Individual cities, however, can diverge in their individual performance from the clusters considered here. Cities like Dresden and

1: The compilation of official construction land statistics by the various State Statistical Offices is not carried out uniformly. Depending on the federal state, different sources are responsible for data supply (e.g. expert committees, tax offices), which is reflected in particular in the number of analyzable transaction figures. Value spikes in both directions cannot be completely ruled out in the case of very low sales figures. In addition, some of the data series show gaps, so that the underlying data basis of 71 independent cities with more than 100,000 inhabitants had to be reduced for some steps of this analysis.

Leipzig, which belong to the price-intensive cities with 500,000 inhabitants or more, still showed comparatively low construction land prices. In contrast, Offenbach am Main and Erlangen, among others, stand out among the smaller and less expensive locations - they

show a comparatively high price level. Large cities are also regularly ahead in terms of the average size of space traded, and the picture is mixed for small and medium-sized cities. However, some fluctuations are due to statistical factors or certain one-off effects.

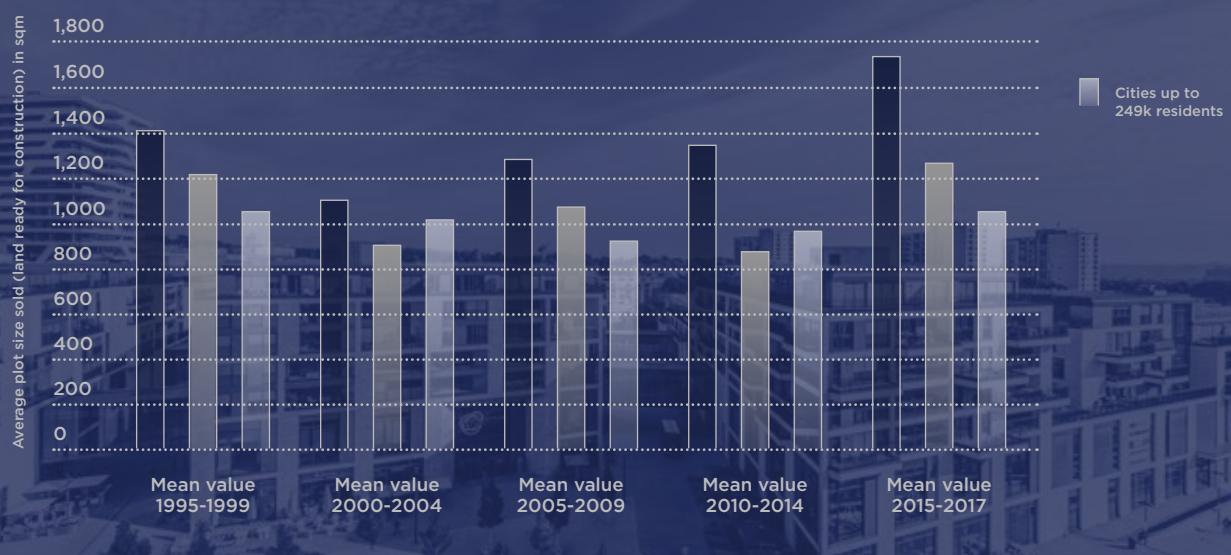


Figure 6: Development of the average plot size sold (land ready for construction) in sqm by population size class
Sources: Federal and State Statistical Offices; own calculation and illustration

A general result of this cluster analysis is that markets are becoming increasingly dynamic. This applies both to price trends and to the size of the plots traded. This development is particularly noticeable in large cities. Despite higher average prices, increasingly, larger plots of land are being sold there. At present, these are approx. 300 square metres above

the average at the end of the last millennium. In the two clusters of cities with less than 500,000 inhabitants, the average take-ups have also significantly increased in recent years. Over the period since 1995, the basis for this analysis, it also becomes clear that the largest plots of land ready for construction were also traded in the largest cities.

4. Cluster analysis regarding the region

In addition to market size, a look at the regional dynamics of construction land prices is also interesting. For this purpose, the following allocation of the 71 independent cities or their respective federal states was made:

- Region North: Bremen, Hamburg, Mecklenburg-Western Pomerania, Lower Sa-

- xony, Schleswig-Holstein
- Region South: Baden-Wuerttemberg, Bavaria
- Region West: Hesse, North Rhine-Westphalia, Rhineland-Palatinate, Saarland
- Region East: Berlin, Brandenburg, Saxony, Saxony-Anhalt, Thuringia

As expected, the south confirms its reputation as the most expensive region for land ready for construction (Figure 7). In addition to the top locations of Stuttgart and Munich, Regensburg, Augsburg, Nuremberg and Karlsruhe are other high-priced and dynamic cities in terms of purchase values for land ready for construction in the south.

While at the turn of the millennium the north was still the cheapest region, this position is

now occupied by the eastern region. However, eastern German locations are catching up again, especially during the recent past. Currently, price levels in the north and east are almost the same. Increasing prices can be observed in both clusters. There are, however, specific effects to be considered. The price level in the eastern region is driven by a few cities such as Berlin, Potsdam and Jena.



Figure 7: Development of average purchase values of land ready for construction (in Euro per sqm) by region and illustration of the spread between most and least expensive region
Sources: Federal and State Statistical Offices; own calculation and illustration

The west remains at a medium level throughout the period under review. Growth was mainly the result of higher prices at some Hessian locations such as Frankfurt am Main, Offenbach am Main, Wiesbaden and Darmstadt. The Rhineland-Palatinate state capital Mainz also showed a price increase. By contrast, locations in North Rhine-Westphalia dampened the average values in the west. Outliers to the bottom are low-cost cities such as Hamm and Bochum, while Cologne, Dusseldorf, Bonn and Aachen are fairly strong locations. For a long time, the spread between the most and the least expensive region was 250 to 300 euros per square metre. For about five years, this spread has been increasing almost steadily. It currently stands at around 500 euros per square metre. A similar differentiation

has already been observed in the criterion of market size. The spread has been increasing despite the simultaneous improvement of the bottom placed eastern cluster. The analysis of the average plot sizes sold does not show a clear picture (Figure 8). Over several periods, the western cluster is showing only slight fluctuations. In the south, plots of below-average size are sold. On the other hand, the plots sold in the northern and eastern regions are, on average, sometimes significantly larger. It can be assumed that higher prices tend to lead to a search for smaller plots, while lower prices tend to lead to slightly larger plots. Nevertheless, over time, an increase in prices does not lead to smaller transactions based on plot size; on the contrary, an increase in the average plot

size sold can be observed. The background for this development cannot be deduced directly from the data available. Perhaps a more professional land development led to increasingly larger project developments. Or price developments and investment pressure have increasingly attracted institutional capital, which led to individual investments becoming larger. Nonetheless, the average plot sold is

just over 1,000 square metres in size, which seems to indicate that private buyers dominate the market.

All in all, the result of this regional analysis is that the south cluster leads by a wide margin in terms of price levels and has recently also been ahead in terms of dynamics. The eastern cluster, which has been trailing for a very long time, is showing signs of catching up.

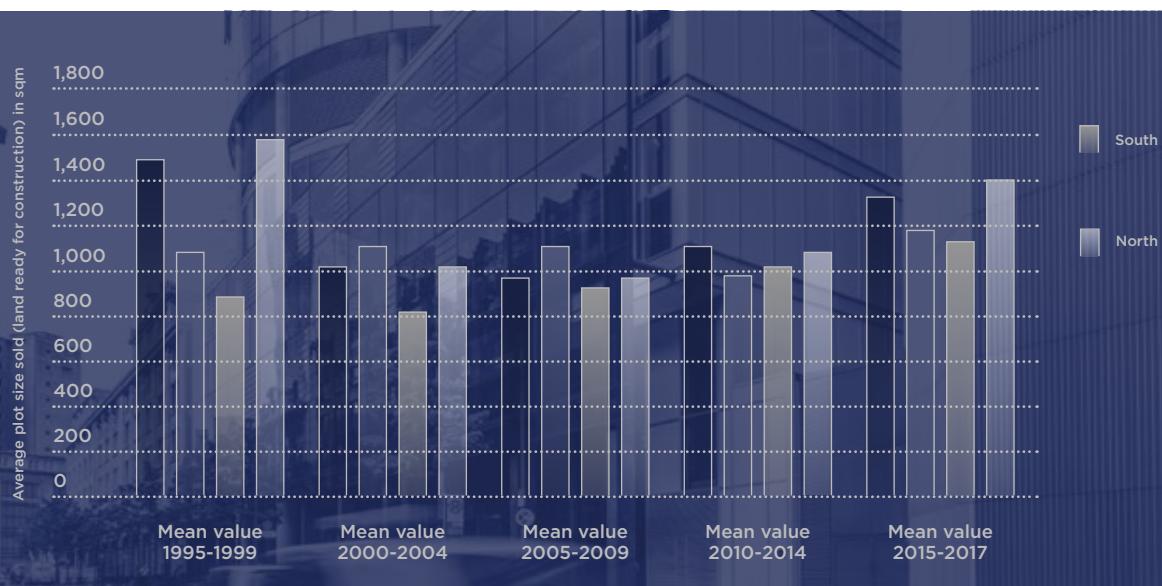


Figure 8: Development of the average plot size sold (land ready for construction) in sqm by region
Sources: Federal and State Statistical Offices; own calculation and illustration

5. Cluster analysis regarding purchasing power

The purchasing power of a region or city is another obvious socio-economic differentiating factor for locations and their price development. The 71 independent cities with a population of 100,000 or more are divided into three groups according to their purchasing power ratios (MB-Research, year 2018, federal average = 100):

- Low purchasing power: lower quartile, 25 % of cities, up to index value 91.2.
- High purchasing power: upper quartile, 25 % of cities, from index value 106.3.
- Average purchasing power: other cities (50 %), between the above index values.

For reasons of simplification, the categorization in reference to the numbers of the year 2018 remains constant, even though the ranking of cities may change over time due to changes in purchasing power. Figure 9 shows the corresponding evaluation of the purchasing power clusters. It is noticeable that there is a clear and permanent gap between the three clusters. In contrast to the other distinguishing features examined so far, there is no approximation, much less an overlapping of price trends.

Cities with high purchasing power form the most expensive cluster. As previously with the

cities with 500,000 inhabitants or more and the cities in the South cluster, there has been a sharp price increase in recent years. On the other hand, the clusters with weaker purchasing power show only a restrained price development, barely following the price development of the strong cluster. This means

that the range between the most expensive and the cheapest cluster is growing. The gap based on purchasing power differentiation, however, is more pronounced than those seen for previous differentiations. The spread currently stands at almost 600 euros per square metre.



Figure 9: Development of average purchase values of land ready for construction (in Euro per sqm) by purchasing power class and illustration of the spread between most and least expensive purchasing power class
Sources: Federal and State Statistical Offices, MB Research; own calculation and illustration

The purchasing power characteristic leads to a significant differentiation of construction land prices. This becomes particularly clear when comparing cities with high construction land prices. This includes most of the top 7 locations (except Cologne and Berlin, both with medium purchasing power). The cluster also includes, for example, the Hessian state capital Wiesbaden, the former seat of government Bonn and the car industry strongholds Ingolstadt and Wolfsburg. Cities in the lower cluster with low purchasing power and correspondingly lower construction land prices include Gelsenkirchen, Halle (Saale), Hamm and Herne.

The plot size-related analysis (Figure 10) is again not very informative, the values are very close to each other and do not show any clear correlation. For some years now, the cluster with the highest purchasing power has had the highest take-up of building area per sales

case, but this used to be different. For some time - until about 2004 - the less expensive locations were ahead in terms of average take-up. Since then, the two lower clusters have shown similar transaction sizes. In detail, some northern and western German cities such as Hamburg, Wiesbaden, Wolfsburg, Darmstadt and Dusseldorf can be identified as locations with high purchasing power and above-average take-up. The smaller town of Fuerth also belongs to this group.

As an interim conclusion of this purchasing power-related cluster analysis, it can be stated that locations with high purchasing power achieve a permanently higher price for construction land. In the medium term, price declines in economically difficult phases were much less common there than for example in the economically weakest cluster. Most recently, the cluster with the highest purchasing

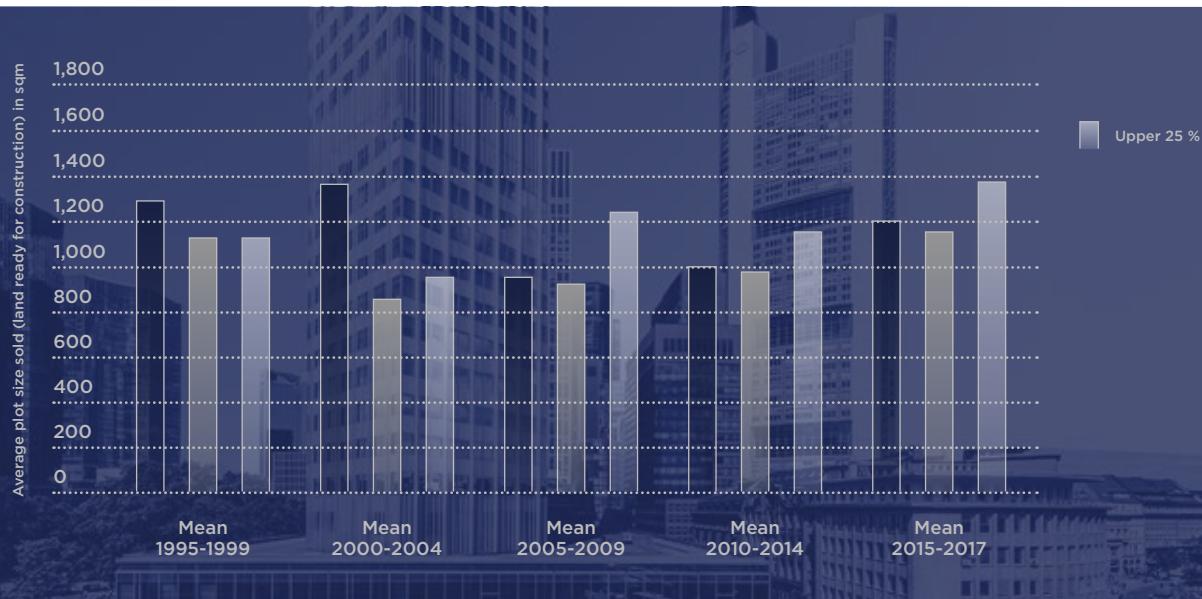


Figure 10: Development of the average plot size sold (land ready for construction) in sqm by purchasing power class
Sources: Federal and State Statistical Offices, MB Research; own calculation and illustration

power showed a dynamic price development, while other locations recorded only slight in-

creases. The spread between extreme values is currently extraordinarily high.

6. Identification of price dynamic clusters based on single parameters

Not only absolute price changes are relevant for investors, but also the relative performance compared to reference variables such as the CPI. As a measurement and criterion, the ratio of price increase (construction land) to general inflation rate (CPI) shall be shown. In this context, values below 1.0 x CPI mean that construction land prices lagged behind inflation. Values above 2.0 x CPI, on the other hand, indicate a significant price increase that cannot be explained solely by general inflation. In each cluster there are different cities that can develop in different directions. It is questionable whether a clear picture emerges within each respective cluster. Thus, a viable analysis requires clusters with an at least predominantly good performance in purchase values for land ready for construction. In order to obtain a smoothing of outlier values (particularly cheap/expensive years, fluctuations in periods with low transaction numbers),

two-year averages were calculated for each case. The starting point is therefore the price level stated for 2016 and 2017. The smoothed five-year comparison thus refers to the years 2011 and 2012. The relative price increase is differentiated accordingly for three periods - 5, 10, 20 years (Figure 11).

Over the short-term, the regional clusters east, north and south show high price dynamics. In the case of western German cities, at least two thirds show increases that exceed double the inflation. Looking at market size, cities with more than 500,000 inhabitants outperform the other classes; they consistently show increases of at least twice the general rate of inflation. Smaller cities with less than 250,000 inhabitants also perform convincingly. Approximately 86 percent of them show increases in value exceeding double the inflation. In the purchasing power comparison, all groups

show good to very good results over a period of five years. In the case of cities with medium and high purchasing power, 84 percent of the

locations achieve results of at least double the CPI development. This also applies to 13 of the 18 cities with lower purchasing power.

CLUSTER		INCREASE IN PURCHASE VALUES								
		LAST 5 YEARS			LAST 10 YEARS			LAST 20 YEARS		
		No. of cities > 2.0 CPI	No. of cities 1.0-2.0 CPI	No. of cities < 1.0 CPI	No. of cities > 2.0 CPI	No. of cities 1.0-2.0 CPI	No. of cities < 1.0 CPI	No. of cities > 2.0 CPI	No. of cities 1.0-2.0 CPI	No. of cities < 1.0 CPI
REGION	East	10	0	0	9	0	1	3	1	5
	West	22	1	10	12	1	16	6	9	13
	South	12	0	1	12	2	0	7	2	3
	North	11	0	1	8	2	1	8	0	1
RESIDENTS	From 500k	14	0	0	9	2	2	5	2	3
	From 250k up to 499k	4	0	7	5	0	7	4	1	7
	Up to 249k	37	1	5	27	3	9	15	9	12
PURCHASING POWER	Lower 25 %	13	0	5	11	1	6	4	2	10
	Average 50 %	26	1	4	13	3	11	10	6	9
	Upper 25 %	16	0	3	17	1	1	10	4	3

Figure 11: Overview of the cluster results - comparison of the development of construction land prices with the rise in the consumer price index, different time periods

Sources: Federal and State Statistical Offices, MB Research; own calculation and illustration

Going further back in time, the regional underdevelopment of the west cluster becomes more and more visible. Within the ten-year period, less than half of the analysed western cities achieve a value increase of at least the CPI. In the long term (20 years), as well, only 15 out of 28 cities have seen their construction land prices rise at least in the range of general inflation. All other regions appear much more positive, with the north in particular showing good long-term values. The eastern region tends to look better in more recent periods, suggesting catch-up effects.

Looking at the criterion of the market size, the outstanding position of cities with more than 500,000 inhabitants decreases for longer observation periods. While over a period of ten years 69 percent of the cities still show an extraordinary price increase of at least twice the inflation rate, over 20 years only 50 percent of the cities show such an increase. Medium-sized cities, on the other hand, show the worst performance of the three clusters over all periods under consideration, with the majority of construction land price developments below the CPI increase.

Going by the purchasing power criterion, the locations with the highest purchasing power dominate in the medium and long term, as expected. In the long-term perspective of 20 years, more than 80 percent are at or above the increase in the CPI, just under 59 percent even above the threshold of $2.0 \times \text{CPI}$. More

surprisingly, in the medium term, poorer locations outperform cities with medium purchasing power. This is reversed in the long-term perspective: Only 37 percent of cities with weak purchasing power still show price increases at or above the inflation level.

Market size is a clear factor across all periods

For all periods, only the criterion market size provides a clear recommendation. Cities with more than 500,000 inhabitants occupy the top position in every period. On the other hand, cities with 250,000 to 500,000 inhabitants deliver the worst results. In each period, more than half of the increase in value was below the CPI. From a regional perspective, mostly cities in northern and southern Germany appear attractive, as does the strongest cluster in terms of purchasing power. It should always be noted, however, that each cluster also contains outlier cities that perform significantly better or worse than their parent group. However, the respective cluster can aid a pre-selection.

The cluster parameters can be combined to filter out high-yield locations for investments in land or construction land. Based on the individual results discussed above, cities with the following characteristics appear attractive:

- Belonging to the northern region,
- Classification as large market, i.e. loca-



tions with more than 500,000 inhabitants,

- Belonging to the top 25 % regarding purchasing power.

In this study, all three criteria apply only to Hamburg. Hanover and Bremen meet at least the regional and population-specific criteria, but they are among the cities with only medium purchasing power.

The weakest cluster combination according to the proportion of cities with lower value growth includes cities with these characteristics:

- Belonging to the western region,
- Classification as medium-sized, that is, locations with 250,000 to 500,000 inhabitants,

- Belonging to the lower 25 % regarding purchasing power.

Duisburg and Gelsenkirchen are the only two cities that adhere to this pattern.

The identified ideal types do not necessarily force us to see Hamburg as the only investment target in the future and to completely avoid Duisburg and Gelsenkirchen. In other clusters, too, there are high-growth individual cities or outliers in a negative respect. Furthermore, individual parameters can also overlap or balance each other out, so that the ideal types cannot be derived directly from the individual results. It should also be borne in mind that this analysis is based solely on a consideration of the past.



7. Identification of price dynamic clusters based on parameter combinations

Testing all conceivable combinations over all time periods, the following results can be seen (Figure 12):

CLUSTER		INCREASE IN PURCHASE VALUES								
		LAST 5 YEARS			LAST 10 YEARS			LAST 20 YEARS		
		No. of cities > 2.0 CPI	No. of cities 1.0-2.0 CPI	No. of cities < 1.0 CPI	No. of cities > 2.0 CPI	No. of cities 1.0-2.0 CPI	No. of cities < 1.0 CPI	No. of cities > 2.0 CPI	No. of cities 1.0-2.0 CPI	No. of cities < 1.0 CPI
REGION & PURCHASING POWER	East & lower	7	0	0	7	0	0	2	0	5
	East & average	3	0	0	2	0	1	1	1	0
	West & lower	3	0	4	1	0	6	0	2	4
	West & average	13	1	4	4	1	9	2	4	8
	West & upper	6	0	2	7	0	1	4	3	1
	South & average	5	0	0	5	1	0	3	1	1
	South & upper	7	0	1	7	1	0	4	1	2
	North & lower	3	0	1	3	1	0	2	0	1
	North & average	5	0	0	2	1	1	4	0	0
	North & upper	3	0	0	3	0	0	2	0	0
RESIDENTS & PURCHASING POWER	From 500k & lower	1	0	0	1	0	0	0	0	1
	From 500k & average	8	0	0	3	2	2	3	1	2
	From 500k & upper	5	0	0	5	0	0	2	1	0
	From 250k up to 499k & lower	0	0	2	0	0	2	0	0	2
	From 250k up to 499k & average	2	0	3	2	0	4	2	0	4
	From 250k up to 499k & upper	2	0	2	3	0	1	2	1	1
	Up to 249k & lower	12	0	3	10	1	4	4	2	7
	Up to 249k & average	16	1	1	8	1	5	5	5	3
	Up to 249k & upper	9	0	1	9	1	0	6	2	2

REGION & RESIDENTS	East & up to 249k	7	0	0	7	0	0	2	1	4
East & from 250k up to 499k	0	0	0	0	0	0	0	0	0	0
East & from 500k	3	0	0	2	0	1	1	0	1	
West & up to 249k	15	1	3	7	0	8	4	6	4	
West & from 250k up to 499k	2	0	7	2	0	7	1	1	7	
West & from 500k	5	0	0	3	1	1	1	2	2	
North & up to 249k	7	0	1	6	1	1	6	0	1	
North & from 250k up to 499k	1	0	0	1	0	0	1	0	0	
North & from 500k	3	0	0	1	1	0	1	0	0	
South & from 249k	8	0	1	7	2	0	3	2	3	
South & from 250k up to 499k	1	0	0	2	0	0	2	0	0	
South & from 500k	3	0	0	3	0	0	2	0	0	

Figure 12: Overview of the cluster results (combined) - comparison of the development of construction land prices with the rise in the consumer price index, different time periods
Sources: Federal and State Statistical Offices, MB Research; own calculation and illustration

Especially cities with the following characteristics show above-average short-term performance ($> 2.0 \times \text{CPI}$):

- Eastern cities with low purchasing power (possibly catch-up effects),
- Western, southern and northern cities with at least medium purchasing power,
- Large cities relatively independent of purchasing power.

If the analysis is extended to a period of ten years, the southern German cities again show above-average results. This also applies to western cities with higher purchasing power. Over a period of 20 years, the results are no longer so clear; cities in the north still tend to stand out due to higher growth rates. Individual analyses of the cities contained in the respective clusters are important here.

8. Identification of cities with dynamic prices using a performance matrix

Starting from the identification of successful clusters, an analysis of the individual locations can follow. The matrices in Figures 13 to 15 illustrate the individual performance of the cities surveyed by correlating the differentiation criteria of market size, purchasing power and region. Separate illustrations show

the short, medium and long-term perspectives, respectively. Regional affiliations are highlighted in color (East = soft-blue, West = white, North = dark-blue, South = red). To indicate performance, the relative price increase in relation to the CPI is represented by the size of quadrats. The axes show the criteria

purchasing power and market size (number of inhabitants).

Change in purchase value over five years

In the short-term illustration (Figure 13), the eastern and southern German cities with their significant increase in construction land prices are particularly noticeable. Many of these cities have a population of up to 250,000. While northern German locations also tend to show a solid performance, the majority of western German cities are falling behind in

comparison (small to very small quadrats). The most conspicuous locations (large quadrats) are Regensburg in southern Germany and Jena and Erfurt from the eastern cluster, which overlap with many other cities in their purchasing power and population size. In the west it is Mainz and in the north Hamburg, Hanover and Wolfsburg that stand out positively. Gelsenkirchen and Monchengladbach, on the other hand, are barely visible as the worst locations. The purchase value development there was actually negative.



Figure 13: Change in purchase value of land ready for construction in relation to CPI increase in five-year view until 2017 – performance presented in a matrix (classification by population, purchasing power, performance, region), cities with 100,000 inhabitants or more (n=68)

Sources: Federal and State Statistical Offices, MB Research; own calculation and illustration

Change in purchase value over ten years

The ten-year price trend (Figure 14) once again shows the below-average performance of many western German locations. At the same time, however, the strongest increase was also recorded in one western location:

Dusseldorf outperformed all other cities with a price increase of more than 350 percent. The cities in the south and north hardly stand out any more, they are outperformed by some very strong locations in the eastern cluster. Jena and Leipzig show an increase of 199 and 179 percent, respectively.



Figure 14: Change in purchase value of land ready for construction in relation to CPI increase in ten-year view until 2017 - performance presented in a matrix (classification by population, purchasing power, performance, region), cities with 100,000 inhabitants or more (n=64)

Sources: Federal and State Statistical Offices, MB Research; own calculation and illustration

Change in purchase value over 20 years

The illustration of the long-term development over 20 years (Figure 15) appears relatively homogeneous. Numerous cities seem to have similar long-term performance. Nevertheless, there is a clearly visible spread. It ranges from the prime location with a price development of 14.3 times the general inflation rate (CPI) to the worst location with the factor -0.9 - a spread of no less than 15.2. In the medium

term, however, this spread is still higher at 28.5 and in the short term even reaches 45.1. However, in the illustration, some cities with strongly above-average purchase value growth are still standing out even over 20 years. These include Dusseldorf, Jena, Regensburg, Karlsruhe and Wolfsburg. Most western German cities again appear below average, although the differences are smaller than in the short and medium term.



Figure 15: Change in purchase value of land ready for construction in relation to CPI increase in 20-year view up to 2017 - performance presented in a matrix (by population, purchasing power, performance, region), cities with more than 100,000 inhabitants (n=58)
Sources: Federal and State Statistical Offices, MB Research; own calculation and illustration

9. Identification of cities with dynamic prices by means of rankings

A ranking of cities by price level and relative price increases to the CPI over 5, 10 and 20 years is shown in the table below (Figure

16). Some cities were not included in the longer-term rankings due to data gaps.

RANK	CITY	PUR-CHASING VALUE Ø 16-17 (Euro per sqm)	CITY	change 5 years	Cmp. to CPI (x-times)	CITY	change 10 years	Cmp. to CPI (x-times)	CITY	change 20 years	Cmp. to CPI (x-times)
1	Munich	2,418.79	Regensb.	189.5 %	37.2	Dusseldorf	354.9 %	25.3	Dusseldorf	450.3 %	14.3
2	Dusseldorf	1,391.78	Erfurt	183.0 %	35.9	Jena	199.5 %	14.2	Regensb.	356.2 %	11.3
3	Stuttgart	1,241.97	Jena	160.2 %	31.5	Leipzig	179.2 %	12.8	Jena	281.1 %	8.9
4	Regensb.	835.30	Mainz	148.0 %	29.1	Regensb.	165.7 %	11.8	Karlsruhe	242.5 %	7.7
5	Frankf. a. M.	811.40	Augsburg	118.7 %	23.3	Erfurt	145.0 %	10.3	Wolfsburg	208.2 %	6.6
6	Mainz	805.36	Leipzig	113.2 %	22.2	Munich	140.0 %	10.0	Oldenburg	194.9 %	6.2
7	Darmstadt	784.11	Ingolstadt	113.0 %	22.2	Mainz	131.7 %	9.4	Erfurt	156.7 %	5.0
8	Nuremberg	756.85	Nuremberg	104.6 %	20.6	Nuremberg	122.5 %	8.7	Trier	132.8 %	4.2
9	Hamburg	725.09	Darmstadt	102.7 %	20.2	Augsburg	120.9 %	8.6	Nuremberg	116.9 %	3.7
10	Wiesbaden	710.75	Berlin	99.1 %	19.5	Potsdam	109.0 %	7.8	Braunschw.	116.0 %	3.7
11	Berlin	679.16	Kiel	92.4 %	18.1	Frankf. a. M.	107.2 %	7.6	Augsburg	116.0 %	3.7
12	Augsburg	661.66	Wolfsburg	88.3 %	17.3	Oldenburg	100.6 %	7.2	Lubeck	94.8 %	3.0
13	Ingolstadt	549.80	Munich	86.1 %	16.9	Kiel	93.2 %	6.6	Ingolstadt	94.2 %	3.0
14	Erlangen	525.60	Hanover	85.4 %	16.8	Wolfsburg	92.3 %	6.6	Berlin	93.6 %	3.0
15	Offenb. a. M.	504.56	Dusseldorf	74.7 %	14.7	Erlangen	92.1 %	6.6	Bremen	91.0 %	2.9
16	Cologne	469.64	Oldenburg	70.3 %	13.8	Berlin	90.5 %	6.4	Kiel	89.4 %	2.8
17	Karlsruhe	457.22	Erlangen	69.7 %	13.7	Kassel	90.4 %	6.4	Salzgitter	87.9 %	2.8
18	Wurzburg	452.34	Braunschw.	68.8 %	13.5	Mulh. a.d.R.	90.2 %	6.4	Aachen	84.2 %	2.7
19	Freib. i. B.	431.39	Halle S.	63.4 %	12.4	Ingolstadt	85.1 %	6.1	Osnabrück	80.5 %	2.6
20	Ludwigsh.	387.93	Potsdam	61.4 %	12.1	Cologne	78.1 %	5.6	Darmstadt	79.2 %	2.5
21	Heilbronn	387.79	Aachen	60.4 %	11.9	Wiesbaden	67.7 %	4.8	Bonn	76.4 %	2.4
22	Hanover	377.34	Kassel	54.6 %	10.7	Ludwigsh.	65.4 %	4.7	Stuttgart	75.0 %	2.4
23	Bonn	360.77	Bottrop	53.5 %	10.5	Stuttgart	64.7 %	4.6	Erlangen	71.7 %	2.3
24	Furth	331.83	Cottbus	53.4 %	10.5	Wurzburg	63.3 %	4.5	Mainz	64.7 %	2.1
25	Essen	316.97	Dresden	52.6 %	10.3	Heilbronn	62.0 %	4.4	Wurzburg	59.8 %	1.9
26	Pforzheim	311.16	Offenb. a.M.	52.4 %	10.3	Cottbus	60.6 %	4.3	Ludwigsh.	57.7 %	1.8
27	Jena	309.00	Pforzheim	51.8 %	10.2	Trier	56.8 %	4.0	Cologne	57.5 %	1.8
28	Trier	304.20	Wurzburg	50.2 %	9.9	Chemnitz	54.1 %	3.9	Bottrop	57.3 %	1.8
29	Mulh. a.d.R.	302.90	Saarbrucken	48.1 %	9.4	Darmstadt	53.9 %	3.8	Frankf. a. M.	43.6 %	1.4
30	Potsdam	301.68	Bielefeld	47.4 %	9.3	Offenb. a.M.	51.9 %	3.7	Hamm	43.2 %	1.4
31	Aachen	290.32	Frankf. a. M.	45.7 %	9.0	Hamburg	50.9 %	3.6	Wiesbaden	41.2 %	1.3
32	Oldenburg	274.75	Hamburg	43.6 %	8.6	Lubeck	47.6 %	3.4	Heilbronn	39.9 %	1.3

33	Leverk.	274.39	Trier	40.8 %	8.0	Magdeb.	44.3 %	3.2	Mulh. a.d.R.	39.5 %	1.3
35	Kiel	273.65	Heilbronn	39.0 %	7.7	Pforzheim	42.5 %	3.0	Solingen	38.7 %	1.2
35	Koblenz	246.83	Ludwigsh.	37.1 %	7.3	Braunschw.	41.4 %	2.9	Oberhausen	36.2 %	1.1
36	Ulm	243.16	Chemnitz	35.6 %	7.0	Karlsruhe	38.8 %	2.8	Potsdam	32.7 %	1.0
37	Dortmund	242.34	Wiesbaden	34.1 %	6.7	Rostock	38.8 %	2.8	Koblenz	31.3 %	1.0
38	Solingen	241.77	Stuttgart	33.5 %	6.6	Furth	38.3 %	2.7	Furth	28.0 %	0.9
39	Leipzig	239.70	Osnabrück	31.5 %	6.2	Bremerh.	36.4 %	2.6	Bielefeld	25.1 %	0.8
40	Münster	232.73	Lübeck	31.4 %	6.2	Bonn	34.5 %	2.5	Pforzheim	22.5 %	0.7
41	Duisburg	228.83	Furth	28.7 %	5.6	Halle S.	33.0 %	2.3	Essen	19.9 %	0.6
42	Bottrop	226.97	Bremerh.	27.9 %	5.5	Ulm	27.4 %	1.9	Duisburg	19.6 %	0.6
43	Braunschw.	221.74	Hagen	27.8 %	5.5	Bremen	25.4 %	1.8	Gelsenk.	18.4 %	0.6
44	Dresden	218.48	Cologne	27.6 %	5.4	Freib. i. B.	20.2 %	1.4	Halle S.	14.5 %	0.5
45	Kassel	208.88	Salzgitter	25.3 %	5.0	Salzgitter	19.7 %	1.4	Hagen	14.2 %	0.5
46	Bremen	208.00	Bremen	22.3 %	4.4	Dortmund	17.0 %	1.2	Ulm	12.2 %	0.4
47	Osnabrück	203.48	Dortmund	21.7 %	4.3	Oberhausen	11.5 %	0.8	Rostock	9.0 %	0.3
48	Wolfsburg	196.04	Hamm	19.9 %	3.9	Dresden	10.9 %	0.8	Münster	6.9 %	0.2
49	Oberhausen	193.10	Magdeb.	19.4 %	3.8	Osnabrück	10.9 %	0.8	Herne	5.2 %	0.2
50	Krefeld	192.81	Essen	18.8 %	3.7	Hamm	10.2 %	0.7	Dortmund	-4.9 %	-0.2
51	Hagen	191.47	Freib. i. B.	16.8 %	3.3	Duisburg	9.6 %	0.7	Cottbus	-10.1 %	-0.3
52	Bielefeld	185.27	Solingen	16.7 %	3.3	Essen	5.2 %	0.4	Remsch.	-10.2 %	-0.3
53	Erfurt	182.85	Mulh. a.d.R.	14.5 %	2.8	Hagen	4.9 %	0.3	Wuppertal	-10.3 %	-0.3
54	Lübeck	177.24	Leverk.	14.4 %	2.8	Bielefeld	-8.3 %	-0.6	Leipzig	-13.8 %	-0.4
55	Wuppertal	172.17	Koblenz	11.8 %	2.3	Solingen	-9.0 %	-0.6	Magdeb.	-15.8 %	-0.5
56	Remsch.	163.75	Remsch.	8.7 %	1.7	Remsch.	-10.5 %	-0.7	Bochum	-24.2 %	-0.8
57	Bochum	147.01	Bonn	3.9 %	0.8	Gelsenk.	-14.8 %	-1.1	Chemnitz	-27.9 %	-0.9
58	Saarbrücken	141.72	Münster	2.1 %	0.4	Bottrop	-15.8 %	-1.1	Moncheng.	-29.6 %	-0.9
59	Gelsenk.	131.69	Wuppertal	-0.7 %	-0.1	Münster	-22.5 %	-1.6	Hamburg	-	-
60	Hamm	122.57	Ulm	-3.9 %	-0.8	Wuppertal	-23.7 %	-1.7	Munich	-	-
61	Moncheng.	118.37	Oberhausen	-6.7 %	-1.3	Krefeld	-26.1 %	-1.9	Hanover	-	-
62	Halle S.	115.81	Rostock	-9.1 %	-1.8	Bochum	-30.4 %	-2.2	Mannheim	-	-
63	Herne	113.54	Krefeld	-10.2 %	-2.0	Herne	-31.5 %	-2.2	Freib. i. B.	-	-
64	Salzgitter	99.14	Duisburg	-12.2 %	-2.4	Moncheng.	-45.2 %	-3.2	Krefeld	-	-
65	Bremerh.	93.00	Herne	-12.9 %	-2.5	Hanover	-	-	Kassel	-	-
66	Magdeb.	92.40	Bochum	-14.7 %	-2.9	Mannheim	-	-	Saarbrücken	-	-
67	Rostock	91.22	Gelsenk.	-27.4 %	-5.4	Aachen	-	-	Leverk.	-	-
68	Cottbus	78.34	Moncheng.	-40.1 %	-7.9	Saarbrücken	-	-	Heidelb.	-	-
69	Chemnitz	69.28	Karlsruhe	-	-	Leverk.	-	-	Offenb. a.M.	-	-
70	Mannheim	-	Mannheim	-	-	Heidelb.	-	-	Bremerh.	-	-
71	Heidelb.	-	Heidelb.	-	-	Koblenz	-	-	Dresden	-	-

Figure 16: Average purchase values of land ready for construction (in Euro per sqm) - illustration of level, development and performance comparison with consumer price index (CPI)

Sources: Federal and State Statistical Offices; own calculation and illustration

The current price level for land ready for construction shows a wide range. Munich, the most expensive location, has a lead of more than 1,000 euros per square metre or almost 75 percent over Dusseldorf, which came second. Compared to Chemnitz, the least pricey location, the Bavarian state capital is 35 times more expensive. In addition to Munich and Dusseldorf, cities from the German top 7 that rank among the ten most expensive cities include Stuttgart, Frankfurt am Main and Hamburg. The capital Berlin ranks 11th, Cologne 16th. In addition to the expected high ranking of the top 7 locations, Regensburg, Mainz, Darmstadt, Nuremberg and Wiesbaden are among the most expensive cities. Locations from former East Germany are at the bottom of the list. Average prices of less than 100 euros per square metre are also found in Salzgitter and Bremerhaven. Extreme differences in price development exist especially in the short and medium term. Performance ranges from +37.2 to -7.9 times the CPI development (5 years) and from +25.3 to -3.2 times the CPI development (10 years). Among the individual cities, Regensburg consistently ranks well, among the top four, not least due to the enormous price increase of

almost 190 percent over the past 5 years. Dusseldorf, which only occupies the 15th place in the short term, leads the rankings for the 10 and 20 year periods. Here, price growth was able to exceed inflation by 25 and 14 times, respectively. The Thuringian cities of Erfurt and Jena are also consistently among the most dynamic locations. Leipzig, too, is interesting in the eastern cluster. The Saxon metropolis shows a relatively poor development in the 20-year perspective, which is due to a downward trend around the middle/end of the 1990s. In the short term (5 years), on the other hand, Leipzig is far ahead. Among the currently very expensive locations, Stuttgart stands out with comparatively moderate growth, which suggests an already high starting level. The same applies to the banking metropolis of Frankfurt. As a negative example, Monchengladbach in particular stands out. It shows the worst results over all time periods within the framework of this study. Investments in construction land in Monchengladbach were not able to compensate even approximately for the general rate of inflation in the long, medium and short term. Bochum and Wuppertal also exhibit negative purchase value developments in all three periods.



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10. Prioritization of markets and further research

Nationwide, the quantities and structures of construction land change only slowly. Nevertheless, certain markets are developing dynamically. For some years now, construction land prices have regularly been rising faster than general inflation (CPI). Differences exist both over time and between regions, clusters and cities.

Differentiation according to market size, region and purchasing power provides insights into the value drivers. Very large, southern German cities with high purchasing power often have a significantly higher price level for construction land. Conversely, prices in eastern German locations with weak purchasing power are low. In terms of price development, northern and southern German locations are in the lead. Due to base effects and catching-up tendencies, several eastern German cities have also recently made significant gains. Large cities with more than half a million inhabitants proved to be reliable investment locations. The increase in value more than compensated for inflation, relatively independent of purchasing power. A particularly risky class were the medium-sized cities, which often performed below inflation.

When looking at individual cities, Düsseldorf, Regensburg, Erfurt, Jena, Leipzig, Mainz, Augsburg and Nuremberg, among others, stood out positively. At the other end of the range were Monchengladbach, Bochum and Wuppertal, which even showed decreases in value despite a good market environment.

Two findings are crucial for the selection of potentially successful markets. On the one hand, construction land prices follow socio-economic indicators such as population and purchasing power. The rates of change are the most important factor here, driven by e.g. newly established companies and the growth of large cities. On the other hand, catch-up and arbitrage effects must be taken into account, especially in the short term. This can be seen in smaller and eastern German cities in particular, i.e. outside the top 7.

An individual case study remains important for any investment decision, as there are different characteristics and developments of specific cities within a cluster. Accordingly, market research must be conducted on a multi-level and parameter-oriented basis in order to identify opportunities and risks at an early stage.



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As of February 2019
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