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Liquidity Effects of a Wealth Tax on Residential Rental Real Estate

Abstract

This article examines the liquidity effects of a wealth tax on residential rental real estate. Using data from a real estate corporation, we simulate the effects of a wealth tax on cash flows from the rental operations. The level of detail of the data enables us to conduct analyses at the annual, regional and year of construction level. A comparison with real estate data from other sources supports external validity. The results of the simulation show that the introduction of a wealth tax can significantly reduce the cash flow from rental operations and lead to liquidity problems. On average over all observations, a wealth tax rate of 2% leads to a negative cash flow after all costs. In general, this finding implies that growth-oriented real estate is more affected by a wealth tax in terms of liquidity than rental yield-oriented real estate. Particularly in large cities with high market values but relatively low rents, the liquidity effects can be more than three times as high as in rural or industrial regions – potentially leading to a relative loss of investment attractiveness. As a wealth tax is decoupled from rental income, the tax burden is very sensitive to market developments, including the interest rate environment. As a result, investments in residential rental real estate are exposed to additional uncertainty. This additional tax uncertainty might impair the willingness to invest and should therefore be taken into account in political discussions on the reintroduction of a wealth tax.

Keywords: Wealth tax, Liquidity effects, Residential rental real estate
JEL Codes: H22, H23, H24, R31

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1 Introduction

At the center of many public debates about current societal challenges are calls for more affordable housing on the one hand and the (re)introduction of a wealth tax on the other. Both are intended to reduce inequality. In order to assess the potential effects of a wealth tax on the residential real estate market, it is important to understand the liquidity effects of a wealth tax on residential properties. Liquidity effects are particularly significant in this segment because private real estate owners are often liquidity-constrained, and the cash flow from their property is particularly important, for example, as a means of retirement provision or to finance major renovation projects.

For this reason, we analyze the effects of a wealth tax on rental yields and operating cash flows from residential rental real estate. We simulate an individual who has invested in residential real estate to examine how a wealth tax (in addition to the income tax burden) reduces rental yields and cash flows and for which types of real estate investments the liquidity effect of the wealth tax is particularly pronounced. To this end, we conduct a comprehensive simulation study based on data provided by a German real estate corporation.

Our analysis contributes to a more evidence-based discussion on the potential (re-)introduction of a wealth tax and its possible implications for real estate investments. By focusing on residential properties, we provide valuable insights into a sector of particular importance due to tight housing markets.

Although many countries have abolished wealth taxes in the past (Drometer et al., 2018; Scheuer and Slemrod, 2021), the (re)introduction of such a tax has been regularly advocated for in political and academic debates in recent years (e.g., Piketty, 2014; OECD, 2018; Saez and Zucman, 2019; IMF, 2020; Klemm et al., 2021). This applies to Germany, but also to many other countries. For example, in July 2023, the EU Commission registered a citizens' initiative to implement a European wealth tax (European Commission, 2023). The main argument in favor of a wealth tax is typically the rising level of inequality and, in particular, the increasing concentration of wealth (OECD, 2018; Saez and Zucman, 2019). However, it appears that the economic burden and consequences of a wealth tax are often not fully considered and can be subject to considerable misperceptions. For example, Chirvi et al. (2022) document a substantial underestimation of the financial burden associated with an annual wealth tax.

Since a wealth tax is levied on the stock of wealth rather than on the income generated by it, the resulting tax burden can be substantial relative to profits and cash flows. In times of financial distress, this can lead to significant strain, potentially even

to the depletion of parts of the wealth base and thus to disinvestment (Maiterth and Sureth-Sloane, 2021). Simulation studies show that introducing a wealth tax is likely to have considerable first- and second-round effects (Hoppe et al., 2016; Fuest et al., 2017). In this regard, Fuest et al. (2017) demonstrate that behavioral adjustments by firms and private households are to be expected, which reduce the revenue from other taxes to such an extent that the overall revenue effect is negative.[1]

In the context of introducing a wealth tax, prior research has discussed the issue of asset valuation, particularly with respect to business assets and real estate (e.g., Maiterth and Houben, 2012; Fuest et al., 2017; Maiterth and Sureth-Sloane, 2021; Anderwald, 2023). For example, Maiterth and Lutz (2019) show that, with regard to the property tax reform, for different valuation methods applied to properties, the assessed tax values deviate substantially from market values.[2] In this study, we abstract from valuation problems for two reasons. First, the specific design of a valuation method for wealth taxation is currently unknown. Second, we are unable to simulate such tax values because we do not have access to detailed property-level data. Therefore, we assume that the market values available to us correspond to the tax values.

Although real estate has received relatively little attention in the debate on wealth taxation thus far, it represents a particularly important asset class. Real estate wealth plays a central role in the asset portfolios of German households (Albers et al., 2022). On average, real estate accounted for around two-thirds of total household wealth in 2021 (Bundesbank, 2023).[3] Real estate also constitutes an important pillar of private retirement provision. In addition, the real estate industry contributes substantially to overall economic value creation. In 2022, the real estate and housing sector accounted for approximately 9.8% of Germany's gross value added (Federal Statistical Office of Germany, 2023). It is therefore all the more surprising that wealth tax implications for this industry have so far received little attention. With this study, we aim to close this gap.

[1] In addition, their model suggests a long-term decline in GDP.

[2] The variation coefficient of the tax-to-market-value ratio consistently exceeds 30% and is in some cases considerably higher, indicating a substantial divergence between tax and market values (see Maiterth and Lutz, 2019). In addition, Bräutigam (2021) illustrates, in the context of the property tax reform, how strongly future property tax burdens may vary across federal states due to differences in valuation models. Regarding business assets, Müller and Sureth (2011) show that even valuation methods introduced after the 2008 inheritance tax reform, such as the simplified income capitalization method, fail to ensure a sufficiently market-oriented valuation.

[3] However, it should be noted that this share varies considerably across the quantiles of the net wealth distribution. Moreover, substantial discrepancies exist between the mean and the median (see also Fuest et al., 2021).

Especially in times of low interest rates, which are typically associated with high property values, a wealth tax can have significant economic consequences in the real estate market, especially for liquidity-constrained owners. The risk of extremely low or even negative cash flows resulting from a wealth tax is particularly pronounced when market values increase more rapidly than rental income. Such a development has been observed in Berlin over the last decade, for example. While property prices have risen by almost 150%, asking rents have grown by only about 60% (Investitionsbank Berlin, 2023).[4] Under such conditions, it would become increasingly difficult to cover the wealth tax liability with rental income, which can lead to liquidity shortages. To better understand and assess the economic relevance of such situations, we analyze the financial effects of a wealth tax in the real estate industry, also examining how the simulated tax effects change over time.

The dataset provided to us by a real estate corporation (hereinafter "our dataset") contains residential properties located in Germany. It includes, among other variables, the (aggregated) market values of this property stock, rents, rent multipliers, as well as administrative and maintenance costs for the years 2013 to 2020. In addition, the property stock can be grouped by year of construction and region. Residential properties account for more than 97% of the total area in our dataset. The majority of these are apartment buildings rented out for residential purposes. The corporation operates in numerous regions of Germany and has more than 100,000 residential units nationwide.

In a first step, we examine how market values and rents—these are the contractually agreed monthly rents excluding tenants' payments for operating and heating costs—have developed in our dataset during the observation period. We find that market values have risen substantially more than the corresponding rents. Accordingly, the rental yield, that is, the ratio of the rent generated to the market value of a property, has fallen continuously. While this trend is observable for all regions in our dataset, there are regional differences. In major cities such as Berlin and Munich, the increase in market values compared to rents is far more pronounced than in more rural regions, such as Westphalia.

In order to assess whether the developments observed in our dataset are generalizable and representative of the German housing market, we draw on other real estate data. To map the German housing market, we use data from the corporation bulwiengesa

[4] Both figures refer to existing properties.

AG,[5] which is frequently used in research (e.g., Kholodilin et al., 2014; Baldenius et al., 2020). This data is also used by the Bundesbank as the basis for its residential property price index (see Bundesbank, 2024a). The ratio of property prices to rents, and thus the rent multipliers, in our data have developed almost identically to the bulwiengesa data.[6] The age structure of the residential property stock in our dataset shows certain differences compared with the German housing market, but these do not affect the validity of our results. Overall, our database can be considered as very suitable for answering the underlying research question.

In the second step, we use the data provided to us to simulate the tax effects on the rental yield and the corresponding cash flow (which also includes non-recoverable costs)[7] that a private individual generates from an investment in residential real estate. For the purposes of our analysis, we draw on wealth tax rates that various political parties have brought into the public debate in Germany in recent years: 1%, 2% and 5% (see Maiterth and Sureth-Sloane, 2021). As a wealth tax rate of 5% is unlikely to be politically feasible, we present the simulation results for such a tax rate, but do not discuss them in detail.

We find that rental yields and cash flows fall considerably as a result of the income tax and wealth tax burden. Even with a wealth tax rate of 1%, the average rental yield (weighted average)[8] falls from just under 4% to around 1% after taxes in 2020. A wealth tax rate of 2% often results in negative after-tax rental yields. If the non-recoverable costs, such as administrative and maintenance costs, are included, there is often no substantial cash flow left even with a 1% wealth tax rate, and with a 2% wealth tax rate the cash flow is negative in many cases.

Our further analyses of regional and temporal differences show, for example, that the wealth tax burden in relation to pre-tax cash flow is more than three times higher in Munich than in the northern Ruhr area. As a result, the remaining cash flow in Munich is lower than in the northern Ruhr area despite considerably higher rents. Over time,

[5] bulwiengesa AG's activities include market analysis in the real estate industry. To collect its data on property prices and rents, bulwiengesa AG uses various sources, e.g., real estate agents, expert committees and price indices, see bulwiengesa AG (ndb). For the quality of the data, see Bundesbank (2020) and for criticism of bulwiengesa AG's methodology, see Klick and Schaffner (2019). In the remainder of this study, the term "German housing market" refers to the data from bulwiengesa AG.

[6] Rent multipliers are often used to determine the market value of a property. By multiplying the annual achievable rent (excluding operating and similar costs and taxes) with the respective rent multiplier, an indication of the market value of the property in question is obtained.

[7] Cash flow = Rent − Non-recoverable costs − Taxes.

[8] Unless otherwise stated, average refers to the weighted average in this study.

the relative burden of a wealth tax increases much more in large cities than in more rural or industrialized regions.

Our results illustrate that the introduction of a wealth tax can lead to a preference for rental yield-oriented over value growth-oriented real estate due to the tax liquidity effects. At a regional level, this means that properties in more rural and industrial regions, which generally has relatively higher rental yields, becomes more attractive compared to properties in large cities, which is typically characterized by relatively lower rental yields with higher expected increases in value. This particularly applies to investors with limited liquidity, as is often the case in the private real estate market. However, it is also conceivable that such investors will switch to other forms of investment, such as equity or investment funds, which have fewer liquidity restrictions. Although other forms of investment, such as shares in reinvesting firms or bonds, can also yield negative cash flows due to a wealth tax, these can—unlike real estate—be (partially) liquidated relatively more easily through (partial) sale.

It is also apparent that the liquidity effects of a wealth tax fluctuate considerably due to the different and changing ratios of market values to rents over time and are therefore difficult for investors to plan. As studies show that tax uncertainty can generally have a considerable negative impact on the willingness to invest (e.g., Edmiston et al., 2003; Niemann, 2004, 2011; Boylan and Frischmann, 2006; Fox et al., 2022; Osswald and Sureth-Sloane, 2024), this aspect must also be taken into account when assessing the effects of a wealth tax.

Our analyses only include first-round effects, that is, behavioral adjustments, price effects and the pass-through of the wealth tax are not taken into account. However, it can hardly be assumed that a wealth tax will be passed on to tenants in the short term. On the one hand, this is prevented by the rent cap for rent increases in existing tenancies, according to which the rent may be increased by a maximum of 20% within three years, but only up to the local reference rent.[9] In addition to the rent cap in regions with a tight housing supply, the rent control for re-letting must also be taken into account

[9] Since 2013, the federal states have also the option of reducing the cap from 20% to 15% for certain regions where the supply of affordable housing is particularly at risk. The majority of federal states have made use of the reduced cap (at least temporarily), especially for large cities (see, Kholodilin, 2017).

on the other hand.[10] There are numerous studies on the longer-term pass-through in connection with the US property tax (for an overview, see e.g., Oates and Fischel, 2016; Zodrow, 2023). However, there is no uniform picture of whether and to what extent the (local) property tax is reflected (capitalized) in house prices or rents.[11] As the property tax is highly relevant for the financing of local public goods in the US (Scheuer and Slemrod, 2021; United States Census Bureau, 2023), this tax is likely to have a significantly different dynamic in terms of its ability to be passed on than a German federal wealth tax.[12] We are not aware of any studies on the pass-through of a wealth tax to tenants of residential real estate.[13] However, theoretical considerations suggest that a wealth tax will lead to a reduction in the supply of real estate in the medium term if the wealth tax can be avoided in whole or in part by a change in investment behavior,[14] a reduction in savings or liquidity-restricted investors switching to other forms of investment. Rents are then likely to rise despite existing rent regulation, as experience in recent years has shown, particularly in major German cities. In this case, the wealth tax is at least partially (indirectly) passed on to tenants.

Our results cannot be easily transferred to other wealth-based taxes, such as the German property tax. On the one hand, this is due to the different legal frameworks.

[10] The rent control stipulates that when a lease agreement is concluded, the rent may not be more than 10% above the local reference rent (Sec. 556d German Civil Code). Until this regulation expires at the end of 2025, most federal states make use of it, especially for large cities. For example, the rent control applies in Berlin, Düsseldorf, Frankfurt, Hamburg, Cologne and Munich. In addition, the Federal Ministry of Justice is currently working on a legal basis for an extension of the rent control until 2029. For an overview of German (and international) rent control laws and their effectiveness, see Deschermeier et al. (2016); Kholodilin et al. (2016); Kholodilin (2017); Kholodilin and Kohl (2023).

[11] For an overview of the (empirical) literature, see e.g., Sirmans et al. (2008); England (2016). The interpretation of the results is heavily dependent on the underlying assumptions and theories. Three theories are discussed in property tax research: the "traditional", the "benefit tax" and the "capital tax" view, see Oates and Fischel (2016); Zodrow (2023). In addition, a meta-analysis by Gindelsky et al. (2023) shows that the regional variance in the results can largely be explained by misperceptions and misjudgements.

[12] There have been few studies on property tax capitalization in Germany to date. In addition to regional assessments (e.g., Haußmann and Schweinberger, 2012; Haußmann et al., 2012; Hardt et al., 2016), Löffler and Siegloch (2021) is the only comprehensive study to analyze the effects of the property tax on house prices and rents in Germany (with the exception of federal states in East Germany). The authors find that the property tax is fully capitalized in rents three years after an increase.

[13] The few studies on the effects of a wealth tax focus primarily on the effects on the tax base, see Scheuer and Slemrod (2021). E.g., Brülhart et al. (2022) show for Switzerland that a reduction in the cantonal wealth tax rate by one percentage point leads to an increase in taxable wealth of over 40% after six years. Part of this effect is explained by the capitalization in house prices.

[14] See Maiterth and Sureth-Sloane (2021). Foreign investors can thus avoid a German wealth tax by not investing in Germany. Resident taxpayers can at least avoid a wealth tax burden at the level of the corporation by acquiring shares in foreign corporations.

While the property tax can be passed on to the tenant in accordance with Sec. 2 No. 1 BetrKV, this is only possible for a wealth tax in the context of net rent increases, which are tightly regulated in Germany. On the other hand, the property tax is a wealth tax for only one specific asset class, namely real estate. Therefore, it is relatively easy to avoid such a tax by investing in other asset classes, whereas this is more difficult with a general wealth tax.

2 Data and development of rents and market values

Our dataset contains information on the residential property stock for the reporting years 2013 to 2020 in 16 regions and four construction year classes.[15] Each region is made up of the municipalities that belong to it.[16] Table 1 provides an exemplary overview of the structure of the dataset. Each observation is available at the year-region-construction-year level. In ll, our dataset comprises 501 observations and more than 100,000 housing units.

Table 1: Structure of our dataset

Year	Region	Year of construction	Housing units	Living space	Rent €/sqm	...
2013	Berlin	before 1945	...	...	...	...
2013	Berlin	between 1945 and 1980	...	...	...	...
2013	Berlin	between 1980 and 2000	...	...	...	...
2013	Berlin	after 2000	...	...	...	...
2013	Bremen	before 1945	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
2020	Westphalia	after 2000	...	...	...	...

Note: The table illustrates the structure of our data set in an exemplary manner. Observations are available at the year-region-construction-year level. Not all characteristics are shown (indicated by column "...").

To enable a comparison with the data from bulwiengesa AG, which covers the housing market even more broadly, we categorize the regions in our dataset into A-, B-

[15] The construction year classes are: (built) before 1945, between 1945 and 1980, between 1980 and 2000, and after 2000.

[16] It should be noted that municipalities that are not assigned to any of the 15 regions by the corporation are categorized as "Other".

and C-cities based on classifications commonly used in practice.[17] This classification is based on bulwiengesa AG and is used both in the real estate industry and in academic research (see Baldenius et al., 2020; Kholodilin and Rieth, 2022). As some of the regions in our dataset include several cities or municipalities from different categories, we assign these regions to the category of the city with the highest classification.[18] Consequently, six regions are in the A-, seven in the B- and three in the C-city category.[19] There are considerably more than 10,000 housing units in each city category.[20] Table 2 provides summary statistics for the most recent year, 2020, as an example. Structurally, the descriptive statistics for the other years do not differ. Only the nominal values change over time.

[17] bulwiengesa AG (nda) defines these categories as follows: "A-cities: most important German centers with national and in some cases international significance. Large, functioning markets in all segments. (...) B-cities: Major cities of national and regional importance. (...) C-cities: Important German cities with regional and limited national significance, with an important impact on the surrounding region" (translated from German; own translation). For example, Berlin and Munich are A-cities, Bremen and Dresden are B-cities and Freiburg and Kiel are C-cities.

[18] E.g., in addition to Düsseldorf and Cologne (both A-cities), the region "Rhineland" also includes Bonn (B-city) and Aachen (C-city). This region is therefore assigned to the A-cities.

[19] The category "C-city" also includes the region "Other". No information on the classification of the municipalities included is available for this region. However, the average values of the relevant characteristics for this region do not differ significantly from the corresponding values of the other C-cities. We therefore assign the region "Other" to the category "C-city".

[20] For anonymization reasons, we cannot provide any more specific information here.

Table 2: Summary statistics for the individual city categories in our dataset for 2020

	Mean	SD	Median	Min	Max
A-cities					
Rent (€/sqm)	7.55	0.92	7.51	5.78	10.94
Market value (€/sqm)	2,636	467	2,610	2,057	4,423
Non-recoverable costs (€/sqm)	1.52	0.06	1.52	1.08	1.69
Rent multiplier	29.08	4.57	26.94	23.48	63.11
Pre-tax rental yield (%)	3.44	0.52	3.61	1.58	4.26
B-cities					
Rent (€/sqm)	6.27	0.41	6.30	4.17	13.07
Market value (€/sqm)	1,652	250	1,654	1,050	3,018
Non-recoverable costs (€/sqm)	1.49	0.07	1.48	0.86	1.62
Rent multiplier	21.98	2.67	21.93	15.21	49.72
Pre-tax rental yield (%)	4.55	0.58	4.36	2.01	6.58
C-cities					
Rent (€/sqm)	6.82	0.46	6.90	6.38	13.05
Market value (€/sqm)	1,858	246	1,834	1,675	4,789
Non-recoverable costs (€/sqm)	1.58	0.07	1.55	1.25	1.71
Rent multiplier	22.70	1.62	22.14	20.14	30.57
Pre-tax rental yield (%)	4.40	0.30	4.52	3.27	4.97
Overall					
Rent (€/sqm)	6.89	0.90	6.49	4.17	13.07
Market value (€/sqm)	2,099	585	1,912	1,050	4,789
Non-recoverable costs (€/sqm)	1.52	0.07	1.52	0.86	1.71
Rent multiplier	25.37	4.95	24.05	15.21	63.11
Pre-tax rental yield (%)	3.94	0.74	4.08	1.58	6.58

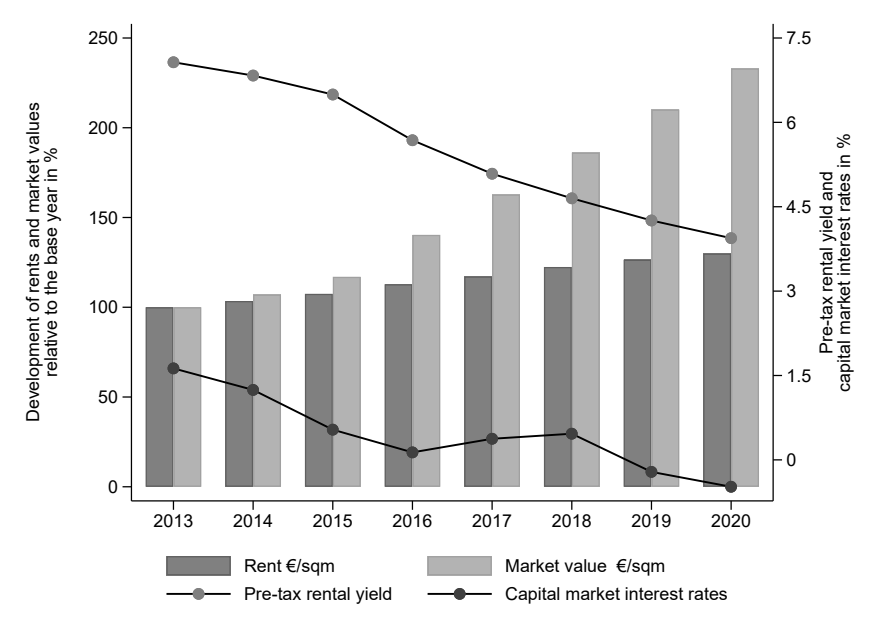
Note: The data refer to values as of December 31. A-cities: Most important German centers with national and in some cases international significance. Large, functioning markets in all segments. B-cities: Major cities of national and regional importance. C-cities: Important German cities with regional and limited national significance, with an important impact on the surrounding region. The category "Overall" represents the average across all regions. The rent multiplier is the ratio between the market value and the annual rent. The minimum and maximum values each represent individual outliers.

As expected, rents and market values per square meter are above average in the A-cities. Since market values are the highest in relation to the rents generated in this market, the rental yield is the lowest. At first glance, however, it seems surprising that all values in the C-cities are higher than those in the B-cities. Yet, this pattern is also reflected in the bulwiengesa data (see bulwiengesa AG, 2019). The mean values of rent, market value (each in euros per square meter) and rent multiplier for the A-city

category in our dataset differ statistically significantly from those for the B- and C-cities. In contrast, the differences in mean values for the B- and C-cities are not significant, with the exception of rent.[21]

As Table 2 only shows values for 2020, we document the growth in market values and rents per square meter, which are central to our analysis, in Figure 1 over the entire observation period from 2013 to 2020 of our dataset. The development of capital market interest rates is also depicted.[22]

Figure 1: Development of rents and market values over time in our dataset



Note: The values refer to the average across all regions. Capital market interest rates are the yield on the most recently issued German government bond with an agreed term of 10 years and refer to the annual average for each year.

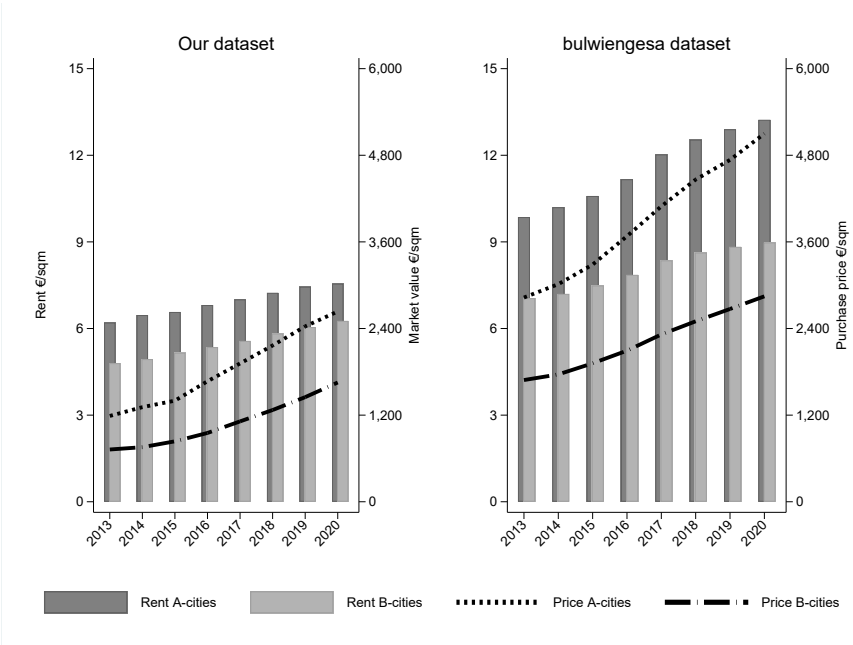
As described in Investitionsbank Berlin (2023)'s housing market report for Berlin, our dataset similarly shows that market values per square meter (light gray bars) have grown considerably faster than rents per square meter (dark gray bars). While market values rose by approximately 130% on average between 2013 and 2020, rents only increased by around 30%. Accordingly, the rental yield (before deduction of non-recoverable costs and taxes) (line with light gray dots) has fallen continuously from

[21] The statistical significance of differences in mean values across city categories is determined using a single-factor ANOVA and subsequent post-hoc analyses (Tukey-Kramer test).

[22] The data are taken from Bundesbank (2024b).

around 7% to below 4%. A comparison of this development with that of capital market interest rates (line with black dots) shows a similar trend, indicating a certain dependence of rental yields on capital market interest rates.[23] This is due to the fact that higher market values relative to rents occur in phases of low interest rates.

Figure 2: Development of rents and market values or purchase prices in A- and B-cities



Note: The bulwiengesa data is based on new lettings (re-lettings and first lettings) and purchase prices for existing condominiums. A-cities: Most important German centers with national and in some cases international significance. Large, functioning markets in all segments. B-cities: Major cities of national and regional importance.

Contrasting our dataset (left in Figure 2) with the German housing market based on data from bulwiengesa AG[24] (right in Figure 2), both datasets exhibit a comparable development in rents and market values or purchase prices per square meter.[25]

Figure 2 shows that both key figures continuously increased from 2013 to 2020, with the growth in rents and property prices in the A-cities (dark gray bars) being similar to that in the B-cities (light gray bars), although the level in the A-cities is

[23] The correlation between the pre-tax rental yield and capital market interest rates is approx. 0.587 ($p < 0.001$).

[24] The bulwiengesa data are taken from bulwiengesa AG (2022). See also bulwiengesa AG (ndb).

[25] Our comparison is only based on A- and B-cities, since the values for C cities in our data do not differ significantly from those of B-cities. See also bulwiengesa AG (2019).

always substantially higher.[26] However, there is a difference between the values in both datasets in the absolute level of rents and property prices, which in our dataset are consistently below the prevailing market levels.

With regard to rents, it should be noted that, unlike the bulwiengesa data (re-letting and first-time letting of existing condominiums), our data are predominantly based on existing rents. Another explanation for the difference in levels is the age structure of the property stock in our dataset. As the data provided to us by bulwiengesa AG does not contain any information on the age of buildings, we use the census data from 2022 as a reference value.[27] This comparison reveals that newer properties built after 2000 are underrepresented in our dataset and properties built between 1945 and 1980 are overrepresented.[28] On average, newer properties have considerably higher rents and market values, but only have a minor impact on the corresponding mean values due to their small share in our dataset, while the opposite is true for older properties.

The rent multiplier is particularly important for the effects of a wealth tax. A higher rent multiplier means a lower rent in relation to the market value, so that the wealth tax claims more liquidity for such properties than in the case of a lower rent multiplier. Table 3 provides an overview of the average rent multipliers by region in our dataset for the years 2013 to 2020 as well as the mean values for the years 2013 and 2020. It is evident that there are considerable differences between the individual regions both in terms of the level of the rent multipliers and their development over time.

[26] The same trends in rents and property prices can also be observed in Kholodilin and Rieth (2022), who use data from the "Immobilienverband Deutschland IVD Bundesverband der Immobilienberater, Makler, Verwalter und Sachverständigen e.V.". In some cases, their absolute values, e.g. for rents in B-cities, are almost identical to the data from bulwiengesa AG.

[27] See Figure 9 in Appendix A.

[28] The share of properties built after 2000 (between 1945 and 1980) is 0.9% (69.2%) in our dataset and 13.4% (41.2%) in the 2022 census.

Table 3: Summary statistics for the rent multiplier in our dataset for 2013 to 2020

Region	City category	N	Mean	SD	Min	Max	Mean 2013	Mean 2020
Berlin	A	32	27.0	6.5	13.2	40.0	14.9	33.8
Bremen	B	29	19.6	3.7	12.5	25.5	12.5	24.8
Dresden	B	30	19.0	3.2	8.6	36.7	11.6	23.5
Freiburg	C	32	22.6	3.8	14.7	34.5	15.0	26.8
Hamburg	A	32	22.1	3.7	10.9	29.6	14.9	27.0
Hanover	B	29	19.4	3.4	12.8	25.0	13.4	23.8
Kiel	C	31	18.0	3.4	11.6	24.5	12.3	22.3
Leipzig	B	32	19.4	3.8	12.2	49.7	13.2	23.3
Munich	A	32	28.9	5.9	16.4	70.0	21.1	36.9
Rhine-Main area	A	32	21.1	3.9	15.0	40.2	16.1	27.1
Rhineland	A	32	19.5	3.1	13.2	30.7	15.0	24.0
Ruhr area (N)	B	32	13.6	1.8	11.4	18.8	12.2	16.9
Ruhr area (S)	B	32	16.3	3.4	12.3	25.7	12.7	21.8
Other	C	32	16.8	3.6	11.9	29.7	12.6	22.3
Stuttgart	A	32	22.1	3.6	12.9	32.4	15.2	27.3
Westphalia	B	30	17.2	3.0	12.6	26.1	14.2	21.4
Overall		501	19.9	5.5	8.6	70.0	14.1	25.4

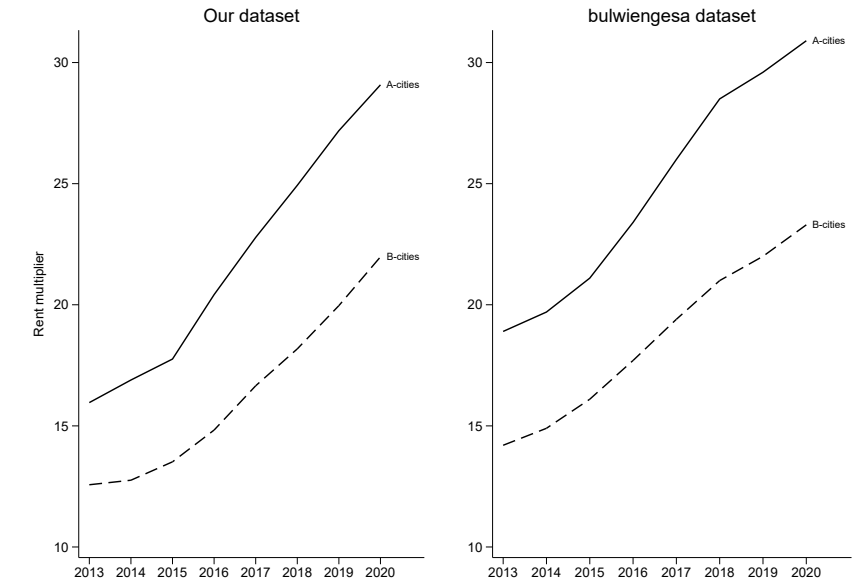
Note: The data refer to values as of December 31. A-cities: Most important German centers with national and in some cases international significance. Large, functioning markets in all segments. B-cities: Major cities of national and regional importance. C-cities: Important German cities with regional and limited national significance, with an important impact on the surrounding region. The region "Overall" represents the average across all regions. The rent multiplier is the ratio between the market value and the annual rent. The minimum and maximum values each represent individual outliers.

Despite the different levels of rent and market value in both datasets, the development of the average rent multiplier is almost identical when we compare our dataset with the bulwiengesa data[29] (see Figure 3). Also, the absolute level of rent multipliers differs only marginally.[30]

[29] The bulwiengesa data are taken from bulwiengesa AG (2022) and typically refer to residential properties that are about 20 years old. See also bulwiengesa AG (ndb).

[30] Additionally, we compare our data with supply-side data from the RWI - Leibniz Institute for Economic Research (RWI and ImmobilienScout24, 2023). The RWI dataset exhibits much higher absolute values and stronger growth rates for the rent multipliers in A- and B-cities. There may be various reasons for this: E.g., it is a dataset based on actual sales advertisements (for apartments) on ImmobilienScout24. Unlike our dataset, the rents and asking prices do not refer to a property stock that is (largely) constant over time. Moreover, the RWI data for 2020 includes a high share of properties built after 2000 at 31.8% (vs. 0.9% in our dataset), which leads to an upward bias in asking prices, see Baldenius et al. (2020).

Figure 3: Development of rent multipliers in A- and B-cities

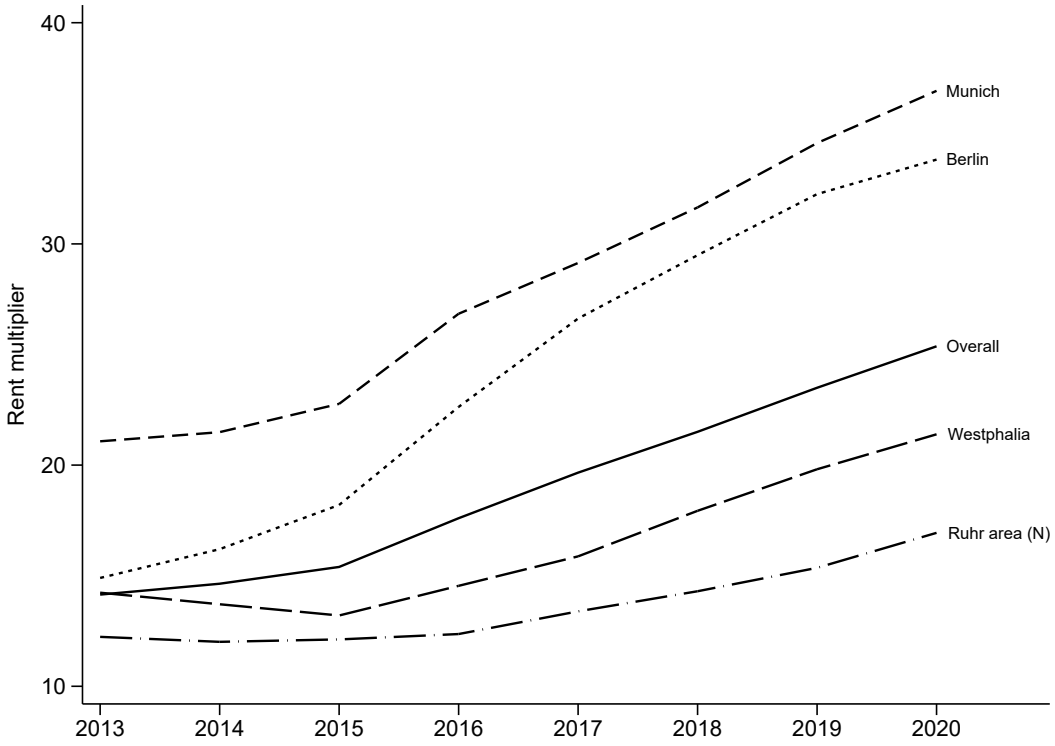


Note: Both datasets relate to residential apartment buildings. A-cities: Most important German centers with national and in some cases international significance. Large, functioning markets in all segments. B-cities: Major cities of national and regional importance. The rent multiplier is the ratio between the market value and the annual rent.

Figure 4 depicts the development of rent multipliers over time for two regions with the highest (Berlin and Munich) and lowest rent multipliers (Westphalia and Ruhr Area North).[31] The rent multipliers in the two major cities of Berlin and Munich are well above the average for all regions ("Overall") and exhibit substantial growth over the entire sample period, with disproportionately high growth in Berlin. By contrast, regions with only smaller cities and rural areas, such as Westphalia, and more industrial regions, such as the northern Ruhr area, are characterized by lower rent multipliers and therefore a smaller discrepancy between rents and market values. However, rent multipliers have also increased significantly over time in these regions.

[31] We have refrained from including a figure that, analogous to Figure 4, contains all regions of our dataset, as it provides little additional relevant information and is unwieldy.

Figure 4: Development of rent multipliers in selected regions over time in our dataset



Note: "Overall" represents the average across all regions. The rent multiplier is the ratio between the market value and the annual rent.

3 Wealth tax impact on rental yield and cash flow

For our simulations of the wealth tax burden, we assume a real estate investment by a private individual,[32] who is subject to an income tax rate of 45% (plus solidarity surcharge).[33] For the sake of simplicity, we also assume that the property is fully self-financed. In the case of partial or full debt financing, the wealth tax liquidity burden is reduced accordingly due to the deductibility of the debt. For example, the wealth tax

[32] If the real estate investment were made by a distributing corporation where the wealth tax is levied at shareholder level, similar effects would occur. However, the tax burden would be lower if the wealth tax is levied entirely at the level of the corporation because this reduces the amount distributed to the shareholders and thus their capital gains tax. We also demonstrate this in untabulated calculations. For further cases, see Maiterth and Houben (2013).

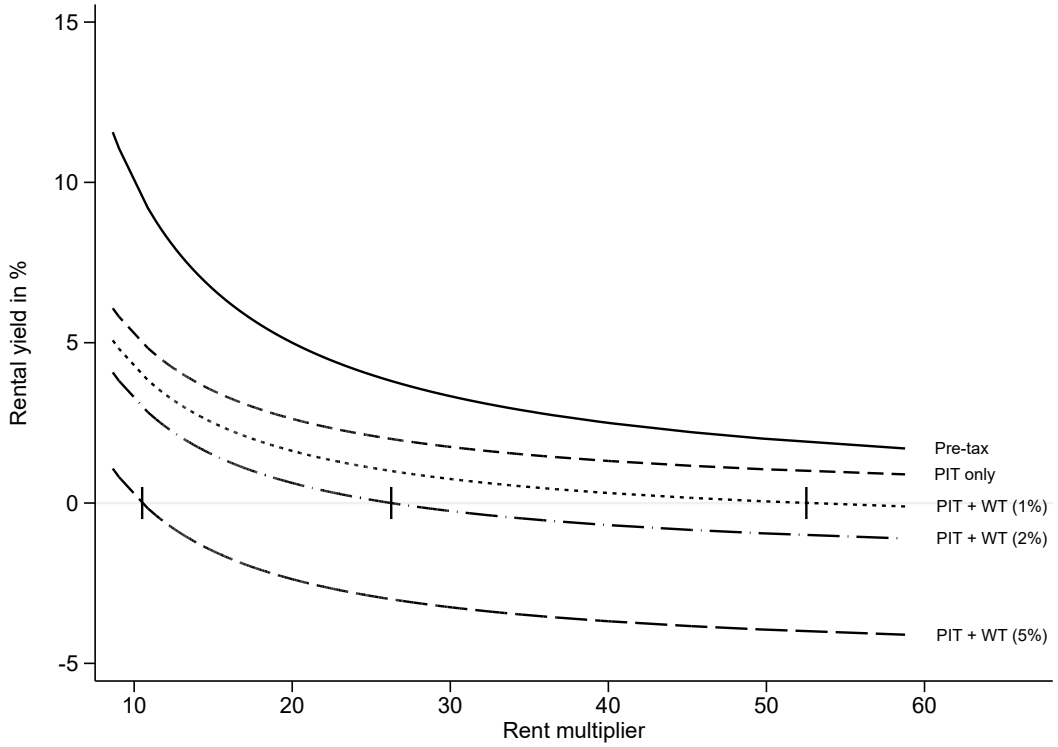
[33] Due to a lack of information on historical acquisition costs and the proportional land value, we abstract from building depreciation for income tax purposes. Further untabulated analyses show that the simulation results change only marginally if we use an income tax rate of 42% instead of 45%.

burden, and thus the reduction in liquidity, is lowered by 10% and 50%, respectively, for debt financing of 10% and 50%.[34]

3.1 Relationship between the rent multiplier and rental yields before and after taxes

The remaining rental yields after income and wealth taxes are largely determined by the rent multiplier and thus the ratio of market value to rent (Figure 5).[35]

Figure 5: Rental yield (before deduction of non-recoverable costs) as a function of the rent multiplier



Note: The roots of the respective yield function are indicated by the vertical black lines. In these cases, the net return after tax is zero. The rent multiplier is the ratio between the market value and the annual rent. PIT = personal income tax. WT = wealth tax.

[34] In this context, the debt financing neutrality of the wealth tax is most easily demonstrated by assuming an interest rate on borrowed capital equal to the pre-tax rental yield (less non-recoverable costs).

[35] The same applies to cash flows before and after taxes.

In addition to the pre-tax rental yield, its development is shown as a function of the multipliers for four tax scenarios: Rental yield after income tax without a wealth tax as well as after income tax and a wealth tax of 1, 2 and 5%.[36] As we are primarily interested in the marginal effects of the wealth tax burden, we abstract from a wealth tax allowance in our analyses. The root of the respective yield function allows us to determine the rental multiplier at which the rental yield is zero in the case of a wealth tax. Depending on the wealth tax rate, the critical rent multipliers[37] illustrated in Figure 5 are 10.5, 26.3 and 52.5 (vertical black lines).[38]

Averaging across all regions, the rental multiplier in our dataset is below 26.3 (see Figure 4). This means that, on average, a positive rental yield remains after tax in the case of a 2% wealth tax. However, in 2020, the average rent multiplier exceeded 26.3 in almost all A-cities and Freiburg, resulting in a negative rental yield after tax.[39]

3.2 Effects of a wealth tax on rental yields and cash flows

3.2.1 Effects on the entire property stock

First, we examine the tax effects on the entire property stock in our dataset. Table 4 shows that, for a 2% wealth tax rate, the average after-tax rental yield is negative (-0.39%) across all regions in 2020. However, with a wealth tax rate of 1%, the after-tax rental yield remains positive at 0.61%.

Of the average pre-tax cash flow of 5.38 €/sqm, a 1% or 2% wealth tax leaves 1.08 or -0.67 €/sqm after taxes, respectively. For a 100 square meter apartment, a 1% wealth tax results in an average after-tax cash flow of €1,290[40] per year meaning that more extensive modernization measures cannot be financed from it, even over time. With a 2% wealth tax rate, the cash flow is negative which means that the rent is insufficient to cover non-recoverable costs and the tax burden.

[36] The rental yield r_s is determined as follows: $r_s = \frac{\text{annual rent} * \left(1 - s_{pit} - s_{wt} \frac{\text{market value}}{\text{annual rent}}\right)}{\text{market value}}$

[37] See Appendix B for a calculation of the rent multipliers.

[38] In our dataset, there are only two observations with a multiplier that would have been small enough to achieve a positive after-tax rental yield at a wealth tax rate of 5%. This pertains to the region Dresden in 2013 and 2014 for properties built between 1980 and 2000.

[39] For Munich (from 2016) and Berlin (from 2017), the rent multipliers were also above 26.3 in years before 2020. Our dataset contains a few observations with a rent multiplier above 52.5. However, these have virtually no effect on the weighted average.

[40] The figure is slightly below the calculated amount of €1,296, which is obtained using the €1.08 from Table 4, as €1.08 is a rounded figure.

Table 4: Overview of the wealth tax effects in our dataset in 2020

Rent (€/sqm)		6.89	
Rent multiplier		25.37	
Pre-tax rental yield		3.94%	
Non-recoverable costs (€/sqm)		1.52	
Pre-tax rental yield (less non-recoverable costs)		3.07%	
Pre-tax cash flow (€/sqm)		5.38	
Tax scenario	After-tax rental yield (less non-recoverable costs)	After-tax cash flow (€/sqm)	Liquidity effect of the WT (€/sqm)
PIT only	1.61%	2.82	-
PIT + WT (1%)	0.61%	1.08	-1.75
PIT + WT (2%)	-0.39%	-0.67	-3.50
PIT + WT (5%)	-3.39%	-5.92	-8.75

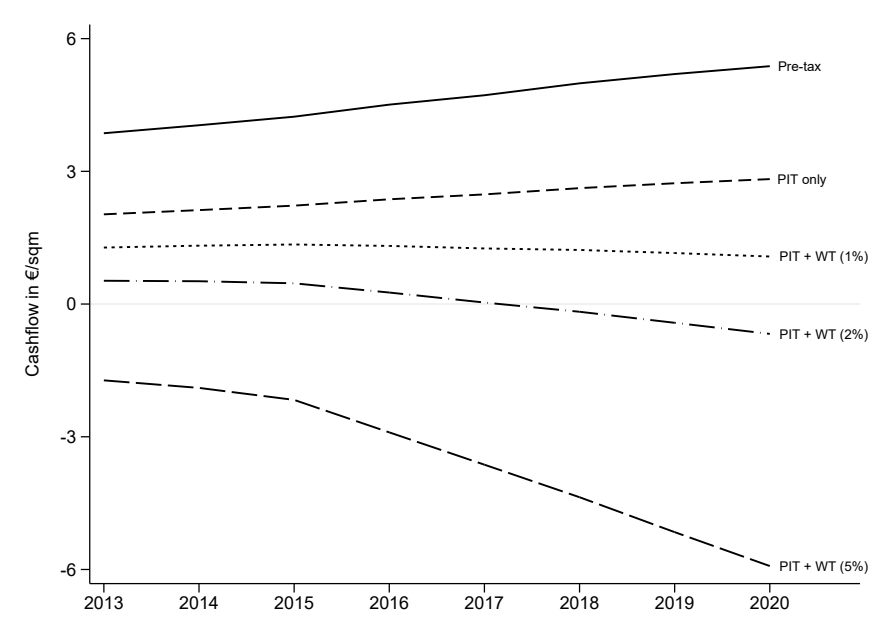
Note: The values refer to the average across all regions. The tax calculations are based on a private individual who is subject to a personal income tax (PIT) rate of 45% (plus solidarity surcharge). The rent multiplier is the ratio between the market value and the annual rent. WT = wealth tax.

Figure 6 illustrates that the effects of the wealth tax vary greatly over time because the ratio of rental income to market values has changed considerably, as shown in Figure 4. Figure 6 depicts this development for the cash flows before and after taxes.

As can be seen, the cash flow after wealth tax decreases in all wealth tax scenarios, even though the pre-tax cash flow (and also after income taxes) increases over time as a result of rising rents. This is because the market values of the properties increase more strongly than the corresponding rents. In order to compensate for the wealth tax burden through rent increases, the average rent increase across all regions in 2020 would have to amount to 48.3% under a 1% wealth tax rate and 96.6% under a 2% wealth tax rate.[41] This is well above the legally permissible rent increase limit, meaning that the wealth tax liquidity effect would remain largely uncompensated, at least in the short term.

[41] These figures take into account that the income tax burden also rises as a result of a rent increase intended to cover the wealth tax liability.

Figure 6: Development of cash flows over time in our dataset



Note: The values refer to the average across all regions. PIT = personal income tax. WT = wealth tax.

3.2.2 Regional effect

The heterogeneity in the effects of a wealth tax over time shown in Figure 6 is also evident within a given year when comparing different regions. Table 5 illustrates this by reporting the remaining after-tax cash flows for each city category in 2020. At a wealth tax rate of 2%, the after-tax cash flows are negative for every category as well as for the average across all regions. Focusing on the wealth tax's liquidity effect in terms of cash flow highlights that the tax affects different property types to varying degrees. Properties located in cities with high market values relative to the rents generated are more strongly affected by a wealth tax than properties in B- and C-cities, where lower rent multipliers translate into comparatively higher rental yields.

Table 5: Liquidity effect of the wealth tax in A-, B- and C-cities in our dataset in 2020

	A-cities	B-cities	C-cities	Overall
Rent (€/sqm)	7.55	6.27	6.82	6.89
Rent multiplier	29.08	21.98	22.70	25.37
Pre-tax rental yield	3.44%	4.55%	4.40%	3.94%
Non-recoverable costs (€/sqm)	1.52	1.49	1.58	1.52
Pre-tax cash flow (€/sqm)	6.03	4.78	5.24	5.38
Tax scenario	After-tax cash flow (€/sqm)			
PIT only	3.17	2.51	2.75	2.82
PIT + WT (1%)	0.97	1.13	1.21	1.08
PIT + WT (2%)	-1.23	-0.24	-0.34	-0.67
PIT + WT (5%)	-7.82	-4.38	-4.99	-5.92
Wealth tax rate	Liquidity effect of the wealth tax (€/sqm)			
1%	-2.20	-1.38	-1.55	-1.75
2%	-4.39	-2.75	-3.10	-3.50
5%	-10.98	-6.88	-7.74	-8.75

Note: The tax calculations are based on a private individual who is subject to a personal income tax (PIT) rate of 45% (plus solidarity surcharge). A-cities: Most important German centers with national and in some cases international significance. Large, functioning markets in all segments. B cities: Major cities of national and regional importance. C cities: Important German cities with regional and limited national significance, with an important impact on the surrounding region. The category "Overall" represents the average across all regions. The rent multiplier is the ratio between the market value and the annual rent. WT = wealth tax.

While the average cash flow in A-cities (3.17€/sqm) is still higher than that in B- and C-cities (2.51 and 2.75€/sqm), even after income taxes, this relationship reverses once the wealth tax is taken into account. The liquidity effect of the wealth tax is approximately 40-60% larger in A-cities than in B- and C-cities.[42]

Turning to the regions discussed in Section 2 for illustrative purposes, the wealth tax effect on cash flows is even more pronounced (see Table 6).

[42] The wealth tax effect reduces the rental yields, which are already lower before taxes in A-cities than in the other two city categories, depending on the wealth tax rate (1%, 2%, 5%) by 1, 2 or 5 percentage points respectively.

Table 6: Liquidity effect of the wealth tax for selected regions in our dataset in 2020

	Munich	Berlin	Overall	Westphalia	Ruhr Area North
Rent (€/sqm)	8.62	6.67	6.89	6.39	5.94
Rent multiplier	36.92	33.81	25.37	21.39	16.94
Pre-tax rental yield	2.71%	2.96%	3.94%	4.67%	5.90%
Non-recoverable costs (€/sqm)	1.51	1.51	1.52	1.45	1.48
Pre-tax cash flow (€/sqm)	7.11	5.15	5.38	4.94	4.46
Tax scenario	After-tax cash flow (€/sqm)				
PIT only	3.73	2.71	2.82	2.60	2.34
PIT + WT (1%)	0.55	0.45	1.08	1.23	1.34
PIT + WT (2%)	-2.63	-1.80	-0.67	-0.14	0.33
PIT + WT (5%)	-12.17	-8.56	-5.92	-4.24	-2.69
Wealth tax rate	Liquidity effect of the wealth tax (€/sqm)				
1%	-3.18	-2.25	-1.75	-1.37	-1.01
2%	-6.36	-4.51	-3.50	-2.73	-2.01
5%	-15.91	-11.27	-8.75	-6.84	-5.03

Note: The tax calculations are based on a private individual subject to a personal income tax (PIT) rate of 45% (plus solidarity surcharge). "Overall" represents the average across all regions. The rent multiplier is the ratio between the market value and the annual rent. WT = wealth tax.

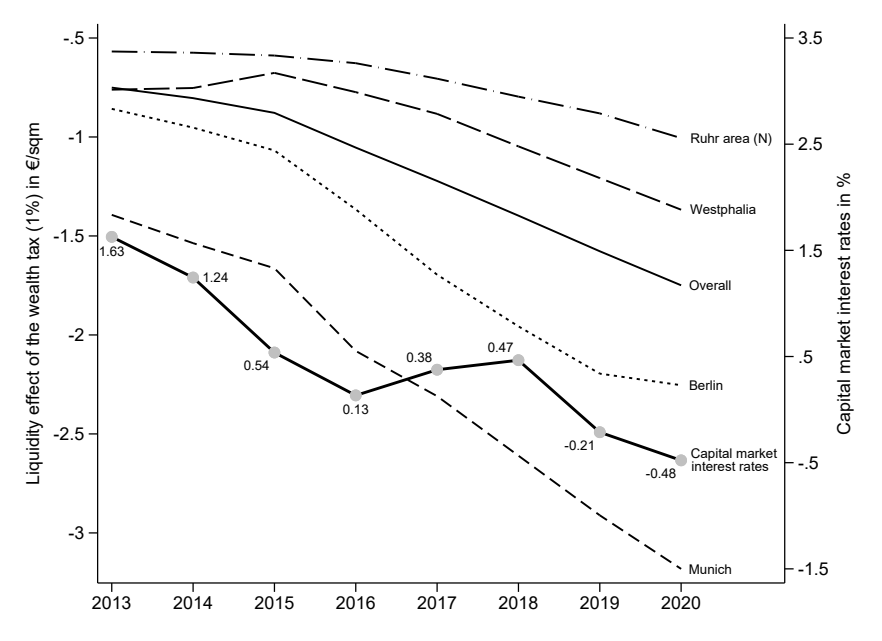
At a wealth tax rate of 2%, after-tax cash flows are consistently negative across regions, with the exception of the northern Ruhr area. Even at a wealth tax rate of 1%, hardly any of the pre-tax cash flow remains. The after-tax cash flows likewise indicate that other common property related expenses not considered here, such as modernization investments, would largely have to be financed from other sources (Maiterth and Sureth-Sloane, 2021).

When examining the liquidity effect of the wealth tax, it is again noticeable that it varies substantially across regions. In Munich, the effect of a 1% wealth tax amounts to 3.18€/sqm, roughly three times the 1.01€/sqm observed in the northern Ruhr area. As a result, the cash flow after wealth tax in Munich is consistently lower than in the northern Ruhr area, even though the cash flow before wealth tax and after income tax is lower in the northern Ruhr area than in Munich. This indicates that a wealth tax increases the relative attractiveness of rental yield-oriented real estate compared to value growth-oriented real estate. In terms of regions, this could lead to investment incentives for properties in more rural or industrial regions relative to properties in large cities, at least for investors facing liquidity constraints, as is often the case with private investors. The liquidity effects described above may also prompt such investors to invest less in

real estate and more in other asset classes, such as shares, which have fewer liquidity restrictions because they can be partially liquidated more easily than real estate in an emergency.

The development of the liquidity effect of a wealth tax over time is illustrated in Figure 7 as an example for a wealth tax rate of 1%. Since almost all rent multipliers have risen strictly over time,[43] the liquidity effects in the other regions lie between the values shown in Figure 7 for Munich and the northern Ruhr area.

Figure 7: Development of the liquidity effect of a 1% wealth tax over time in our dataset



Note: "Overall" represents the average across all regions. Capital market interest rates are the yield on the recently issued German government bond with an agreed term of 10 years and refer to the annual average for each year.

Over time, Munich exhibits a substantially stronger increase in the rent multiplier (see Figure 4) than the northern Ruhr area, resulting in a much more pronounced liquidity effect of the wealth tax in Munich. In Munich, this effect rises from -1.39€/sqm in 2013 to -3.18€/sqm in 2020 (+129%) at a 1% wealth tax rate compared with -0.57€/sqm

[43] Minor (temporary) exceptions are Westphalia and the northern Ruhr region (see Figure 4) as well as Bremen and the southern Ruhr region.

to -1.01€/sqm (+77%) in the northern Ruhr area.[44] With respect to capital market interest rates, a correlation with the liquidity effect emerges, indicating that the prevailing interest rate environment matters for the magnitude of the liquidity effect.

A comparison of Figure 7 with Figure 4 shows that the liquidity effect of the wealth tax moves inversely to the development of the rent multipliers depicted in Figure 4.

3.3 Additional analyses

Finally, Table 7 shows how the liquidity effect of a wealth tax differs across properties of different construction years. While the first three construction year classes exhibit similar values, the results for newer properties built after 2000 differ considerably. Not only are rents higher for these newer properties, but so is the ratio of market value to rent as well. This is reflected in the liquidity effect: Newer properties are relatively more heavily burdened by a wealth tax and, at a wealth tax rate of 2%, exhibit lower after-tax cash flows compared to older properties.

[44] See Table 8 in Appendix C. The wealth tax effect is particularly extreme under a 5% tax rate. In this case, for a 100 square meter apartment in Munich in 2020, an additional €14,608 per year (calculated on the basis of unrounded values) would be required to cover the non-recoverable costs as well as all tax liabilities.

Table 7: Liquidity effect of the wealth tax for the different construction year classes in our dataset in 2020

	before 1945	between 1945 and 1980	between 1980 and 1999	after 2000	Overall
Rent (€/sqm)	6.64	6.94	6.78	9.43	6.89
Rent multiplier	26.46	24.82	26.24	31.00	25.37
Pre-tax rental yield	3.78%	4.03%	3.81%	3.23%	3.94%
Non-recoverable costs (€/sqm)	1.58	1.51	1.50	1.19	1.52
Pre-tax cash flow (€/sqm)	5.06	5.42	5.28	8.23	5.38
Tax scenario	After-tax cash flow (€/sqm)				
PIT only	2.66	2.85	2.77	4.32	2.82
PIT + WT (1%)	0.90	1.13	1.00	1.40	1.08
PIT + WT (2%)	-0.86	-0.59	-0.78	-1.52	-0.67
PIT + WT (5%)	-6.13	-5.76	-6.12	-10.29	-5.92
Wealth tax rate	Liquidity effect of the wealth tax (€/sqm)				
1%	-1.76	-1.72	-1.78	-2.92	-1.75
2%	-3.51	-3.44	-3.56	-5.85	-3.50
5%	-8.78	-8.61	-8.89	-14.61	-8.75

Note: The values refer to the average across all regions. The tax calculations are based on a private individual subject to a personal income tax (PIT) rate of 45% (plus solidarity surcharge). "Overall" represents the average across all construction year classes. The rent multiplier is the ratio between the market value and the annual rent. WT = wealth tax.

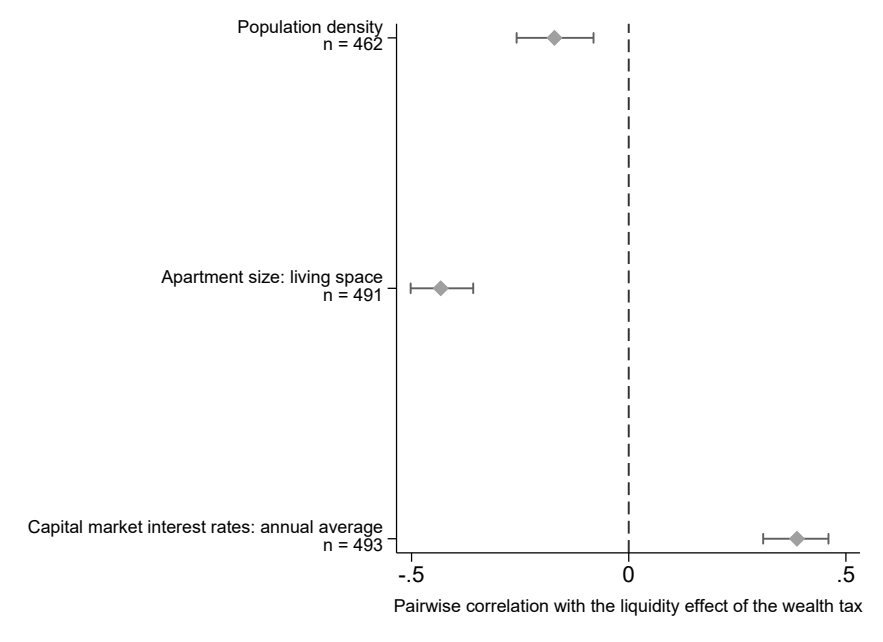
In addition, we examine the extent to which the liquidity effect we observe is related to various characteristics. Figure 8 provides an overview. All variables considered are statistically significantly correlated with the liquidity effect of the wealth tax. For example, population density[45] and living space have negative correlation coefficients, which means that, on average, a higher population density and a larger area per housing unit are associated with stronger liquidity effects of the wealth tax. Since A-cities are on average more densely populated than B- or C-cities, this is consistent with the findings above that properties in A-cities would be more affected by a wealth tax. The negative correlation with apartment size also seems plausible, as larger apartments are, on average, associated with higher market values relative to the rents generated.[46] By contrast, the correlation coefficient for capital market interest rates is positive, suggesting that, on average, stronger liquidity effects of the wealth tax are to be expected in times of low capital market interest rates. This is also intuitive considering the development of rents

[45] The data are taken from the Federal Statistical Office of Germany (2021).

[46] This is implied in particular by the correlation of 0.239 ($p < 0.001$) between the apartment size and the rent multiplier.

and market values shown in Figure 1, as declining capital market interest rates tend to coincide with rising market values.[47]

Figure 8: Pairwise correlation with the liquidity effect of the wealth tax



Note: The correlation coefficients are calculated using the years 2013 to 2020. The squares indicate the correlation coefficient between each variable and the liquidity effect of the wealth tax and the horizontal lines show the 95% confidence interval. Population density is defined as the population of the municipalities in each region divided by the corresponding area in km^2. Apartment size is measured as the average floor area per housing unit, based on aggregated total living space for each observation in our dataset. Capital market interest rates are the yield on the most recently issued German government bond with an agreed term of 10 years and refer to the annual average for each year.

In a multivariate regression, we show that the (univariate) results presented above prove to be robust.[48]

[47] In untabulated results, we use alternative measures for the variables in Figure 4: total population, average area per housing unit based on aggregate total area and capital market interest rates based on the last trading day of the year. The correlation coefficients remain stable, with the exception of average apartment size based on aggregate total area (r = -0.075 with p = 0.099).

[48] See Appendix D. Further analyses also demonstrate that the region explains more of the variation in the liquidity effect than population density. In such a regression, the effect of capital market interest rates on the liquidity effect appears to be at least as relevant as the region in terms of magnitude and statistical significance. This implies that, in addition to the location of a property, the interest rate environment is an important factor for the tax burden effects of a wealth tax.

4 Discussion and outlook

In this concluding chapter, we embed the results from the simulation of the wealth tax burden in a broader context and discuss them against the backdrop of the political and current real estate market situation.

Regardless of the spatial and temporal heterogeneity of the wealth tax burden identified in the previous chapter, introducing a wealth tax often results in the cash flow from a real estate investment being reduced to such an extent that it turns negative. Sufficient liquidity is particularly important for real estate, which is often owned by liquidity constrained private investors, since, compared with other asset classes such as shares, real estate more frequently entails unexpected payments, for instance to repair damage, and partial liquidation is not possible in the same way as it is for shares.

The results from the spatial and temporal analysis of the liquidity effects of a wealth tax also show how strongly the wealth tax burden varies across regions and how it changes over time. Recent developments in the real estate market underscore this volatility. After years of steadily rising property prices, driven inter alia by low interest rates, they have been trending downward since mid-2022 (Federal Statistical Office of Germany, 2024a),[49] whereas rents have not followed the same pattern (Federal Statistical Office of Germany, 2024b). Therefore, this recent development mitigates the wealth tax induced liquidity drain for residential real estate, since declining rent multipliers are accompanied by a lower wealth tax burden.

The wealth tax burden, which is largely decoupled from rental income, introduces substantial additional uncertainty for investors. Such uncertainty is likely to be highly detrimental to real estate investments. From an investor perspective, this is exacerbated by the fact that the additional cash flow burden resulting from a wealth tax cannot be fully passed on to tenants due to statutory rent caps. This is likely to have particularly adverse effects in regions facing the highest wealth tax burdens. These are the cities with the highest rent multipliers, such as Berlin and Munich, where the housing market is already extremely tight. As a result, these regions could lose attractiveness relative to regions with stronger rental yields. Moreover, private investors in particular may shift away from real estate entirely toward other asset classes that involve fewer liquidity constraints.

Potential issues may also arise in the context of a legal assessment of the wealth tax in light of the liquidity effects documented above. In the case of properties with low rents

[49] A comparison of the development of the house price index with that of capital market interest rates (moving averages) shows a correlation of about -0.321 ($p < 0.05$) over the period from 2013 to 2023.

relative to market value, these effects call into question the concept of a wealth tax as a presumptive yield tax.[50] In the context of real estate taxation in particular, it is crucial to clarify what is meant by "income" and "substance", since the total return on a real estate investment typically stems from two sources: rental income, which affects liquidity, and capital appreciation, which is largely irrelevant from a liquidity perspective. If the focus is solely on liquidity relevant income, that is, the cash flow generated by rents,[51] the strongly regionally varying liquidity effects may prove especially problematic.

Our study is not intended as a political recommendation for or against the reintroduction of a wealth tax as a redistribution instrument in Germany. Rather, we focus on a single aspect, the liquidity effect, for a specific asset class, residential real estate, and its implications. In doing so, we highlight the often overlooked effects and side effects of a wealth tax on this societally important asset class. With this study, we aim to inform the public debate about the conditions and constellations under which a wealth tax can lead to liquidity problems and thereby reduce investment incentives. These interactions should be taken into account and weighed when designing such a tax.

[50] According to the jurisprudence of the German Federal Constitutional Court (Bundesverfassungsgericht, BVerfG), a wealth tax may only be designed in such a way "that, in its interaction with the other tax burdens, it leaves the substance of wealth, the wealth base, unaffected and can be paid out of the returns that can typically be expected (presumptive returns)" (BVerfG, decision of 22 June 1995 - 2 BvL 37/91, BVerfGE 93 para. 47 – translated from German; own translation). Whether this view still remains valid cannot be predicted, see Birk (2016). A wealth tax that has to be paid not out of returns but out of the wealth substance is regarded as disproportionate, see Hey (2016); Kube (2016).

[51] This view is echoed by Birk (2016), who points to disproportionate effects of a wealth tax in cases where liquidity is lacking, e.g. for artworks or certain real estate assets. In such cases, the respective market value of the property is regarded as the wealth substance, whereas under an approach based on total returns the historical purchase price of the property would be regarded as the substance to be preserved.

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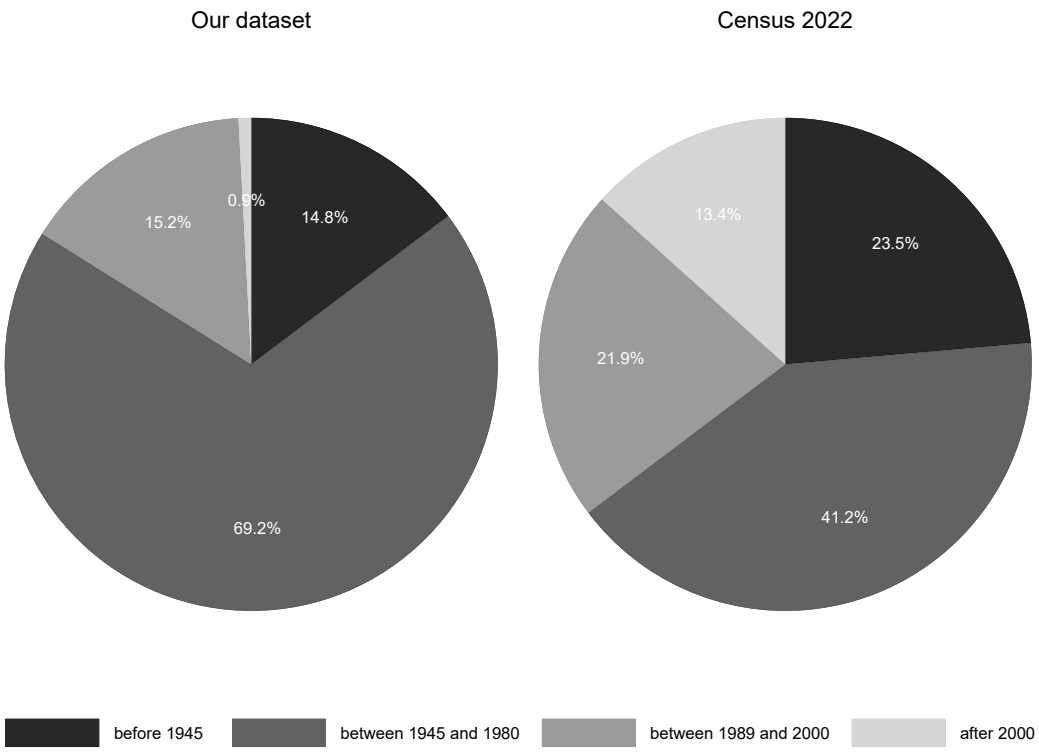
Appendix

A Comparison of the age structure of the housing units

Figure 9: Age structure of the housing units



Note: The values from our dataset refer to the last available year: 2020. The age structure of the housing units remains largely constant over the entire observation period. The 2022 Census data refer to apartments.[52] For these, the first two construction year classes differ slightly from the legend: The properties are classified as "before 1950" and "between 1950 and 1980".

[52] The data are taken from Statistical Offices of the Federation and the Länder (2024).

B Determining the rent multiplier for a zero after-tax yield

The pre-tax rental yield is given by

$$r = \frac{1}{m} = \frac{\text{annual rent}}{\text{market value}},$$

where r denotes the pre-tax rental yield and m is the rent multiplier, i.e., the ratio of market value to annual rent. Accordingly,

$$m = \frac{\text{market value}}{\text{annual rent}}.$$

Taking taxes into account, the after-tax rental yield is

$$r_s = \frac{\text{annual rent} * (1 - s_{pit} - s_{wt} * \frac{\text{market value}}{\text{annual rent}})}{\text{market value}},$$

Where r_s denotes the after-tax rental yield, s_{pit} the income tax rate (incl. solidarity surcharge) and s_{wt} the wealth tax rate. If one wants to determine the rent multiplier required to achieve a zero after-tax yield, it follows from

$$r_s = \frac{1}{m} - \frac{s_{pit}}{m} - s_{wt} \stackrel{!}{=} 0$$

that

$$m^* = \frac{1 - s_{pit}}{s_{wt}}.$$

C Liquidity effects in selected regions over time

Table 8: Liquidity effect of the wealth tax in Munich and the northern Ruhr area in our dataset in 2013 and 2020

	Munich		Ruhr Area North	
	2013	2020	2013	2020
Rent (€/sqm)	6.61	8.62	4.64	5.94
Rent multiplier	21.08	36.92	12.24	16.94
Pre-tax rental yield	4.74%	2.71%	8.17%	5.90%
Non-recoverable costs (€/sqm)	1.44	1.51	1.45	1.48
Pre-tax cash flow (€/sqm)	5.17	7.11	3.20	4.46
Tax scenario	After-tax cash flow (€/sqm)			
PIT only	2.72	3.73	1.68	2.34
PIT + WT (1%)	1.32	0.55	1.11	1.34
PIT + WT (2%)	-0.07	-2.63	0.54	0.33
PIT + WT (5%)	-4.25	-12.17	-1.16	-2.69
Wealth tax rate	Liquidity effect of the wealth tax (€/sqm)			
1%	-1.39	-3.18	-0.57	-1.01
2%	-2.79	-6.36	-1.14	-2.01
5%	-6.97	-15.91	-2.84	-5.03

Note: The tax calculations are based on a private individual who is subject to a personal income tax (PIT) rate of 45% (plus solidarity surcharge). The rent multiplier is the ratio between the market value and the annual rent. WT = wealth tax.

D Regression results for the liquidity effect

$$\text{Liquidity effect of the wealth tax (1\%)}_i = \alpha + \beta X_i + \varepsilon_i$$

Table 9: Multivariate regression of the liquidity effect of the wealth tax (1%)

	Liquidity effect of the wealth tax (1%)	
	(1)	(2)
Population density	-0.0003***	
	(0.00008)	
Apartment size	-0.0327***	-0.0316***
	(0.00260)	(0.00213)
Capital market interest rates: annual average	0.5014***	0.5116***
	(0.20436)	(0.03387)
Bremen		0.4717***
		(0.12221)
Dresden		0.4669***
		(0.12344)
Freiburg		0.0251
		(0.12025)
Hamburg		0.1967*
		(0.11825)
Hanover		0.4542***
		(0.12152)
Kiel		0.2736**
		(0.12257)
Leipzig		0.7108***
		(0.11828)
Munich		-0.8883***
		(0.11922)
Rhine-Main area		-0.0347
		(0.11841)
Rhineland		0.3493***
		(0.12043)
Ruhr area (N)		0.5523***
		(0.11843)
Ruhr area (S)		0.6155***
		(0.11830)
Other		0.5085***
		(0.11937)
Stuttgart		-0.0203
		(0.12052)
Westphalia		0.5999***
		(0.12032)
Constant	0.9843***	0.2300***
	(0.20436)	(0.17089)
N	460	491
R^2	0.385	0.625
Adj. R^2	0.381	0.611

Note: The table shows the results of the OLS regressions of the liquidity effect of the wealth tax (1%) on various influencing factors (X_i). The liquidity effect of the wealth tax (1%) is the wealth tax liability calculated per square meter and month (with a negative sign). Thus, a negative (positive) sign for a coefficient means a strengthening (weakening) influence on the liquidity effect. Specification (1) takes into account the influencing factors from the pairwise correlation analysis (see Figure 8), specification (2) the individual regions (reference region: Berlin) instead of the population density. Population density is defined as the population of the municipalities in each region divided by the corresponding area in km^2. Apartment size is measured as the average floor area per housing unit, based on aggregated total living space for each observation in our dataset. Capital market interest rates are the yield on the most recently issued German government bond with an agreed term of 10 years and refer to the annual average for each year. The data refers to the average of the respective year. Standard errors in parentheses. Significance levels: * $p < 0.1$; ** $p < 0.05$ and *** $p < 0.01$.