



**Who has really paid for the Reconstruction of
East Germany? Expected and Realized Returns
on Real Estate Investments in East and West
Germany in the 1990s**

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Abstract

The purpose of this paper is to challenge the wide-spread view that investment in residential property in East Germany after unification has turned out to be a financial disaster in most cases by calculating (1) the after-tax return an investor in real property might have expected at the beginning of the 1990s and (2) the after-tax return that has been realized ten years after. We compare investments by a high-income investor resident in Germany in an average individually-owned flat in three major cities in East Germany and two cities in West Germany.

The result of our study is that tax subsidies have protected investors from losing money in a real estate investment. Therefore, it was indeed the taxpayers not the investors who have borne the cost of reconstructing East Germany. But taxpayers have spent a lot more on subsidising the much bigger West German housing market where property prices and tax subsidies per average investment were much higher.

key-words: real-estate investment, after-tax return on investment, tax subsidies, Assisted Area Law (Fördergebietsgesetz), empirical study, income tax reduction, loss offset, special depreciation, return on equity capital (ROE), property prices

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Who has really paid for the Reconstruction of Eastern Germany? Expected and Realized Returns on Real Estate Investments in East and West Germany in the 1990s

1 Introduction

At the time of German re-unification in 1990, after more than four decades of socialist maladministration, supply of flats and houses was short and the existing structure was generally in a very poor state of preservation. As a fast catch-up of the East German economy was expected, real property markets were characterized by a peak in the demand for housing and increasing property prices. Federal government promoted housebuilding and improvement with generous additional tax breaks and by the mid 1990s there was a real construction boom (Donner 2001, 60). When the transformation turned out to be slower than expected and the net-out migration from the new federal states could not be stopped (Burda 2006, 5), this massive construction resulted in an oversupply of dwellings. Vacancy rates were rising, and property prices and rents were in decline until the recent past (Vornholz 2001, 712-714).

According to a popular view, investment in residential property in East Germany after unification has turned out to be a financial disaster in most cases. This seems plausible, given the initial boom in the market for real property and its subsequent break-down. But it does not take into account the generous tax benefits offered to investors in the new federal states. The purpose of this paper is to challenge this wide-spread view by calculating (1) the after-tax return an investor in real property might have expected at the beginning of the 1990s and (2) the after-tax return that has been realized ten years after, showing how profitable the investment has actually been. Only if realized returns after tax turn out to be substantially lower than those of similar investments in the old federal area popular wisdom would be confirmed. Otherwise we would have to conclude that the special tax subsidies have compensated for the unexpected downturn in the East German real estate market and that it was the general public who has borne the cost of reconstructing the East.

To this end we compare investments in an average individually-owned flat in three major cities in East Germany, Erfurt, Leipzig and Magdeburg and two cities in West Germany, Munich and Stuttgart. The term “individually-owned flat” refers to a flat within a larger property, usually a multi-unit dwelling, where the ownership in the

separate flat is typically connected with a share in the common property of the multi-unit dwelling. Expected rates of return are derived through complete financial budgeting for each investment based on expected rents, expected property prices in the year of divestment, expected lending and borrowing rates, and the tax law effective in the year of investment. Realized returns are calculated using prices, rents, and interest rates which could actually be realized during the investment period. Changes in tax legislation are also taken into account. We use data for average property prices and rents for typified flats provided by BulwienGesa AG, a research and consulting firm that specialises in the analysis of real property markets.¹ Deutsche Bundesbank (2003a) uses these data for calculating a nation-wide price indicator for real property.

The rest of the paper is organised as follows: in section 2 relevant aspects of tax legislation in Germany are presented. The data set and its interpretation for the purpose of this study is discussed in section 3. In section 4, computations of the expected and realized returns are described and results are evaluated in section 5. Section 6 summarises and concludes.

2 Taxation of Real Estate Investments

Tax consequences of an investment in residential property mainly result from the Income Tax Law (Einkommensteuergesetz, abbreviated: EStG). Since it is assumed that the investor held the flat as privately-owned (non-business) property, income from renting the flat is to be classified as income from rentals and royalties (EStG § 21 (1)). This is quite typical for direct real estate investments of high income individuals in Germany. Investments in assets in the new federal states being acquired after 31 December 1990 and before 1 January 1997 were promoted by certain tax benefits stipulated under the *Assisted Area Law* (Fördergebietsgesetz, abbreviated: FöGbG) of 24 June 1991 (BGBl 1991 I p.1322, 1331).

2.1 Income Tax on Rental Income

Net rental income is to be computed as the excess of total receipts from rents over income-related expenses (EStG § 2 (2) No. 2). Deductible income-related expenses are interests on loans, insofar as they relate to generating the rental income (EStG § 9 (1)), taxes on real property (EStG § 9 (1) No. 2), and depreciation (EStG § 9 (1) No. 7 and EStG § 7 (4,5)).

¹ We gratefully acknowledge to the support from BulwienGesa AG for giving us access to their property price statistics.

The *Assisted Area Law* law permitted, among other things, the claim of a *special depreciation amount* of 50 % of the acquisition cost (FöGbg § 4 (1)) for privately-owned depreciable, immovable assets such as buildings and separately-owned flats if they had been purchased in the year of completion (FöGbg § 3). The remaining 50% of the acquisition cost may be depreciated over 50 years according to EStG § 7 (4). In the case of a converted building only the conversion costs qualify for the accelerated depreciation and the acquisition cost for the old building must be depreciated according to regular schemes of the Income Tax Law.

Further income-related expenses are the expenses for the maintenance or repair of the rented property as well as the premiums for insurances of the apartment, because these costs are also incurred by obtaining, maintaining or preserving the rental income. A loss from renting the flat would arise if the income-related expenses exceeded the receipts from rentals in a certain calendar year. Such a loss can be netted against positive income from the same income category or/and from the other categories (EStG § 2 (3)). Losses not offset in the period in which they occur can be carried back to the previous period up to €511,500 (EStG § 10d (1)) or alternatively carried forward to future periods without time limit (EStG § 10d (2) and (4)).

In the calculations, it is assumed for convenience that a loss which might have been sustained from renting the dwelling can be immediately and completely offset against positive income from other sources, so that the investor receives an immediate tax reduction and no losses needed to be carried back or forward. A loss reduces the total income tax liability and leads to a tax reimbursement, if income tax has been collected at source such as the wage tax. So-called “progressive benefits” would be obtained, if a loss reduced taxable income so much that a lower marginal tax rate would be applicable. We always apply the highest marginal tax rate, as it is assumed that the investor belongs to top income earners.

2.2 *Income Tax on Capital Gains*

A *capital gain* from the sale of a privately-owned flat is to be classified as other income according to sec. 22 (EStG § 22 No. 2) and thus is liable to income tax, if the time period between the acquisition and the sale of the apartment does not exceed 10 years (EStG § 23 (1) No. 1). The profit or loss from the sale of an individually-owned flat is the difference between its price of sale and its acquisition cost reduced by regular,

accelerated or/and special depreciation amounts which were claimed (EStG § 23 (3)). Losses from the sale of private assets may only be offset against profits from the sale of private property (EStG § 23 (3)). We assume that the sales of the privately-owned flats occur after ten years, so that any capital gains earned are not liable to income tax.

2.3 Other Taxes

In addition to the income tax, a solidarity surcharge (Solidaritatzuschlag, abbreviated: SolZ) is levied on the actual income tax amount (SolZG § 3 (2)) for the purpose of supporting the economy of the new federal states.

Another tax that needs to be taken into account is the real property transfer tax. The Real Property Transfer Tax Law (Grunderwerbssteuergesetz, abbreviated: GrEStG) relates to real property as understood by civil law, i.e. it refers to the land and any buildings on it. Flat ownership is considered as real property, too (GrEStG § 2 (2), No. 3). The tax is imposed on transactions which imply a transfer of title to domestic real property and is usually measured by the purchase price (GrEStG §§ 8-9).

The effects of the real property tax were considered, too. The tax is annually imposed on farming and forestry establishments (called real property tax A) and on real estate (termed real property tax B) [GrStG § 2 No. 1, 2]. The tax liability of the real property tax B is calculated in two steps as stipulated in the law. First, the standardized value is multiplied by a factor of 0.0035 for general real estate (GrStG §§ 13 (1), 15 (1)). Then, a multiplier, which is determined by the municipality (GrStG § 25 (1)) and which varies between approximately 200 % and 600 %, is applied to this result (Rose 1993, 126-127). Real estate situated in the new federal states is subject to special rules. Partly, the standardized values of 1935 form the tax base (GrStG § 41). If the standardized value of 1935 does not exist or cannot be determined, a substitute assessment basis is applied to certain types of residential property such as rental housing capital (GrStG § 42).

The wealth tax was imposed on natural and legal persons until 1996, but has not been collected since 1997 because of the decision of the Federal Constitutional Court of 22 June 1995 (European Commission (ed), 12). The tax was regulated by the Wealth Tax Law (Vermogensteuergesetz, abbreviated: VStG) and related to many stipulations of the Valuation Law (Bewertungsgesetz, abbreviation: BewG). The wealth tax was levied on the net worth (assets minus liabilities) as defined according to sec. 114 to 120 of the Valuation Law (VStG § 4). Due to this fact no tax liability would arise in the first years after the acquisition of the flat if the investment was largely debt-financed.

Since rental income is exempt from value added tax (VAT) according to Sec. 4 No. 12 of the Value Added Tax Law, VAT does not need to be considered. Likewise, church tax is not taken into account, because the investor is assumed not to belong to a public-law church body.

2.4 Changes in Tax Legislation between 1992 and 2002

During the investment period several relevant elements of German tax law have been subject to changes which have to be taken into account when calculating realized returns: The income tax tariff in Section 32a of the Income Tax Law has been changed substantially since 1999. The highest marginal tax rate in the upper proportional zone totalled to 53 % from 1991 until 1999. It was reduced to 51 % in 2000, to 48.5 % in 2001 and 2002, to 47 % in 2003, to 45 % in 2004, and to 42 % from 2005. These reductions were the results of the Tax Relief Law 1999/2000/2002, the Tax Reduction Law of 23 October 2000, BGBl 2000 I p. 1433, the Extended Tax Reduction Law of 19 December 2000, BGBl 2000 I p. 1812, and the Law of 29 December 2003, BGBl 2002 I p. 3076.

The tax rate of the solidarity surcharge has changed over time, as well. First, the solidarity surcharge was introduced only for the assessment periods 1991 and 1992 to be imposed at a regular rate of 7.5 % (Solidarity Surcharge Law of 24 June 1991, BGBl 1991 I p. 1318). Then, under the Solidarity Surcharge Law 1995 of 23 June 1993, BGBl 1993 I p. 975, the charge was levied at a rate of 7.5 % (§ 4) without time limit as from 1995. The tax rate of 7.5 % has been replaced by a rate of 5.5 % from the assessment period of 1998 under the Law of 21 November 1997, BGBl 1997 I p. 2743.

A lump sum deduction of DM 42 per m² of living space was deductible as an income-related expense in addition to interests on loans and depreciation from 1996 to 1998. This lump sum deduction was introduced by Article 1, No. 15 of the Law of 11 October 1995, BGBl 1995 I p. 1250 and abolished by Article 1, No. 14 of the Tax Relief Law 1999/2000/2002 of 24 March 1999, BGBl 1999 I p. 402.

The purchase of an individually-owned flat has been subject to the real property transfer tax as from 24 June 1991 (Article 23 of the Law of 24 June 1991, BGBl 1991 I p. 1322). At that time, the tax was imposed at a rate of 2 % (section 11 of GrEStG 1983 of 17 December 1982, BGBl 1982 I p. 1777). The tax rate has been increased to 3.5 % as from 1 January 1997.

3 Data

Calculation of realized returns of typical or average real estate investments first of all requires information on the actual past development of property prices and rents. As our calculations should be of representative character we found it most appropriate to use existing statistical data. Nevertheless, this kind of data cannot be readily obtained for a number of reasons. First, a continuous measurement of price trends of identical objects is simply not possible, because there are usually long intervals between any two transactions, so that ongoing price measurements must relate to different objects. Second, residential property is very heterogeneous. No single building is completely identical to another. The most important single pricing determinant is the location of a property. Other relevant pricing determinants are e.g. the living space, the characteristics and the configuration of the flat (Bank of England 2003, 38; Deutsche Bundesbank 2003a, 46).

It is due to these technical problems that for a long time there have not been any official statistics for residential property prices in Germany. It was not until 2003 that Deutsche Bundesbank presented a property price index (Monatsbericht Mai 2003; English version: Monthly Report September 2003). This index is based on raw data on rents and property prices provided by BulwienGesa AG. These statistics are available for terraced houses and flats of standardized characteristics in a number of German cities. There are prices for new and new reformed dwellings and for used property. BulwienGesa AG has provided us with data series of average prices of residential property and average rents for new and second-hand flats in Erfurt, Leipzig, Magdeburg, Munich, and Stuttgart. Data go back to 1990 (see *diagrams 1-4* below, all data are given in Euro). According to BulwienGesa AG data series were derived from prices and rents of flats with approximately 70 m² of living space, three rooms, in good locations. We find these characteristics appropriate for a typical direct investment in rental property.

These data are used in several ways: first, the *purchase price* for each of the five flats is directly taken from BulwienGesa's average property prices for new and new reformed dwellings in the respective city in the year of the investment. Second, the nominal amount of the rent in the first year is also taken from the data set of rents for first-time occupation.

Diagram 1: Prices of flats in different cities (New dwellings)

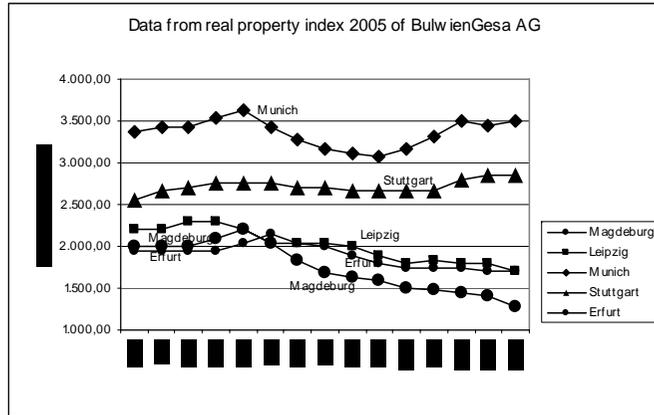


Diagram 3: Rents of flats (First-time occupation)

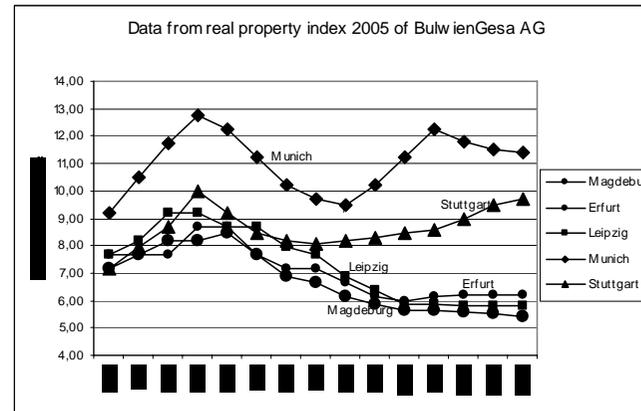


Diagram 2: Prices of flats in different cities (Resales)

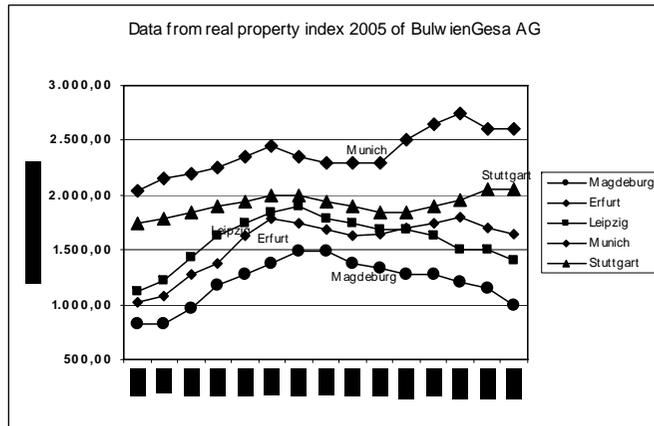
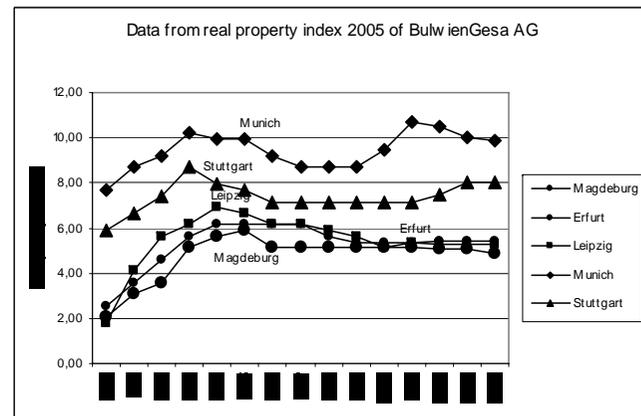


Diagram 4: Rents of flats (Reoccupation)



Generating reasonable numbers for expected changes in property values and rents requires some additional assumptions. In principle, the prices of resold flats should form the basis of the property price movements over the investment period and the change in rents should be calculated from re-occupation data. But due to the special situation after unification, there seem to be quality related differences in the data series for the new federal states. From 1990 to the mid 1990s the increase in the prices for resold flats in the three East German cities is substantially higher than for new dwellings (see *diagrams 1 and 2*). Presumably, the share of well-preserved and well-equipped flats in the total stock of second-hand flats was very small in 1990. Over the years, this proportion has certainly risen substantially due to the massive construction of new dwellings and the renovation of older ones. The extra-ordinary increase in the prices of resold flats in the three Eastern German cities (see *diagram 2*) thus reflects a change in the quality of the average flat sold. Over the same period of time, we observe a strong increase in rents for re-occupation in the East German cities (see *diagram 4*). This effect should at least partially be due to the adjustment of the heavily subsidised rents in the former GDR to market levels. This interpretation is supported by the fact that these effects cannot be observed in the data of the cities in the old federal area. This is why we derive price movements for investments in Munich and Stuttgart from resale property prices and from rents for re-occupation without further modification. In order to eliminate the presumed data quality-related effects from price trends in the new federal states, price movements as well as the changes in rents are computed by using a weighted average of the data for new dwellings (80%) and second-hand flats (20%) until 1995. We believe that the data for new dwellings are less polluted with quality related differences and therefore better reflect the pure price movements over this period. As from 1996 the price trends were calculated by using only resale data, since the effect of quality differences should be rather small by then.

There are no comparable issues to be reported with respect to the remaining input data. Credit and debit interest rates are readily available through Bundesbank statistics (for details, see sec. 4.2 and 4.4). Tax data, including special municipal tax rates, have been collected from several sources (for details see sec. 4.4).

4 Computation of Returns

4.1 Capital Budgeting Method applied

In order to evaluate expected and realized profitability, *terminal value* is calculated using the *concept of Visualization of Financial Implications (VOFI)*, see Grob 1993 for a detailed description). All payments related to the project are accounted for, including a mortgage loan and the re-investment of positive cash flows at an average credit interest rate. This method of capital budgeting is consistent with the assumption of imperfect capital markets with differing debit and credit interest rates.

As the average price of the standard flat differs between cities, terminal value is transformed into Baldwin-type rates of return in order to make the profitability of investments of different amounts comparable. The expected / realized return on the investor's equity ROE is (Baldwin 1959; Grob 1993, 115):

$$(1) \quad ROE = \begin{cases} \sqrt[n]{\frac{E_n}{E_0}} - 1 & \text{for } E_n \geq 0 \\ -\sqrt[n]{1 - \frac{E_n}{E_0}} & \text{for } E_n < 0 \end{cases}$$

where E_0 denotes the amount of equity capital invested at date $t=0$ and E_n denotes the terminal wealth of the investor's equity at the date of divestment $t=n=10$. An ROE higher than the opportunity cost of capital means that this investment is a favourable one. When comparing the profitability of different projects, a higher ROE stands for a more profitable project. This characteristic allows us to get a ranking of all investments analyzed.²

4.2 Expected Return: Calculation

Expected ROE are calculated using forecasted prices and interest rates as if they were certain. We do not account for uncertainty in any way because we think our approach is good enough to produce an indicator of ROEs that could realistically be expected, given the market environment as it was in the year the investment was to be undertaken. Technically, this simplification could easily be overcome by including a sensitivity analysis or by accounting for probability-weighted scenarios.

² Nevertheless, using ROE as a tool for capital budgeting may lead to wrong decisions when projects with different investment periods are compared (see Hax 1993, 31; Pegels 1968, 219) or when an entire investment program has to be decided on.

It was assumed that all cash inflows and outflows always occur at the end of the period. The investor is assumed to maximize terminal value. There are no withdrawals for consumption during the investment period. Positive cash flows are reinvested at the relevant credit interest rate. Negative cash flows are assumed to reduce an existing capital market investment. Therefore, the investor loses other income at the credit interest rate. This foregone income is attributed to the project.

Calculations are in Euro. Data prior to the introduction of the Euro in 1998 were converted at the official rate (1 €= 1.95583 DM). Furthermore it should be noted that exact numbers were used for computation although numbers displayed are rounded to full Cents.

The input data and assumptions underlying the calculation of the ROE for an investment in Magdeburg are given in *exhibit 1*. Differences between these data for Magdeburg and the data for the other four cities are restricted to the purchase price of the flat, the rent, and data which derive from these amounts (e.g. amount of loan). It is assumed that the flat is purchased in the same fiscal year in which the (re-)construction of the building had been completed. The date of purchase is the 30 December 1992. In addition to the purchase price, it was estimated that some fringe costs of 5 % of the purchase price (see *exhibit 1*) were incurred for extra expenses such as the real property transfer tax that amounted to 2 % at that time (section 11 of GrEStG 1983 as of 17 December 1982, BGBl 1982 I p. 1777), and costs for real estate agents and the like.

We assume that 75% of the purchase cost is financed through a mortgage loan. Such a debt ratio can be regarded as conservative, since even ratios of up to 80 % are not unusual for direct real estate investments (see Laux 1993, 380). According to German practice, the loan is an annuity loan with a fixed interest rate. Typically, the interest rate is fixed for 5, 10, or sometimes 15 years and will then be re-negotiated. At these dates, the mortgagee has the right to pay back the loan, instead. At the beginning of the nineties, rates were rather high and could be expected to fall. Therefore, we assume the investor to chose a fixed rate for only 5 years. On divestment at date $t=10$, the investor pays back the outstanding loan. Using the average nominal interest rate for mortgage loans in December 1992 of $p=9.3\%$ which was computed on the basis of the effective rate of 9.71% (Statistisches Bundesamt (ed.) 1995, 360) and assuming a contract term for the mortgage of $n=30$ years, the annuity payment to serve the loan is calculated as:

$$(2) \quad Ann_t = L_0 * \frac{p(1+p)^n}{(1+p)^n - 1}$$

Thus, the annuity payment for the investment in Magdeburg, which requires a debt capital $L_0=109,921$ €, totals to 10,985 € (see exhibit 1). The credit interest rate of 5.24 % p.a. at which cash flows from the investment are reinvested until the end of the planning horizon is the average of the interest rate on fixed-term deposit accounts with a term of 1-3 months and deposits of DM 100,000 to DM 1,000,000 in December 1992 (7.65 %) and the interest rate for savings accounts (2.82%) published in the Statistical Yearbook (Statistisches Bundesamt (1995, 360)).

Exhibit 1: Data of calculation of expected return (Investment in flat in Magdeburg)

<i>Investment Cost</i>			
Purchase price for flat	70 m ²	1.994,04 € m ²	139.582,80 €
Share of building	60 %	83.749,68 €	
Share of land	40 %	55.833,12 €	
Fringe costs	5 %	6.979,14 €	
Total investment	105 %	146.561,94 €	
<i>Financial Capital Structure</i>			
Debt capital	75 %	109.921,46 €	
Equity capital	25 %	36.640,49 €	
Total	100 %	146.561,94 €	
<i>Receipts</i>			
Annual rent received			
70 m ²	8,18 € m ² /month	12 months	6.871,20 €
Change in rents	3,00 % p.a. 34,39 % over investment period		
Change in property value	3,00 % p.a. 34,39 % over investment period		
Credit interest rate	5,24 %		
<i>Results</i>			
ROE before tax	0,97 %		
ROE after tax	11,09 %		
Gross return on capital invested	4,69 %		
<i>Debt Capital – Annuity Loan</i>			
Nominal amount	109.921,46 €		
Amount of pay-out	100,0 %		
Interest rate	9,3 %		
Term of loan	30 years		
Annuity payment	10.985,13 €		
<i>Operating Expenditures</i>			
Rate of inflation	3 %		
Maintenance and repairs (0,5 % of building value)	418,75 € p.a.		
Insurance	76,00 € p.a.		

Interest rates are not varied over the investment period, since from the viewpoint of an investor in 1992, the current interest rate can be considered the best predictor of the future rate. It is estimated that property values, rents, and operating expenditures will all increase by an average 3% p.a. These assumptions were adopted from Laux (1993, 382) and can be regarded as reasonable estimates at that date.

The complete *cash flow calculation* of the investment in the flat in Magdeburg is depicted in *exhibit 2*. Calculations for the other cities are built up likewise. Total cash inflow per year is calculated in lines 1-6, cash outflow in lines 7-14.

Exhibit 2: Financial Plan of Calculation of Expected Return (Investment in flat for first-time occupation in Magdeburg)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total	
	0	1	2	3	4	5	6	7	8	9	10		
Cash Inflows													
1. Income from rentals	3,00%	6.871,20	7.077,34	7.289,66	7.508,35	7.733,60	7.965,60	8.204,57	8.450,71	8.704,23	8.965,36	78.770,61	
2. Interest earnings		1.312,68	1.256,93	1.202,56	1.149,54	1.097,87	1.047,49	998,37	950,43	903,58	857,70	10.777,16	
3. Pay-out loan		109.921,46										109.921,46	
4. Pay-out equity capital		36.640,49										36.640,49	
5. Liquidation value of property											187.587,61	187.587,61	
6. Total Cash Inflow		146.561,94	8.183,88	8.334,27	8.492,21	8.657,89	8.831,46	9.013,10	9.202,95	9.401,14	9.607,81	197.410,67	423.697,32
Cash Outflows													
7. Maintenance/ repairs	3,00%	-418,75	-431,31	-444,25	-457,58	-471,31	-485,44	-500,01	-515,01	-530,46	-546,37	-4.800,48	
8. insurance		-76,00	-78,28	-80,63	-83,05	-85,54	-88,10	-90,75	-93,47	-96,27	-99,16	-871,25	
9. Interest expense (loan)	9,30%	-10.222,70	-10.151,79	-10.074,29	-9.989,58	-9.897,00	-9.795,80	-9.685,19	-9.564,30	-9.432,16	-9.287,74	-98.100,54	
10. Redemption of loan		-762,43	-833,34	-910,84	-995,54	-1.088,13	-1.189,33	-1.299,93	-1.420,83	-1.552,96	-99.868,13	-109.921,46	
11. Initial investment		-146.561,94										-146.561,94	
12. Real property tax		-91,00	-91,00	-91,00	-91,00	-91,00	-91,00	-91,00	-91,00	-91,00	-91,00	-910,00	
13. Wealth tax		0	0	0	0	0	0	0	0	0	0	0,00	
14. Total Cash Outflow		-146.561,94	-11.570,87	-11.585,72	-11.601,00	-11.616,75	-11.632,97	-11.649,67	-11.666,88	-11.684,60	-11.702,86	-109.892,40	-361.165,67
15. Cash Flow		0,00	-3.387,00	-3.251,45	-3.108,79	-2.958,86	-2.801,51	-2.636,58	-2.463,93	-2.283,46	-2.095,05	87.518,27	62.531,65
16. Income tax increase (+) or reduction (-)		-25.051,10	-2.323,15	-2.213,73	-2.097,05	-1.972,69	-1.840,22	-1.699,18	-1.549,05	-1.389,33	-1.219,44	-1.038,78	-42.393,73
17. Cash Flow after Tax		25.051,10	-1.063,84	-1.037,72	-1.011,74	-986,17	-961,28	-937,40	-914,88	-894,13	-875,61	88.557,05	104.925,38
18. Cumulated CF after tax (terminal wealth)		25.051,10	23.987,26	22.949,54	21.937,80	20.951,63	19.990,35	19.052,95	18.138,07	17.243,94	16.368,33	104.925,38	
19. ROE before tax		0,97%											
20. ROE after tax		11,09%											

	1992 0	1993 1	1994 2	1995 3	1996 4	1997 5	1998 6	1999 7	2000 8	2001 9	2002 10	Total
Calculation of Income Tax Increase or Reduction												
Rental Income												
21.	Receipts											
22.	Income from rentals	0,00	6.871,20	7.077,34	7.289,66	7.508,35	7.733,60	7.965,60	8.204,57	8.450,71	8.704,23	8.965,36
23.	Total receipts from rental income	0,00	6.871,20	7.077,34	7.289,66	7.508,35	7.733,60	7.965,60	8.204,57	8.450,71	8.704,23	8.965,36
Income-related expenses												
24.	<i>Book value of flat (share of building)</i>	<i>87.937,16</i>	<i>43.968,58</i>	<i>42.209,84</i>	<i>40.451,10</i>	<i>38.692,35</i>	<i>36.933,61</i>	<i>35.174,87</i>	<i>33.416,12</i>	<i>31.657,38</i>	<i>29.898,64</i>	<i>28.139,89</i>
25.	Special depreciation 50%	43.968,58										
26.	Linear depreciation 2%		1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74
27.	Maintenance/ repairs	0,00	418,75	431,31	444,25	457,58	471,31	485,44	500,01	515,01	530,46	546,37
28.	Insurance	0,00	76,00	78,28	80,63	83,05	85,54	88,10	90,75	93,47	96,27	99,16
29.	Interest expense	0	10.222,70	10.151,79	10.074,29	9.989,58	9.897,00	9.795,80	9.685,19	9.564,30	9.432,16	9.287,74
30.	Real property tax	0,00	91,00	91,00	91,00	91,00	91,00	91,00	91,00	91,00	91,00	91,00
31.	Total income-related expenses	43.968,58	12.567,19	12.511,12	12.448,91	12.379,95	12.303,58	12.219,09	12.125,69	12.022,52	11.908,64	11.783,01
32.	Net income from rentals	-43.968,58	-5.695,99	-5.433,79	-5.159,25	-4.871,60	-4.569,99	-4.253,49	-3.921,12	-3.571,81	-3.204,41	-2.817,66
33.	<i>marginal tax rates (income tax, solidarity surcharge)</i>	<i>56,98%</i>	<i>53,00%</i>									
34.	Income tax reduction (-)/ increase (+) from rental income	-25.051,10	-3.018,87	-2.879,91	-2.734,41	-2.581,95	-2.422,09	-2.254,35	-2.078,19	-1.893,06	-1.698,34	-1.493,36
Interest Income												
35.	<i>marginal tax rates (income tax, solidarity surcharge)</i>	<i>56,98%</i>	<i>53,00%</i>									
36.	Income Tax on interest income		695,72	666,17	637,35	609,26	581,87	555,17	529,14	503,73	478,90	454,58
37.	Total Income Tax reduction (-)/ increase (+)	-25.051,10	-2.323,15	-2.213,73	-2.097,05	-1.972,69	-1.840,22	-1.699,18	-1.549,05	-1.389,33	-1.219,44	-1.038,78
												-42.393,73

The calculation of taxable rental income and interest income (from re-investing free cash flows) is calculated in lines 21-37, resulting in a net income tax payment (>0) or reduction (<0) from the investment (line 37 = line 16). This payment (reimbursement) reduces (increases) the cash flow before tax and results in the cash flow after tax of that year (line 17). All cash flows are reinvested at the assumed credit interest rate. The ROE after tax of 11.09% is calculated by applying formula (1) to the cumulated cash flow at date $t=10$, €104,925.38 (line 18). The ROE before tax (.97%, line 19) is computed the same way in an identical spreadsheet where all tax rates are set to zero.

Payments for income tax and solidarity surcharge are computed separately for rental income (lines 21 to 34 in *exhibit 2*) and interest income (lines 35-36). Assuming that the investment takes place at the end of year 0, the investor can claim a special depreciation amount of 50 % of the building value including a share of 60 % of the fringe cost (line 25) in that same year. In the case of a new converted building, special depreciation was restricted to the cost of conversion. In the following years, the building is depreciated in constant amounts of 2 % of this initial book value (line 26). Net income (line 32) multiplied with the marginal tax rate of the investor will give the income tax reduction or increase from rental income (line 34). In addition to the assumption that the investor has the highest marginal income tax rate, it was assumed that potential losses would not reduce the income so much that a lower marginal tax rate would become applicable. The highest marginal income tax rate was 53 % at that time and the solidarity surcharge amounted to 7.5 % (Solidarity Surcharge Law of 24 June 1991, BGBl 1991 I p. 1318). Since the solidarity surcharge is to be imposed on the income tax liability (SolZG §3 (2)), a marginal tax rate of 56.975 % was applicable. Because the solidarity surcharge was restricted to the years 1991 and 1992 (Solidarity Surcharge Law of 24 June 1991, BGBl 1991 I p. 1318), from 1993 onwards the marginal tax rate of 53 % was used.

4.3 Expected Return: Results

In order to evaluate the expected return on equity capital after tax of 11.09 % for an investment in a flat in Magdeburg (see line 20 in *exhibit 2*), this ROE needs to be compared with the opportunity cost of capital to the investor. The opportunity cost of capital depends on the individual investment opportunities of a person or firm and is difficult to estimate, but credit interest rates at that time can serve as indicators.

The average interest rate for fixed-term deposit accounts of investments from DM 100,000 to DM 1,000,000 was 7.65 % p.a. before tax (Statistisches Bundesamt (1995), 360) or 3.29 % p.a. (3.60 %) after tax at a marginal tax rate of 56.975 % (53 %). The average yield of public debt securities with a residual maturity of 10 years was 7.9 % in 1992 (Deutsche Bundesbank (ed) 2003b, 61), i.e. 3.4 % p.a. (3.71 %) after tax at a marginal tax rate of 56.975% (53%). Compared to this, the expected ROE of 11.09 % after tax offered a considerable premium to compensate for the risks from leverage and from the development of real property and rental markets.

Exhibit 3 shows expected returns for all five cities. The best return was realized by an investment in Erfurt which yielded a ROE before tax of 3.06 % and a ROE after tax of 11.49 %. After Erfurt follow Magdeburg, Leipzig, Munich, and Stuttgart in this order. The ranking is identical with respect to the ROE before tax. There are a number of interesting observations to be made in this tableau. First, ROE after tax is considerable higher than ROE before tax, in each of the five locations. Corresponding to this, the investor's wealth after divesting the flat E_{10} is higher after tax than before tax. Terminal wealth and ROE after tax are boosted by tax benefits which on average amount to more than 60% of terminal wealth. This is due to the well-known fact that, under German income tax, the profit from selling the flat remains untaxed although depreciation allowances are deductible in the calculation of current rental income. In East Germany, this tax subsidy is even higher than in West Germany. The special depreciation of 50% plus the regular depreciation of 2% p.a. of the building value add up to a deduction of 70% of the acquisition and conversion cost of the building (not the ground). For West German investments, the investor could opt for declining balance depreciation with 7 % in the year of acquisition and three more years, 5 % in the following 6 years, and 2 % for 6 more years (EStG § 7 (5) No. 3). For a holding period of ten years (plus one day) this adds up to only 60% of the cost of the building.³

But heavier tax subsidies are not the only reason for higher expected returns in East Germany. Also before tax, profitability was expected to be higher there, as slightly higher gross returns on the capital invested (defined as rent / investment) show. This ratio is highest for Erfurt (5,11%) and lowest for Stuttgart (4,2 %). Therefore, the contribution of tax savings to the investor's terminal wealth was even lower in the East

³ Linear depreciation of 2% p.a. (EStG § 7 (4)) would only allow to write down 20% of the building value. As this is obviously worse, we assume the declining balance scheme in all calculations.

than in the West. From this point of view, property prices in the East did not look overpriced to a potential investor.

Exhibit3: Expected returns for cities in Germany

	<i>Magdeburg</i>	<i>Leipzig</i>	<i>Erfurt</i>	<i>Munich</i>	<i>Stuttgart</i>
Investment cost	146.561,94 €	169.109,54 €	142.803,89 €	251.786,01 €	199.173,98 €
Invested equity capital	36.640,49 €	42.277,38 €	35.700,97 €	62.946,50 €	49.793,49 €
Average rent received p.a.	6.871,20 €	7.728,00 €	7.299,60 €	10.735,20 €	8.374,80 €
Expected liquidation value	187.587,61 €	216.446,74	182.777,60	322.266,04	254.926,83
... in % of investment cost	127,99%	127,99%	127,99%	127,99%	127,99%
Gross return on capital invested	4,69%	4,57%	5,11%	4,26%	4,20%
Terminal wealth E_{10} before tax	40.362,97 €	43.984,86 €	48.272,45 €	52.491,23 €	40.057,06 €
ROE before tax	0,97%	0,40%	3,06%	-1,80%	-2,15%
Special depreciation	50% in 1992			none	
Annual depreciation	2% in 1993-2002			7% in 1992-1995 5% in 1996-2001 2% in 2002	
Terminal value of tax benefits	64.562,41 €	76.005,42 €	57.682,39 €	91.602,47 €	73.317,23 €
Tax benefits in % of terminal wealth after tax	61,53%	63,34%	54,44%	63,57%	64,67%
Terminal wealth E_{10} after tax	104.925,38 €	119.990,28 €	105.954,84 €	144.093,70 €	113.374,29 €
ROE after tax	11,09%	11,00%	11,49%	8,63%	8,58%

4.4 Realized Return: Calculation

The computations of realized returns are structured in the same way as those of expected returns. But now, realized changes in rents, maintenance costs, and property prices replace the forecasts used in *section 4.3* and changes in interest rates and tax rates are accounted for. *Exhibit 4* shows some non-tax key data for Magdeburg.

Exhibit 4: Data excerpt of calculation of realized return (Investment in flat in Magdeburg)

<i>Receipts</i>				<i>Debt Capital – Annuity Loan</i>	
Annual rent received					
70 m ²	8,18 € m ² /month	12 months	6.871,20 €	Nominal amount	109.921,46 €
Average change in rents			-1,62 % p.a.	Amount of pay-out	100,0 %
Change in rents over investment period			-15,11 %	Interest rate 1	9,3 %
Average change in property value			-0,46 % p.a.	for	5 years
Change in property value over investment period			-4,50 %	Next interest rate	6,13 %
Credit interest rate (year 1)			4,86 %	Term of loan	30 years
				Annuity payment 1	10.985,13 €
				Annuity payment 2	8.341,77 €
<i>Results</i>				<i>Operating Expenditures</i>	
ROE before tax		-101,70 %		Rate of inflation (year 2)	2,67 %
ROE after tax		3,27 %		Maintenance and repairs (0,5 % of building value)	418,75 €p.a.
Average gross return on capital invested		4,21 %		Insurance	76,00 €p.a.

Note that the average price changes in *exhibit 4* are merely given for information purposes. Computations are based on year-per-year price movements (see lines 2, 8, and 11 in *exhibit 5* for Magdeburg)). The one-year-change in the rent per year R_t is computed on the basis of the time-series data of BulwienGesa AG (see *section 3*) applying the following formula:

$$(3) \quad \Delta R_t = \frac{R_t - R_{t-1}}{R_t}$$

The change in the property value is calculated in the same way. Costs of maintenance and repair are assumed to grow with the consumer price index as reported in the Statistical Yearbook (Statistisches Bundesamt 2005, 512).

Exhibit 5: Financial Plan of Calculation of Realized Return (Investment in flat for first-time occupation in Magdeburg)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
	0	1	2	3	4	5	6	7	8	9	10	
Cash Inflows												
1.	Income from rentals	6.871,20	7.183,08	6.725,28	5.844,58	5.844,58	5.844,58	5.844,58	5.844,58	5.844,58	5.833,15	61.680,20
2.	<i>weighted average changes in annual rental</i>		4,54%	-6,37%	-13,10%	0,00%	0,00%	0,00%	0,00%	0,00%	-0,20%	
3.	Interest earnings	1.216,23	843,95	716,96	527,86	447,45	420,24	366,88	342,69	396,09	256,11	5.534,47
4.	<i>credit interest rates</i>		4,86%	3,53%	3,15%	2,46%	2,22%	2,23%	2,03%	2,05%	1,88%	
5.	Pay-out loan	109.921,46										109.921,46
6.	Pay-out equity capital	36.640,49										36.640,49
7.	<i>weighted average changes in property prices</i>		8,31%	5,64%	-3,98%	7,41%	0,00%	-6,90%	-3,70%	-3,85%	0,00%	-6,12%
8.	<i>market value of property</i>	139.582,80	151.186,65	159.716,08	153.357,07	164.717,02	164.717,02	153.357,07	147.677,10	141.997,12	141.997,12	133.306,64
9.	Liquidation value of property										133.306,64	133.306,64
10.	Total Cash Inflow	146.561,94	8.087,43	8.027,03	7.442,23	6.372,45	6.292,03	6.264,82	6.211,46	6.187,28	6.240,68	347.083,25
Cash Outflows												
11.	<i>changes in consumer price index</i>		2,67%	1,73%	1,49%	1,89%	0,93%	0,61%	1,42%	2,00%	1,37%	
12.	Maintenance/ repairs	-418,75	-429,93	-437,38	-443,90	-452,29	-456,48	-459,27	-465,79	-475,11	-481,63	-4.520,53
13.	Insurance	-76,00	-78,03	-79,38	-80,57	-82,09	-82,85	-83,35	-84,54	-86,23	-87,41	-820,44
14.	Interest expense (loan)	-10.222,70	-10.151,79	-10.074,29	-9.989,58	-9.897,00	-6.456,80	-6.341,25	-6.218,62	-6.088,47	-5.950,34	-81.390,84
15.	Redemption of loan	-762,43	-833,34	-910,84	-995,54	-1.088,13	-1.884,97	-2.000,52	-2.123,15	-2.253,30	-97.069,25	-109.921,46
16.	Initial investment	-146.561,94										-146.561,94
17.	Real property tax	-91,00	-91,00	-91,00	-91,00	-95,67	-95,67	-105,00	-105,00	-105,00	-105,00	-975,33
18.	<i>municipal factors in %</i>		390	390	390	390	410	410	450	450	450	
19.	Wealth tax	0	0	0	0	0	0	0	0	0	0	0
20.	Total Cash Outflow	-146.561,94	-11.570,87	-11.584,08	-11.592,89	-11.600,59	-11.615,16	-8.976,76	-8.989,40	-8.997,10	-9.008,11	-344.190,54
21.	Cash Flow	0,00	-3.483,44	-3.557,05	-4.150,65	-5.228,14	-5.323,13	-2.711,94	-2.777,93	-2.809,82	-2.767,43	35.702,26
22.	Income tax increase (+) or reduction (-)	-25.051,10	-2.374,27	-2.375,70	-2.847,93	-3.971,20	-3.966,92	-1.984,75	-1.418,09	-1.315,76	-1.162,98	-47.642,42
23.	Cash Flow after Tax	25.051,10	-1.109,17	-1.181,35	-1.302,72	-1.256,94	-1.356,21	-727,19	-1.359,84	-1.494,07	-1.604,46	50.535,13
24.	Cumulated CF after tax (terminal wealth)	25.051,10	23.941,93	22.760,58	21.457,85	20.200,91	18.844,70	18.117,51	16.757,68	15.263,61	13.659,15	50.535,13
25.	ROE before tax	-101,70%										
26.	ROE after tax	3,27%										

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Total
	0	1	2	3	4	5	6	7	8	9	10	
Calculation of Income Tax Increase or Reduction												
Rental Income												
27.	Receipts											
28.	Income from rentals	0,00	6.871,20	7.183,08	6.725,28	5.844,58	5.844,58	5.844,58	5.844,58	5.844,58	5.833,15	
29.	Total receipts from rental income	0,00	6.871,20	7.183,08	6.725,28	5.844,58	5.844,58	5.844,58	5.844,58	5.844,58	5.833,15	
Income-related expenses												
30.	<i>Book value of flat (share of building)</i>	<i>87.937,16</i>	<i>43.968,58</i>	<i>42.209,84</i>	<i>40.451,10</i>	<i>38.692,35</i>	<i>36.933,61</i>	<i>35.174,87</i>	<i>33.416,12</i>	<i>31.657,38</i>	<i>29.898,64</i>	<i>28.139,89</i>
31.	Special depreciation 50%	43.968,58										
32.	Linear depreciation 2%		1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	1.758,74	
33.	Maintenance/ repairs	0,00	418,75	429,93	437,38	443,90	452,29	456,48	459,27	465,79	475,11	481,63
34.	Insurance	0,00	76,00	78,03	79,38	80,57	82,09	82,85	83,35	84,54	86,23	87,41
35.	Share of lump sum deduction exceeding m/r + i					978,73	968,83	963,87				
36.	Interest expense	0	10.222,70	10.151,79	10.074,29	9.989,58	9.897,00	6.456,80	6.341,25	6.218,62	6.088,47	5.950,34
37.	Real property tax	0,00	91,00	91,00	91,00	91,00	95,67	95,67	105,00	105,00	105,00	105,00
38.	Total income-related expenses	43.968,58	12.567,19	12.509,49	12.440,79	13.342,52	13.254,60	9.814,41	8.747,62	8.632,70	8.513,55	8.383,13
39.	Net income from rentals	43.968,58	-5.695,99	-5.326,41	-5.715,52	-7.497,94	-7.410,02	-3.969,82	-2.903,04	-2.788,11	-2.668,97	-2.549,98
40.	<i>marginal tax rates (income tax, solidarity surcharge)</i>	<i>56,98%</i>	<i>53,00%</i>	<i>53,00%</i>	<i>56,98%</i>	<i>56,98%</i>	<i>56,98%</i>	<i>55,92%</i>	<i>55,92%</i>	<i>53,81%</i>	<i>51,17%</i>	<i>51,17%</i>
41.	Income tax reduction (-)/ increase (+) from rental income	25.051,10	-3.018,87	-2.823,00	-3.256,42	-4.271,95	-4.221,86	-2.219,73	-1.623,23	-1.500,14	-1.365,64	-1.304,76
Interest Income												
42.	<i>marginal tax rates (income tax, solidarity surcharge)</i>	<i>56,98%</i>	<i>53,00%</i>	<i>53,00%</i>	<i>56,98%</i>	<i>56,98%</i>	<i>56,98%</i>	<i>55,92%</i>	<i>55,92%</i>	<i>53,81%</i>	<i>51,17%</i>	<i>51,17%</i>
43.	Income Tax on interest income		644,60	447,30	408,49	300,75	254,93	234,98	205,14	184,39	202,67	131,04
44.	Total Income Tax reduction (-)/ increase (+)	25.051,10	-2.374,27	-2.375,70	-2.847,93	-3.971,20	-3.966,92	-1.984,75	-1.418,09	-1.315,76	-1.162,98	-1.173,72
												-47.642,42

Credit interest rates (*exhibit 5*, line 4) were derived by forming the average of the interest rates of fixed-term deposit accounts and savings accounts which were published in the Statistical Yearbook (Statistisches Bundesamt (1995, 360), (1998, 343), (2000, 338), (2003, 347)). As the interest rate on the mortgage loan was assumed to be fixed for 5 years, terms could be re-negotiated for the second half of the investment period (1998-2002). We assume a nominal 6.13 % p.a. (see *exhibit 4*) which corresponds to an effective 6.31 % p.a., the average interest rate on mortgage loans in December 1997 (Statistisches Bundesamt (1998, 343)).

There have also been a number of changes in the relevant tax rules during the project's life (see *section 2.4*). First, the combined marginal tax rates reflect the changes in the top marginal income tax rate and the re-introduction of the solidarity surcharge had to be adapted to the valid rate each year (see *exhibit 5*, lines 40 and 42). Second, between 1996 and 1998, a lump sum allowance for expenses could be deducted instead of actual maintenance costs. The allowance was €21.47 / m² (DM 42 / m²) or €1,503.2 per year for a 70 m²-flat (*exhibit 5*, lines 33-35). Finally, there are location-specific differences with respect to the real property tax. Magdeburg, e.g., has increased its municipal multiplier twice (*exhibit 5*, line 18).

Adapting the annual rent received to the market level every year as we do is a somewhat problematic assumption. Under German tenancy law, there are rather tight limits to increasing the rent for an existing tenancy. On the other hand, the landlord is not obliged to reduce the rent within an existing contract. Only if the tenants changed every year, the rent would necessarily have to be adapted to the current price level. Therefore, in times of sinking rents (see *exhibits 3/4*), our assumption is rather pessimistic. On the other hand, due to a lack of reliable data, we do not assume any vacancy periods. This somewhat exaggerates revenues and should compensate for the first effect.

4.5 Realized Return: Results

None of the five investments has met with the investor's expectations but realized returns differ a lot between locations (see *exhibit 6*). Surprisingly, the profitability gap is not between East and West Germany. There are more and less prosperous real estate markets in the new as well as in the old federal area. The most successful investments could be realized in Erfurt with an ROE after tax of 8.47 %. The second best investment was in Munich. Here, the expected ROE was only missed by one percentage point

(7.56 % instead of 8.63 %). Only in Leipzig, the return was negative. Investments in Magdeburg and Stuttgart have reached low, but positive ROEs.

Exhibit 6: Realized returns for cities in Germany

	<i>Magdeburg</i>	<i>Leipzig</i>	<i>Erfurt</i>	<i>Munich</i>	<i>Stuttgart</i>
Investment cost	146.561,94 €	169.109,54 €	142.803,89 €	251.786,01 €	199.173,98 €
Invested equity capital	36.640,49 €	42.277,38 €	35.700,97 €	62.946,50 €	49.793,49 €
Average rent received p.a.	6.168,02 €	6.757,19 €	6.470,99 €	10.084,58 €	7.203,87 €
Gross return on capital invested (avg.)	4,21%	4,00%	4,53%	4,01%	3,62%
Liquidation value	133.306,64 €	126.078,02 €	158.800,88 €	299.941,58 €	200.958,64 €
... in % of investment	90,96%	74,55%	111,20%	119,13%	100,90%
Terminal wealth E_{10} before tax	-6.736,81	-40.706,70	26.493,33	55.240,86	-384,81
<i>ROE before tax</i>	-101,70%	-106,98%	-2,94%	-1,30%	-100,08%
Terminal value of tax benefits	57.271,94 €	69.195,94 €	53.978,58 €	75.208,11 €	64.364,13 €
Tax benefits in % of terminal wealth after tax	113,33%	242,88%	67,08%	57,65%	100,60%
Terminal wealth E_{10} after tax	50.535,13 €	28.489,24 €	80.471,91 €	130.448,97 €	63.979,32 €
<i>ROE after tax</i>	3,27%	-3,87%	8,47%	7,56%	2,54%

Lower than expected rents and liquidation values both are responsible for the low realized ROEs. In all five locations, rents did not evolve as expected. In four out of five locations the gross return from rents received, on average, was approximately 0.50 % below plan (Munich: -0.25 %). But the liquidation value's effect on the result is much higher than the one of the rental revenues'. Therefore, the ranking of the locations with respect to realized ROEs is mostly driven by property prices. During the investment period, real estate prices have risen in Erfurt and Munich, they have stagnated in Stuttgart, and they have fallen in Magdeburg and Leipzig. Without the tax advantage of a privately held real estate investment, the investor would have lost his money in Magdeburg and Stuttgart, and he would even have lost twice the amount of his investment in Leipzig.

5 Conclusion

An investor who, in 1992, has bought public debt securities with a residual maturity of 10 years yielding 7.9 % p.a. on average, has earned a net return of 3.58 % after income tax and solidarity surcharge (average marginal tax rate of 54.715 %).

In retrospect, public debt securities with a term of 10 years have delivered a better return than a real estate investment in Magdeburg, Leipzig, and Stuttgart, but have performed worse than investments in Erfurt and Munich. Whereas German public debt securities can be regarded as riskless investment, the average real estate investor had to bear the risks from the development of property prices and from a 75 % leverage of his investment.

Back in 1992, assuming a further although low increase of property prices and rents and counting on a healthy development of the East German economy, investors had good reasons to expect attractive returns on real estate investments. Due to additional tax incentives, investments in East Germany promised an extra 2.5 % to 3 % of return after tax.

Exhibit 7: Expected and realized returns for cities in Germany

	Magdeburg	Leipzig	Erfurt	Munich	Stuttgart
Expected Returns					
ROE before tax	0,97%	0,40%	3,06%	-1,80%	-2,15%
ROE after tax	11,09%	11,00%	11,49%	8,63%	8,58%
Realized Returns					
ROE before tax	-101,70%	-106,98%	-2,94%	-1,30%	-100,08%
ROE after tax	3,27%	-3,87%	8,47%	7,56%	2,54%

Our calculations make it very clear that tax subsidies are an important contribution to the profitability of direct real estate investments all over Germany. The subsidy is based on the rules of income calculation which allow to expense 60 % of the building's value during a holding period of 10 years. For East Germany this subsidy was only somewhat higher as the *Assisted Area Law* (see section 2.1) increased the amount of depreciation to up to 70 % instead of 60 % of the building's value. In any case, this leads to negative rental income which is allowed to be subtracted from positive income from other sources, e.g. labour income. Therefore, rental income in Germany is systematically negative, also on an aggregate level (see Müller 2004, 76). On the other hand, profits from selling the property are not taxable after a holding period of at least ten years.

In the period we have analysed, tax subsidies alone protected a high-income investor from losing his money in a real estate investment, whether it was undertaken in the East or in the West. Only in markets which were most overheated in 1992, like Leipzig, tax subsidies did not prevent a complete loss of the money invested. To a low-income investor the tax subsidy is worth much less, as our calculation of ROE before tax show for a marginal tax rate of zero.

We must point out that these results are based on a typified investment at an average price with an average performance. The performance of actual investments may differ significantly from these average results, of course. We also want to emphasize that our results cannot be transferred to other types of real estate investments like office buildings or to investors with other tax characteristics like non-residents.

Nevertheless, we find that our research offers valuable insight to the question who has really paid for the reconstruction of East Germany. Whereas raw data on property prices and rents suggest that investors have lost a lot of the money they have invested in East Germany, our calculations show that on average tax subsidies should have compensated for most of the losses. Therefore, it was the taxpayers not the investors who have carried the extra burden from reconstructing East Germany. But taxpayers probably have spent a lot more on subsidising the much bigger West German housing market where property prices and tax subsidies per average investment were much higher.

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