How to close the value gap between market and tax values?

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Abstract

Finding a fair company value that can serve as a tax base is a difficult entrepreneurial and fiscal problem when taxes on capital (e.g. inheritance tax) are levied. Due to the fact that most companies are not listed at a stock market the market value has to be estimated. Traditionally, code-law countries solve this problem in practice dictating a compulsory valuation model as an approximation. In Germany the tax valuation is based on a combination of the net asset value and earnings. Due to legal restrictions earnings forecasts may not be included in the tax base but must be derived from historic data. In this paper we apply this German tax method to small companies listed at the German Stock Exchange 1990-2003 and analyze the spread between market value and tax value. We find out which industries are discriminated and which are privileged by this method. Furthermore, relying to Ohlson (1995) we employ regressions and investigate the explanatory power of book values and historic earnings with regard to the market value of equity. Thereby, we extend the underlying method in compliance with legal restrictions to minimize the value gap.

1 Introduction

In this study we analyze the value gap between a specific firm valuation model for tax purposes and market values and evaluate which steps can be taken to minimize the estimated spread.

If market prices are not observable the value of a firm has to be estimated. This problem is relevant for every country that levies taxes on capital or wealth, e.g. wealth, gift or inheritance tax. Basically, the legislator decides either to determine the firm value individually for each corporation or to apply standardized valuation models.

The mandatory valuation method for unlisted corporations in Germany consists of a combination of the net asset value and an earnings factor. This method has often been criticized for its focus on book values and historic figures. It is assumed that this valuation method leads to significantly lower values than market values. Nevertheless, empirical evidence does not exist yet.

Empirical research on value relevance has traditionally followed two approaches. One approach investigates the market reaction to unexpected earnings. Another approach focuses on the information content of accounting data for the formation of market prices over longer periods.

The aim of our study is to investigate if the Stuttgart Method serves as a good estimation for market values and how this approach can be improved. Section 2 introduces the structure of the Stuttgart Method. We conduct a theoretical evaluation of this method's power by comparing it with the Ohlson (1995) model. Ohlson's model represents an excellent benchmark for the Stuttgart Method as proposes a framework that relates accounting figures with market values. Furthermore, underlying concepts of both approaches are similar. From this comparison we derive four hypotheses in section 3 which we test empirically.

Section 4 describes the data sample and the necessary adjustments and assumptions. The results of our empirical analyses are presented in section 5. Based on the results from our hypotheses test we propose adjustments of the valuation model in order to improve its explanatory power of market values. The test of these hypotheses are analyzed in section 5.2. We summarize our findings and draw conclusions in the last section.

2 Company Valuation for Tax Purposes

The valuation of all assets and liabilities of a company is necessary when taxes on capital or wealth are levied, e.g. inheritance tax. Many items such as cash can be assessed easily with their fair value. Assessing several other items often forces problems as a fair value is not observable. Thus, depending on a country's valuation principles there may be different policies estimating such values. With regard to the valuation of companies and businesses many countries pursue similar general objectives. Taxable business assets are to be assessed at the market value. If transactions have been recently processed a market price usually is observable. If not, in absence of comparable transactions, a price that is likely to be realized, i.e. regular conditions between two independent dealers, has to be determined. This market value principle can be found in many countries, such as Great Britain [2], United States [3], Germany [4], Netherlands [5]or France [6].

Differences between the countries arise from individual approaches how to realize this principle. Countries with a case law system provide different methods for valuation but finally the value is settled by court decisions based on expert opinions. Code law countries, e.g. Germany, try to avoid individual valuations by statutory valuation rules. Consequently, the mandatory valuation method must be used for every company that fulfills the required conditions. Whenever companies are non-quoted the market does not provide a value for assessment. Thus the valuation of corporations that are not listed at a stock exchange is more challenging. In the following we focus in on a promising valuation method the so called *Stuttgart Method*.

2.1 Combined Method of Net Assets and Estimated Earnings

The main goal of the Stuttgart Method is to assess an impartial firm value.This method is implemented in Germany's Inheritance Tax Code Directives and is in use for several years now. The firm value V^{SM} is defined as the sum of the net asset value NAV and estimated future earnings E. This value is based on the assumption that a potential buyer is willing to pay a price that is higher than the net asset value only if the company earnings in a foreseeable period of time T exceed earnings of an alternative investment. In the following the foreseeable period of time is set equal to five years, the return of the alternative investment i_{SM} is assumed to be 9%.

[2] Chamberlain et al. (2004) p. 6403.
[3] Wassermeyer (1996) p.174.
[4] § 9 II German Valuation Code.
[5] Hoog (1996) p. 253.
[6] Ferbos et al. (2000) p. 510.

2.1.1 Net Asset Value

The net asset value can also be explained as the book value of equity. We use the expression net asset value only in the context of the Stuttgart Method. The value of all assets at the time of taxation forms the basis. Deducting the sum of all liabilities leads to the net asset value NAV. Goodwill and similar assets may not be included in the NAV. *Eisele*[7] explains that these assets are already incorporated in the earnings factor as they are said to be responsible for yielding a return above the normal rate of return. Thus, a double entry has to be avoided. Basically, the values of assets and liabilities can be derived from the latest financial statement that has been drawn up for tax purposes.

As the time of taxation and the end of the financial year usually are not identical some adjustments have to be made. All transactions and changes in value that occurred since the latest financial statement have to be included into the table of assets and liabilities. Frequently, the following events involve a reconciliation:

1. addition of profit or subtraction of loss since the last financial statement - depreciation must be considered pro rata temporis,
2. changes in property due to purchasing or selling,
3. reduction of assets caused by distributing company profits,
4. capital changes due to capital increase or capital decrease,
5. addition of assets due to hidden deposit.

Generally, the value must comply with the guidelines of taxation inducing that net asset value is based on book values. Furthermore, the book values might have been reduced by additional capital allowances. Conversely, for some assets explicit rules exist that require a revaluation and usually break with tax book values. A new assessment is mandatory for:[8]

1. land and buildings - assessed with their capitalized earnings value,
2. shares in partnerships - assessed with the share in business assets,
3. quoted securities - assessed with the lowest market value,
4. unquoted shares in a corporation - assessed with the estimated fair value, probably also the Stuttgart Method.

[7] Eisele (2004) p. 344.
[8] § 12 IV German Inheritance Tax Law.

2.1.2 Earnings

The aim of the earnings factor E is to include future earnings in the firm valuation method. The prospective earnings estimation is based on the average earnings that have been gained in the previous three years. Based on the taxable income corrections might be necessary to eliminate non-recurring, uncommon and special items. To be added:

- special additional depreciation, allocation to tax-free reserves or current-value depreciation,
- depreciation for goodwill or similar assets,
- loss deduction,
- one-time capital losses,
- tax-free investment allowance.

To be deducted:

- one-time capital gains, tax-free release of reserves,
- non-deductable expenditures,
- half of the remuneration for members of the supervisory board,
- corporate tax.

These corrections have to be considered for each of the last three years. Afterwards, the three results e_t are temporally weighted. As it is assumed that recent values are more likely to influence future earnings the latest result is weighted with the factor 3, the one before with the factor 2 and the oldest with the factor 1. Negative average earnings are assessed with 0. This may look odd against the background of the treatment in DCF-models. But this can be explained by the assumption that a potential buyer would still be willing to pay for the assets of the company.

$$E = \frac{e_{t-1} \times 3 + e_{t-2} \times 2 + e_{t-3}}{6} \tag{1}$$

2.1.3 Firm Value

The firm value is composed of the net asset value and the prospective earnings that exceed the return of an alternative investment. The prospective earnings are projected over 5 periods based on the earnings factor. Thus, the firm value is:

$$V^{SM} = NAV + 5(E - i_{SM} \times V^{SM}) \tag{2}$$

The equation can by solved for V^{SM}:

$$V^{SM} = \frac{NAV + 5E}{1 + 5i_{SM}}$$

If you set 9% for i_{SM} complying with the tax guidelines the following equation arises:

$$V^{SM} = 0.6897(NAV + 5E) \tag{3}$$

For reasons of simplification it is rounded to 0.68.

Under certain circumstances a deduction from the earnings percentage is permitted due to disproportionate earnings. The precondition for this allowance is that the employed assets yield less than 4.5% ($\frac{NAV}{E} < 4.5\%$). In other words, if the company earns in comparison to the employed assets less than 50% of the expected normal rate of return the fair value given in percent may be reduced by a certain rate. A deduction auf 3% is acceptable for every 0.45% that the rate of return falls below 4.5%. Thus, an earnings percentage of 0 leads to a fair firm value of 47.6% of the net asset value.

2.2 Theoretical Classification of the Stuttgart Method

Equity valuation approaches can be divided into dividend, cash flow, earnings and comparables approaches. Depending on the aim of the valuation and the available information a suitable approach is chosen. Discounted Cash Flow (DCF) and Discounted Dividend methods have gained strong acceptance among both practitioners and theoreticians. As the main idea of these approaches is to estimate future cash flows or dividends they cannot serve as a tax base under German law. Tax bases must not include future and thus non-deterministic figures. Consequently, a technique had to be chosen that focuses on historic figures as book value and earnings.

The Stuttgart Method can be classed in the group of Residual Income Valuation Models (RIV). Ohlson[9] provided a model that relates earnings and book values to the market value of a firm's equity. The key assumptions are the clean surplus equation and the abnormal earnings dynamics. The clean surplus equation assumes that all changes in equity book values apart from capital contributions and distributions are included in the earnings:

$$X_t = (BV_t - BV_{t-1}) + d_t$$

with X_t denoting the accounting earnings between date t-1 and date t; BV_t denoting the equity book value at date t. d_t denoting dividend at date t. Via this equation he achieves to connect accounting figures with the neoclassical framework where the value of the firm is assumed to be equal to the sum of the discounted value of the future dividends:

$$P_t = \sum_{\tau=1}^{\infty} \frac{E_t[d_{t+\tau}]}{(1+r)^{\tau}}.$$

[9] Ohlson (1995).

Peasnell[10] has shown that because of the clean surplus relation goodwill equals the present value of future abnormal earnings X_t^a. Abnormal earnings are defined as earnings exceeding the required return on book value at the beginning of the period. Integrating this finding leads to the following valuation formula

$$P_t = BV_t + \sum_{\tau=1}^{\infty} \frac{E_t[X_{t+\tau}^a]}{[1+r]^\tau}$$

with

$$X_t^a = (a_t - r)BV_{t-1} \tag{4}$$

and r is the risk-free rate and a_t is the accounting rate of return in period t.[11] Ohlson assumes that the abnormal earnings follow a linear dynamic process

$$X_{t+1}^a = \omega X_t^a + \upsilon_t + \epsilon_{t+1}$$

with ω denoting the persistence parameter of abnormal earnings, υ_t denoting the impact of information at date t, other than current abnormal earnings, on future abnormal earnings and ϵ_t describes the disturbance term at date t.

Taking into account that υ_t has the following dynamic process: $\upsilon_{t+1} = \gamma\upsilon_t + \eta_{t+1}$ with γ denoting the persistence parameter of the impact of other information the market value of a firm can be expressed as the weighted average of equity book value and abnormal earnings:

$$P_t = BV_t + \alpha_1(a_t - r)B_{t-1} + \alpha_2\upsilon_t$$

with $\alpha_1 = \frac{\omega}{1+r-\omega}$ and $\alpha_2 = \frac{1+r}{(1+r-\omega)(1+r-\gamma)}$.

2.3 Discussion of the Stuttgart Method against Ohlson's Model

Comparing the Stuttgart Method with the Ohlson model reveals significant parallels.

1. Book Value of Equity BV_t

   The net asset value represents the book value of equity. Both values focus on the same target but differences may occur from a diverging methodology in calculation. The net asset value under the Stuttgart approach is based on the balance sheet for tax purposes. Even though a couple of corrections have to be made, e.g. assessing new values for land and buildings as well as financial assets, the net asset value is mainly characterized by the prudence principle in taxation. In contrast, Ohlson favors a fair value accounting system. His model is also valid for prudent accounting systems but the explanatory power of the book value is smaller which leads to a

[10] Peasnell (1981).

[11] This equation is not new and can be found in Edwards et al. (1961) and Preinreich (1938).

stronger weight of the other information factor v_t. Research by Harris, Lang and Möller[12] underlines that the explanatory power of shareholder's equity in Germany is less significant with regard to prices than in the United States. Including book value into company valuation models is justified for at least two reasons. First, with the Ohlson model it serves as a proxy for future normal earnings and second it may represent the liquidation value.[13]

2. Abnormal Earnings X_t^a

   The Stuttgart Method also incorporates the idea of abnormal earnings. In order to estimate the actual abnormal earnings both approaches begin with a realized earnings figure. Including the abnormal earnings persistence parameter into calculus, Ohlson uses the earnings at date t. In contrast the Stuttgart Method revises earnings by uncommon and one-time items. The time-weighted average of the earnings here can be interpreted as a specification of the persistence parameter. We assume that this standardized earnings average may serve as a proxy for some companies but will lead for many companies to an over- or undervaluation.

   Furthermore, Ohlson assumes risk-neutrality and thus reduces the earnings figure by a the required return on equity book value based on the risk-free interest rate.[14] The Stuttgart Method in contrast determines a risk-adjusted rate of 9% to be applied on the capital to be invested for comparison with the earnings figure.[15] The legislator obviously assumes a risk-averse investor. Comparing both approaches, we can point out that the expected normal earnings of the Stuttgart Method clearly exceed those expected by Ohlson and thus will lead ceteris paribus to lower company values.

   This effect may be compensated by weighting the book value of equity and earnings. According to Ohlson the weight depends on the firm specific parameter ω and γ. The firm specificity is eliminated in the Stuttgart Method by a standardized multiplier of 5 years. Overall we see that the net asset value is weighted with almost 69% whereas the earnings account for 31% [16] An equal weight of NAV and E can be realised when $T \times i_{SM} = 1$. For every value > 1 E would dominate NAV. Depending on companies' and industries' characteristics this may be suitable but will also lead over- or undervaluation in certain cases.

3. Other Information v_t

   The Stuttgart Method does not take other information into account. The main problem of this rather important factor is the lack of operationalization. Not only

[12] Harris et al. (1994) p. 202.
[13] Compare e.g. Berger et al. (1996), Burgstahler et al. (1997), Collins et al. (1999).
[14] Compare Equation (4).
[15] Compare Equation (2).
[16] If you equate (3) $V^{SM} = 0,6897NAV + 3,4485E$, capitalize earnings with $EW = \frac{E}{0,09} = 11,11E$ and insert this into the previous equation $V^{SM} = 0,6897NAV + 0,3103EW$ is incidental.

that the German legislator would not implement such a vague factor into the valuation rule but valid proxies for v_t have not been identified yet.

3 Research Design

Studies of relevance in accounting have different approaches. One focus is to analyze the market reaction to unexpected earnings. Another traditional research field is the relation between accounting earnings and stock prices. Especially the information content of reported earnings has been a major focus since Ball and Brown (1968), Beaver et al. (1979), Bowen (1981) etc.[17]. After Ohlson's (1995) and Feltham and Ohlson's (1995)[18] valuation models many studies tested their models empirically with different data. Collins et al. (1997)[19] found that the combined relevance of book value and earnings has slightly increased over the past forty years which can be particularly explained by the increased value-relevance of the book value. We follow this general approach but set a slightly different focus. Our aim is to assess not only the information content of both book value of equity and earnings but furthermore, their relation specified by the Stuttgart Method. Thus we can figure out in how far Stuttgart Method is suitable as a proxy for the market value of equity.

- Hypothesis 1

  For the following regressions we assume that a potential buyer uses the Stuttgart Method as an estimate for the market value. Thus, the market value is the dependent variable. If the Stuttgart Method value is irrelevant as it focuses rather on historic figures than on future earnings or dividends the coefficient will be negative and the regression model will have no explanatory power. We expect to find a correlation between market values and Stuttgart Method an further R^2 to be lower than 1.

- Hypothesis 2

  Due to the fixed relation between book value and earnings we hypothesize that the Stuttgart Method serves as a good proxy for industries which are capital intensive and whose earnings develop constantly but has very little explanatory power for services which are characterized by smaller capitalization and greater earnings dynamics.

- Hypothesis 3

  Our third hypothesis is closely related to hypothesis two. We evaluate the significance of the information content over a longer period of time. We assume that

[17] Ball et al. (1968), Beaver et al. (1979), Bowen (1981).
[18] Feltham et al. (1995).
[19] Collins et al. (1997).

in years with volatile market expectations, both increasing and decreasing, the Stuttgart Method shows a weaker correlation with market values than in years with a development close to the long-run average.

- Hypothesis 4

  The Stuttgart Method assumes a risk averse investor, thus a risk-adjusted rate of return is incorporated in the valuation formula. Additionally, a correction of the resulting firm value is possible if the profitability is less than half of the expected rate of 9%. We assume that the explanatory power of the Stuttgart Method with regard to market values is equal for all profitability groups.

4 Data and Sample Selection

Analyzing the relation between Stuttgart Method and market price is almost impossible for unquoted companies as we cannot observe market prices. Thus, we use data of listed companies for which we find market values. Our data is taken from Datastream which provides financial statement variables and stock prices. As our main focus is to conduct our analysis only for small corporations we selected German companies whose market value is less than 0.05% of the Total Market Germany Index provided by Thomson Financial. Our sample consists of 576 companies for 1989 to 2003 after excluding companies of the financial sector (banks, insurances, etc.).

For comparative purposes, we only select cases where the financial statement has been prepared in accordance with the German Commercial Code. Thus, we eliminate disturbances that may arise from different accounting standards. The required information may not be available for the full period 1989-2003 for every company but all company figures are consecutive and do not lack information in the time series. This may have different reasons. Either the company was not listed for the whole period or they did not prepare their financial statements in accordance with the local standards throughout the whole period. Thus, the composition of the sample is not uniform for every year and every industry. Next, we reduce all cases with a negative book value of equity which leaves 3,043 cases. The reason for this is that the directives of the Stuttgart Method provide special rules in this case. Taking into consideration that three consecutive years are needed in order to assess the earnings factor for the Stuttgart Method we have to eliminate another 780 cases which leaves 2,263 suitable cases finally.

We use the four-digit industry code provided by Worldscope to divide the companies into industry groups. Industries with only few cases have been merged with similar industries: diversified and utilities, metal producers and metal product manufacturers, drugs & cosmetics and chemicals, oil, gas & coal and utilities and paper and printing & publishing.

We derive the market value from the stock price at year end multiplied with the number of outstanding shares. The book value of equity includes common equity and retained earnings. We adopt the accounting values and do not reassess land and buildings, partnerships or shares in unquoted companies as demanded by the Stuttgart Method. The required detailed information is not available. Furthermore, for the same reason we neglect all corrections that might be mandatory with regard to the results.[20] As we cannot distinguish between regulat and on-time capital gains and losses we have to be aware of the possibility that this may have a substantial impact on the earnings figure. We calculate the accounting earnings by deducting income taxes and interests paid from the earnings before income and taxes (EBIT). All values are given in one thousand Euro.

Table 1 provides descriptive statistics for the dependent variable market value MV and the independent variable Stuttgart Method value V^{SM}. Furthermore, the key components of the Stuttgart Method, the net asset value, equal to the book value, BV and the annual earnings E are displayed. It is noteworthy that the maximum of the book value is higher than the maximum of the Stuttgart Method value. This can be explained by the possibility to reduce the firm value if the profitability $\frac{E}{NAV}$ is smaller than 4.5%.

Table 1: *Descriptive Statistics for Dependent and Independent Variables*

	N	Mean	Median	Standard Deviation	Min.	Max.	First Quartile	Third Quartile
MV_{jt}	2,263	74,169.95	37,884,00	124,134.95	0	1,911,474	15,120.00	87,758.00
V_{jt}^{SM}	2,263	41,475.77	18,915.45	67,422.54	0	968,343	5,438.64	48,367.38
BV_{jt}	2,263	49,205.38	22,713.00	81,170.02	1	1,104,298	8,267.00	52,794.00
E_{jt}	2,263	341.28	896.00	18,514.19	-381,600	166,089	-875.00	4,713.00

MV_{jt} is the market value for firm j at time t.
V_{jt}^{SM} is the value applying the Stuttgart Method for firm j at time t.
BV_{jt} is the book value of equity for firm j at time t.
E_{jt} is earnings for firm j at time t.

5 Results

5.1 Relation between Stuttgart Method Value and Market Value

Starting point for our analysis is the relation between the Stuttgart Method value and the market value for the full sample. Their association is shown in table 2.

With regard to the regression, we find our Hypothesis 1 supported. R_{adj}^2 (0.630) shows a significant correlation. The coefficient β is positive and greater than 1 (1.461). These

[20] Compare p. 4.

Table 2: *Test of Relations between Stuttgart Method Value and Market Value for 1989-2003*

	N	α	β	R^2_{adj}
V^{SM}	2263	13,566.27	1.461	0.630

results suggest that the Stuttgart Method is value relevant for the market price. Nevertheless, we can only explain 63% of the market value with this approach. 37% of the market price is due to other information.

Hypothesis 2 deals with the generalization of these findings across all industries. Table 3 shows our corresponding findings.

Table 3: *Test of Relations between Stuttgart Method and Market Value sorted by industries*

$$MV_{jt} = \alpha_t + \beta_t V^{SM}_{jt} + \epsilon_{jt}$$

Industry	N	α	β	R^2_{adj}
Utilities	85	-16,572.00	1.675	0.878
Construction	238	-17,696.50	2.168	0.845
Metal Product Manufacturers	100	9,468.54	1.067	0.832
Printing and Publishing	59	-7,306.73	1.809	0.791
Automotive	95	11,025.43	1.372	0.791
Beverages	201	13,742.99	2.370	0.782
Chemicals	89	21,635.32	1.077	0.765
Machinery and Equipment	353	17,800.31	1.064	0.673
Apparel	131	22,340.72	1.470	0.632
Miscellaneous	298	25,298.76	1.048	0.649
Wholesalers	163	33,092.95	1.106	0.610
Food	84	18,889.89	1.229	0.438
Electronics	234	29,608.60	1.049	0.405
Recreation	100	1,609.75	3.822	0.352
Textiles	111	17,415.36	0.705	0.340
Retailers	87	41,419.06	0.525	0.269
Transportation	82	30,289.94	0.513	0.212
Service Organizations	308	29,550.70	1.032	0.204
Electrical	54	29,056.65	1.438	0.078

N is the number of observations.

We observe high R^2_{adj} (0.765-0.878) for seven industries - Automotive, Beverages, Chemicals, Construction, Metal Product Manufacturers, Printing and Publishing and Utilities. Six industries (Electrical, Recreation, Retailers, Textiles, Transportation, and Service Organizations) show only a low correlation between Stuttgart Method and Market Values (R^2_{adj}: 0.078-0.352). Our Hypothesis 2 is supported by these findings. Obviously the relation between book values and earnings determined by the Stuttgart Method serves as a useful proxy where it fails for other industries.

These results may be influenced by the fact that an industry group may consist of a smaller or greater number of different firms according to the availability of data. In order to minimize this impact we conducted a second analysis where each company is incorporated with their average figures for the available period. Consequently, we have a smaller number of observations but we are able to support our findings especially for small industries as Table 4 shows.

Table 4: *Test of Relations between Stuttgart Method and Market Value sorted by industries with company averages*

Industry	N	α	β	R^2_{adj}
Automotive	10	6,364.80	1.439	0.992*
Utilities	9	-3,868.66	1.548	0.981*
Metal Product Manufacturers	9	10,020.65	1.132	0.936*
Construction	21	-40,773.70	2.577	0.912*
Chemicals	8	17,435.49	1.190	0.887*
Apparel	10	43,828.00	1.914	0.843*
Machinery and Equipment	36	13,968.78	1.199	0.837*
Printing and Publishing	7	-9,485.75	1.670	0.826*
Beverages	18	13,505.45	2.224	0.744*
Miscellaneous	34	18,831.98	1.156	0.741*
Wholesalers	16	19,639.45	1.114	0.648*
Textiles	10	8,847.24	1.189	0.592*
Food	7	3,321.62	1.588	0.466**
Electronics	31	29,451.93	1.048	0.448*
Recreation	16	17,580.77	1.826	0.425*
Retailers	11	36,295.24	0.503	0.324**
Electrical	6	-3,147.35	3.509	0.220**
Service Organizations	48	40,084.99	0.943	0.083*
Transportation	7	25,954.59	0.608	0.082**

** Significant at 0.05 level.*

*** Not significant at 0.05 level.*

Overall we observe that R^2_{adj} is slightly higher for most industries except Transportation and Service Organizations. This is a consequence of the incorporation of the company averages. Due to small numbers of observations some industries do not show significant results. Nevertheless, we can state that our findings in Table 3 find support. The set of industries for which the Stuttgart Method has a high value relevance is extended by Apparel and Machinery and Equipment whereas the set of industries with a small R^2_{adj} remains unchanged.

The hypothesis, that the Stuttgart Method has a higher explanatory power for capital intensive industries holds when we look at the characteristics of the group with high R^2_{adj}. These firms are production oriented which requires plant and machinery and thus leads to absolute higher capitalization. The market seems to valuate these traditional industries with a similar measure as the Stuttgart Method does.

The market value of trade and service oriented industries can only be weakly explained by the Stuttgart Method. The R^2_{adj} of 0.083 for Service Organizations serves as a good example for the inability of the Stuttgart Method as a market proxy. This approves our assumption that the strong focus on the book value is the wrong approach for this sector. To sum it up, we can conclude that production industries seem to show a fair value applying the Stuttgart Method in comparison with the market value. In contrast, the Stuttgart Method leads to results that vary greatly from the market value. We cannot clarify whether an over- (discrimination) or undervaluation (subsidization) is the consequence for the particular companies. But we assume that the Stuttgart Method Value is significantly smaller for most Service Organizations due to a higher independence of earnings from capital.

Assuming that the Ohlson Model can perfectly explain market prices the persistence parameter of abnormal earnings and the other information multiplier lead to a different weight of book value and earnings for each company at any valuation date t. Hypothesis 3 proves that the fixed relation between book values and earnings in the Stuttgart Method has not a constant explanatory power for all years between 1989 and 2003. Table 5 gives detailed summary over the years examined.

Table 5: *Relation between the Stuttgart Method and the Market Value for each year 1989-2003*

Year	N	α	β	R^2_{adj}
1991	99	10,434.67	1.820	0.774
1992	117	17,091.86	1.418	0.755
1993	120	14,902.98	2.183	0.901
1994	133	16,347.82	1.834	0.926
1995	156	6,922.89	1.775	0.727
1996	156	9,324.48	1.613	0.711
1997	165	27,317.53	1.403	0.484
1998	210	23,209.26	1.291	0.482
1999	227	33,454.91	0.915	0.316
2000	246	36,767.62	0.847	0.243
2001	230	9,162.02	1.152	0.683
2002	216	-134,04	1.270	0.770
2003	188	-3,950.56	1.560	0.741
all years	2263	13,566.27	1.461	0.630

The R^2_{adj} for 1991-1996 shows a relative high correlation between the Stuttgart Method and market values (0.711-0.926) as well as between 2001 and 2003 (0.683-0.770). From 1997 to 2000 we discover a weak explanatory power of market values by the Stuttgart Method. These figures could be explained by three reasons.

Firstly, the sample of companies is not identical for each year. Depending on their first or last listing and their chosen accounting standards companies are incorporated in the an-

nual regression. We assume that this effect is not significant as the number of observations for each year is comparably high and effects may also offset each other.

Secondly, the yearly sample may be influenced by the listed companies that belong to certain industries. It is well known that the stock market has increasingly attracted public interest in Germany since 1996. As a consequence, smaller companies and especially companies from the Service or IT-sector went public. We have already shown that trade- and service oriented industries have a weak relation between Stuttgart Method an market value. We suspect that this effects our yearly analysis but has not a strong impact. Most companies that went public during this period chose special stock segments that required financial statements in accordance with international standards. These are excluded from our analysis.[21]

Thirdly, and most relevant from our point of view, we can identify a significant increase in market expectations between 1996 and 2000. Annual returns between 17.7% and 47.1% in the German stock market index (DAX) for each year in comparison with a long-run annual return of around 9.2% point out that market expectations have been exaggerated.[22] Transfering this conclusion to small companies must be done with caution as the development might have been different due to the liquidity of the premium stock segment. Nevertheless, it may have affected small companies as well. Thus, the Stuttgart Method was not able to incorporate all information that was value relevant. Our hypothesis that the fixed relation between book value and earnings leads in times of volatile market expectations to poorer results is significantly supported. The consolidation at the stock market in between 2001 and 2003 reveals an increasing relevance of the Stuttgart Method.

The last factor that may influence the relation between the Stuttgart Method and market values is the profitability. Comparing the four profitability groups in Table 6, selected by their treatment with regard to the earnings factor, we do not find our Hypothesis 4 supported.

Table 6: *Testing the Relation between Stuttgart Method and Market Values according to Profitability*

Profitability	N	α	β	R^2_{adj}
$\frac{E}{BV} = 0\%$	948	16,453.59	2.294	0.560
$0\% < \frac{E}{BV} \leq 4.5\%$	387	25,413.12	1.443	0.532
$4.5\% < \frac{E}{BV} \leq 9\%$	511	-961.34	1.574	0.758
$\frac{E}{BV} > 9\%$	1,020	7,938.32	1.257	0.639

We find the strongest explanatory power for a profitability between 4.5% and 9% with a R^2_{adj} of 0.758. High profitability companies ($> 9\%$) still have a significant correlation with market values but suffer from the weak importance of earnings in the valution model. For

[21] We also find certain companies in recent years that changed from international standards back to local accounting principles due to their delisting from particular stock segments.

[22] Performances provided by the German Stock Institute www.dai.de.

companies that yield a return $< 4.5\%$ we observe a quality of the Stuttgart Method of only 56%. We conclude that the corresponding adjustments are either not sufficient or too prudent. The provision for risk in this model differs obviously from market valuation processes.

5.2 Closing the Value Gap

Our previous findings show that the Stuttgart Method serves as a useful proxy for the market value but does not explain the market value completely. We try to identify ways to improve this approach by tackling the relation of book value and earnings. As the Ohlson model and the Stuttgart Method show remarkable differences with regard to the assessment of abnormal earnings [23] we take this as a starting point.

- Hypothesis 5

  The persistence of abnormal earnings is partly incorporated in the Stuttgart Method in the 3-2-1 weighting of the last three annual earnings. Comparing this proxy with different weights and taking longer periods into account we will be able to assess the informative quality of the current approach.

In the following test we analyze the information quality of five different estimates.

- E1 denoting the latest reported earnings figure.
- E2 denoting the average of the last three earnings with a 3-2-1 weighting.
- E3 denoting the average of the last three earnings with an equal weighting.
- E4 denoting the average of the last five earnings with a 5-4-3-2-1 weighting.
- E5 denoting the average of the last five earnings with an equal weighting.

The current estimate for the Stuttgart Method is E2. The other estimates are motivated by two aspects. Firstly, we want to test whether the weighting is relevant and secondly whether the length of the underlying period plays an important role. Both factors may be able to improve the persistence of abnormal earnings in the current model.

Table 7 shows that the weakest explanatory power can be assigned to E1, the latest reported earnings figure. We cannot observe significant differences between the other four estimates. Our hypothesis that weights or periods included lead to a different impact cannot be confirmed for E2 to E5 for the full sample. We find this confirmed testing is with two random groups out of the full sample.

[23] Compare page 7.

Table 7: *Test of Relations between Earnings Estimates and Market Value*

Estimate	α	β	R^2_{adj}
E1	43,082.61	6.392	0.250
E2	33,167.79	10.070	0.359
E3	32,437.95	10.532	0.361
E4	31,801.76	11.346	0.370
E5	30,832.86	12.040	0.365
$MV_t = \alpha + \beta Ei_{jt} + \epsilon_{jt}$			

- Hypothesis 6

  Taking the findings of Hypothesis 5 into account we assess the relation between the market value and the weighting of the earnings factor in comparison to the book value. We assume that for book values under conservative accounting systems a larger emphasis should be placed on earnings. Thus, we assume that an increase of the earnings multiplier leads to higher explanatory power.

Harris, Lang, and Moeller[24] found out that reported earnings do not differ significantly from US earnings according to their relevance for valuation. Consequently, in order to close the value gap, we have to find a better weight between book value of equity and reported earnings.

To test our findings of Table 7 we include two different earning estimates into our valuation model as a proxy for the earnings factor, E2 and E5. Additionally, we vary the earnings multiplier. Adjustments due to weak profitability are excluded from this analysis.

Table 8: *Test of Relation between Adjusted Stuttgart Method and market values*

Estimate	α	β	R^2_{adj}
$V^{SM_2E_5}$	9,253.09	1.241	0.662
$V^{SM_5E_5}$	6,663.89	1.389	0.699
$V^{SM_2E_7}$	11,545.50	1.068	0.627
$V^{SM_5E_7}$	6,832.69	1.262	0.688
$V^{SM_2E_9}$	14,005.20	0.926	0.592
$V^{SM_5E_9}$	7,391.44	1.149	0.673
$V^{SM_2E_{11}}$	16,353.54	0.810	0.561
$V^{SM_5E_{11}}$	8,160.55	1.049	0.658

Our standardized model formula then is:

$$V_t^{SM_kE_l} = 0.68(BV_t + E_{kt})$$

where k denotes the earnings estimate,
l denotes the earnings multiplier and
t denotes the value at date t.

[24] Harris et al. (1994) p. 201.

We find that R^2_{adj} reveals for the current system under the exclusion of profitability adjustments comparably good results with 0.662. The explanatory power for the full sample does not show huge differences across the different approaches. But we can identify two trends. Firstly, the explanatory power of the model including earnings estimate E5 dominates E2 in all cases. This stresses the slight difference that we can see in Table 7. Secondly, and this is surprising, an increasing earnings multiplier leads to a decreasing value relevance of the Stuttgart Method.

6 Summary and Conclusions

In this paper we analyzed the relation between a certain firm valuation method for tax purposes, the Stuttgart Method, and market values for a sample of German corporations. Our test yield several results. First, we find that there is a significant relation between the Stuttgart Method and market values. But, as assumed, only a part of the market value can be explained by the model. Second, we prove that the Stuttgart Model has a strong explanatory power for capital intensive industries but only weak for trade and service oriented industries. Third, we provide evidence that in times of moderate market expectations the Stuttgart Method has a higher correlation than in years with over exaggerated prospects, both negative and positive. Obviously, the Stuttgart Method cannot take other information into account. Fourth, about 56% of the market values of companies with low profitability can be explained with by the Stuttgart Method in contrast to 64-76% for highly profitable companies.

Our hypothesis with the aim to find ways to improve the Stuttgart Method has only weak support. We can identify a small tendency in favor of an earnings estimate based on a longer period that three years and with an equal weighting. An explanation can be the importance of the last year in an 3-2-1 weighting. An equal weight for five years is rather comparable with the weight put on the last years in a present value setting.[25] Neither can a significant improvement of the quality be achieved by increasing the earnings multiplier.

To sum it up, the Stuttgart Method works for some constellations very well as a proxy for the market value but it also fails in a number of cases. We did not find an easy practical solution for this problem but we could identify the setting in which the model works fine and where it fails. A reason, why the higher weighting of the earnings multiplier failed might lie in a quasi-Pareto-Optimum of the current model. Whenever we try to improve the weaknesses we lose relevance in other fields. A solution for this problem may lie in a different weighting of book value and earnings for different groups of companies. Future research will have to deal with optimal weighting and especially with the optimal and unambiguous classification of firms.

[25] The weights depend on the discount rate.

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