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Abhandlungen

Regression Betas and Implied Betas: Their Respective Implications for the Equity Risk Premium

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I. Introduction

An important issue in modern financial economics is that of how to trade off expected return against risk. One of the most influential models that quantifies this trade-off is the capital asset pricing model (CAPM) of *Sharpe* (1964) and *Lintner* (1965). The CAPM implies that the expected return of an asset is linearly related to its beta factor. It is appealing because of its strong theoretical background and its being easy to use. Therefore, CAPM betas are in wide application (e.g. for calculating the cost of capital estimation, for capital budgeting and for value based management). The breadth of their practical use has been documented by various studies. *Bruner et al.* (1998) claim that more than 80 percent of a sample of 27 best-practice US corporations use the CAPM for calculating the cost of equity, while in a broader sample of 392 US companies, *Graham/Harvey* (2001) also document that more than 70 percent of the companies surveyed do so.

A common method for determining the beta factor is based on a regression of a company's stock return on the market's return.[1] The regression approach would be appropriate if realized returns were in fact representative of future returns, as the CAPM calls for measures of ex ante return. *Elton* (1999), however, raises strong doubts about past returns actually being representative.[2] His arguments are based on the following two issues: First, information surprises are unlikely to cancel out over a

[1] In addition to past return data, accounting variables have also been used as a basis for estimating betas (e.g. *Beaver* et al. (1970), *Rosenberg/Guy* (1976a,b)). However, these approaches are rarely applied in practice.

[2] Nevertheless, the historical estimator seems to be still widely used. *Welch's* (2000) survey indicates that most finance professionals extrapolate the historical average into the future. *Ritter* (2002) refers to the method of using historical re-

sample period. This can produce a significant bias in the historical estimator. Second, returns do not seem to be identically and independently distributed over time (e.g. *Bos/Newbold* (1984), *Fama/French* (1988)). In general, they vary with the economic cycle. As a result, future returns and past returns can be negatively related. Both problems – information surprises and time varying returns – can have a large impact on regression betas.[3] Taking these two problems associated with the regression beta into consideration, it is not surprising, then, that the regression beta seems unable to explain the cross section of stock returns (e.g. *Fama/French* (1992)). This has produced the 'Is beta dead?' debate.

In this study, I propose an alternative method for estimating CAPM betas. This concept does not rely on historical returns but, in contrast, applies only current data (market expectations and current prices). Therefore, the aforementioned problems can be avoided. Specifically, the proposed method consists of three steps: First, the implied expected return for a firm is estimated by the discount rate that equates the market value of a firm to the present value of all future cash flows (*Gebhardt* et al. (2001)). Second, subtracting the risk-free rate from the implied expected return estimates the equity risk premium (e.g. *Claus/Thomas* (2001)). This implied risk premium will be computed for each company and for a market index which proxies the market risk premium. Third, dividing a company's risk premium by the market risk premium finally yields an estimate for a company's implied beta. I provide empirical evidence for my claim that implied betas do perform better than regression betas when explaining the cross section of stock returns and that, therefore, the implied beta provides a better understanding of the market's perception of the risk associated with an investment in a firm's stock.

This paper proceeds as follows: In section II, the regression beta is compared with the implied beta method. Section III investigates how the two measures of the beta perform empirically when explaining the cross

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turns to estimate future returns as one of the "biggest mistakes being taught in finance courses".

3 First, it is well known that regression estimators are particularly sensitive to outliers (information surprises). Second, a time variation in returns violates the assumptions underlying the OLS regression of identically and independently distributed returns. The sensitivity of outliers in a regression approach can be reduced if, instead of single stocks, betas of portfolios are estimated (e.g. *Alexander/Chervany* (1980), *Fama/French* (1992)). Alternatively, robust estimation methods have been proposed that reduce the impact of outliers on the regression beta (e.g. *Chan/Lakonishok* (1992)).

section of stock returns. In this section, the German stock market will be investigated. Conclusions are presented in Section IV.

II. How Betas are Estimated

1. The Regression Beta

The most common estimator of a stock's beta is the slope coefficient of an ordinary least square (OLS) regression based on realized returns. In particular, the beta is estimated by running the regression

$$(1) \qquad (R_{i,t-\tau} - R_{f,t-\tau}) = \alpha_{it} + \beta_{it} \cdot (R_{m,t-\tau} - R_{f,t-\tau}) + \varepsilon_{i,t-\tau} \quad \tau = 0,\ 1,\ 2,\ \ldots,\ T-1$$

where $R_{i,t}$ and $R_{m,t}$ are the realized returns in period $[t-1, t]$ of asset i and market portfolio m, respectively, and $R_{f,t}$ is the risk-free rate. t denotes the date on which the regression beta is estimated and T is the length of the estimation period. I will refer to the OLS estimator $\hat{\beta}_{it}^{OLS}$ as the *regression beta*.

There is no theoretical justification for selecting the return frequency (e. g. daily or monthly returns) and the length of the estimation period.[4] I therefore follow the common approach in the literature, which is to use five years of monthly return data. The risk-free rate in (1) is approximated by a one-month money market investment. As a proxy variable for the unobservable market portfolio (*Roll* (1977)), six different market indexes are applied: Two stock indexes (a German stock index and a world stock index), two equally weighted indexes of stocks and bonds, and two equally weighted indexes of stocks, bonds and real estate:

- Datastream Total Market Index Germany (DTM)
- MSCI World Index (MSCI)
- 1/2 DTM and 1/2 Rex Performance Index (RPI)
- 1/2 MSCI and 1/2 RPI
- 1/3 DTM and 1/3 RPI and 1/3 Nareit[5] Equity Total Return Index (NAR)
- 1/3 MSCI and 1/3 RPI and 1/3 NAR.

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4 Varying the return frequency or the sample length might alter the regression beta (e. g. *Smith* (1978)).

5 Nareit = National Association of Real Investment Trusts.

2. The Implied Beta

Following the notion of the CAPM, which calls for expected returns, the implied beta approach is a forward looking method which relies solely on market expectations (future earnings) and current data (price and book value). Implied betas are computed from implied expected returns following *Gebhardt* et al. (2001). Implied expected returns are derived from a residual income model that equates the present value of a stock with the discounted sum of expected future abnormal earnings plus the current book value:[6]

$$PV_t = B_t + \sum_{\tau=1}^{\infty} \frac{E_t\big[\overbrace{\big(roe_{t+\tau} - r_t^{(e)}\big) \cdot B_{t+\tau-1}}^{AE_{t+\tau}}\big]}{\big(1 + r_t^{(e)}\big)^{\tau}} \tag{2}$$

where

PV_t = present value of future cash flows at time t

B_t = book value at time t

$E_t[.]$ = expectation based on information available at t

$AE_{t+\tau}$ = abnormal earnings for period $t+\tau-1, t+\tau$

$r_t^{(e)}$ = implied expected return (cost of equity) at time t

$roe_{t+\tau}$ = return on equity for period $t+\tau-1, t+\tau$

By equating the present value to the stock price, $PV_t = P_t$, equation (2) can be solved for the discount rate $r_t^{(e)}$. As $r_t^{(e)}$ is implied by the current market price, it can be termed "the implied expected return". This implied expected return can be computed for both an individual stock i and the market portfolio m denoted by $r_{it}^{(e)}$ and $r_{mt}^{(e)}$ respectively. The implied expected return for the market portfolio will be proxied by a value weighted average of all company's implied expected returns, $r_{mt}^{(e)} = \sum_{i=1}^{N} w_{it} \cdot r_{it}^{(e)}$, where w_{it} is the market weight of stock i with $\sum_{i=1}^{N} w_{it} = 1$. Subtracting the risk-free rate of return yields the implied risk premium: $\pi_{it} := r_{it}^{(e)} - r_{ft}$, where π_{it} denotes the implied risk premium of stock i. π_{mt} is then the implied risk premium of the market portfolio m. Following *Claus/Thomas* (2001), the risk-free rate r_{ft} is approximated by the yield

6 Alternatively, a different valuation model (e.g. dividend discount model) could be applied. The advantage of the residual income model over the dividend discount model is its lower sensitivity to assumptions about long-term profitability (*Claus/Thomas* (2001)). However, under consistent assumptions, all valuation models would lead to comparable results.

of a ten-year government bond. Dividing the company's implied risk premium by the market's implied risk premium yields the *implied beta*:

$$\hat{\beta}_{it}^{IMP} := \frac{\pi_{it}}{\pi_{mt}}. \tag{3}$$

As the implied risk premium is a forward looking measure, the implied beta (3) captures the idea of the CAPM as an ex ante model. $r_{it}^{(e)}$ in (2) can then be replaced by

$$r_{it}^{(e)} = r_{ft} + \hat{\beta}_{it}^{IMP} \cdot \pi_{mt}, \tag{4}$$

and the resulting equation can be solved for $\hat{\beta}_{it}^{IMP}$.

Equation (2) states the present value in terms of an infinite series requiring an infinite number of abnormal earnings estimates, which are difficult to obtain. Therefore, empirical implementation of (2) requires simplifying assumptions. First, a forecast period must be specified, where abnormal earnings are explicitly estimated. Second, expected abnormal earnings after the forecast period must be captured by a terminal value.

Here, I follow the approach of *Gebhardt* et al. (2001), who employ a three-stage residual income model. In the first stage, abnormal earnings are estimated directly from analysts' forecasts. This is the explicit forecast period. In stage two – sometimes termed "fading period" – the return on equity converges to a steady-state return on equity. In stage three, the steady-state return on equity is assumed to be constant in all future periods. This assumption allows the calculation of a terminal value. Specifically, (2) with (4) can then be rewritten as

$$PV_t = B_t + \sum_{\tau=1}^{T_1} \frac{E_t\left[\left(roe_{t+\tau} - \left(r_{ft} + \hat{\beta}_{it}^{IMP} \cdot \pi_{mt}\right)\right) \cdot B_{t+\tau-1}\right]}{\left(1 + r_{ft} + \hat{\beta}_{it}^{IMP} \cdot \pi_{mt}\right)^{\tau}} \qquad \text{(stage1)}$$

$$(5) \qquad + \sum_{\tau=T_1+1}^{T_2} \frac{E_t\left[\left(roe_{T_1} - \left(roe_{T_1} - roe_{t,L}\right) \cdot \frac{\tau - T_1}{T_2 - T_1} - \left(r_{ft} + \hat{\beta}_{it}^{IMP} \cdot \pi_{mt}\right)\right) \cdot B_{t+\tau-1}\right]}{\left(1 + r_{ft} + \hat{\beta}_{it}^{IMP} \cdot \pi_{mt}\right)^{\tau}} \qquad \text{(stage2)}$$

$$+ \sum_{\tau=T_2+1}^{\infty} \frac{E_t\left[\left(roe_{t,L} - \left(r_{ft} + \hat{\beta}_{it}^{IMP} \cdot \pi_{mt}\right)\right) \cdot B_{t+\tau-1}\right]}{\left(1 + r_{ft} + \hat{\beta}_{it}^{IMP} \cdot \pi_{mt}\right)^{\tau}} \qquad \text{(stage3)}$$

Stage 1: The explicit forecast period

The explicit forecast period T_1 is limited by the availability of analysts' forecasts. The earnings forecasts are available for the next 3 fiscal years (I/B/E/S consensus forecasts). Therefore, $T_1 = 3$. The return on equity (ROE) is computed by dividing the earnings forecasts for fiscal year $t + \tau$ by the book value at the end of fiscal year $t + \tau - 1$.

Stage 2: The fading period

In the second stage, earnings are forecasted implicitly by mean reverting the expected ROE in T_1 to a steady-state ROE (described below). This mean reversion in the ROE captures the idea of a possible long-term erosion of an abnormal ROE (the difference between the explicitly estimated ROE and the steady-state ROE). This long-term erosion can be empirically observed.[7] The results of *Penman* (1991) suggest that an abnormal ROE converges to a steady state over a period of between 9 and 12 years. Thus, the total forecast horizon is assumed to be $T_2 = 10$ fiscal years.

Stage 3: The terminal value

Fama/French (2000) argue that a competitive economic environment leads to a mean reverting profitability – within as well as across – industries. Therefore, the steady-state ROE (denoted by $roe_{t,L}$) is assumed to be the same across all firms.[8] The steady-state ROE is set to the yield of a 10-year government bond plus 6 percent. Six percent is approximately the excess ROE above the long-term bond yield that has been observed in the past.[9] While the specification of the terminal value can have a significant effect on the implied risk premium (see, e. g., *Daske* et al. (2006)) for a comparison of two different approaches in the German stock market), the impact on the implied beta should be smaller. The reason

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7 See, e. g., *Freeman* et al. (1982), *Penman* (1991) and *Fama/French* (2000).

8 *Gebhardt* et al. (2001) use, instead, an industry-specific steady-state ROE. They implicitly assume that the competitive advantage of an industry, reflected in an above average profitability, will last forever.

9 See Appendix A for a derivation. Six percent can also be justified by the results of *Fama/French* (2002). They report, albeit for US companies, a real ROE (nominal ROE minus inflation rate) of 7.6 percent. Deducing the real interest rate of 1.5 percent, which can be derived from inflation linked bonds (in April 2005), also yields approximately 6 percent.

for the smaller influence stems from the calculation of the implied beta as the quotient between two implied risk premiums (see Equation (3)). If the specification of the terminal value changes the implied risk premium of the stock and the market in the same direction, the influence of the long-term assumptions cancel out partly.

Book values, dividend pay-out ratios and long-term growth rates

Implementation of (5) requires future book values. The residual income model generates future book values by using the clean surplus relation, whereby the future book value is $B_{t+1} = B_t + E_{t+1} \cdot (1 - q_{t+1}) = B_t \cdot (1 + (roe_{t+1} \cdot (1 - q_{t+1}))$. This assumption, as pointed out by *Ballwieser* (2005), can be violated. However, the implication of a possible violation seems to be difficult to assess. The dividend pay-out ratio, q_t, is set to the most recent (observed) pay-out ratio in stage one. Pay-out ratios greater than one (less than zero) are set to one (zero). In the second stage, the pay-out ratio is assumed to converge linearly to the long-term pay-out ratio of 50 percent,[10] which is the constant pay-out ratio in stage 3. According to the residual income model, a constant ROE and a constant dividend pay-out ratio yield a constant expected growth rate of book values, earnings and dividends, which is assumed to be the same across companies.[11] This assumption seems to reflect the empirical observations of *Chan* et al. (2003) quite well. Their findings suggest that above average growth rates are unlikely to last longer than ten years (due to the competitive economic environment).[12]

3. *Case Study: Merck*

The two approaches – the regression beta and the implied beta – will now be illustrated by the example of the position of the US pharmaceutical company, Merck, during the last quarter of 2004. The case study

10 A pay-out ratio of 50% approximates the historical pay-out ratio of German companies quite well.

11 See (A3) in appendix A for how the growth rate of the book value relates to the return on equity and the pay-out ratio. This growth rate of the book value also equals the growth rate of dividends and earnings in stage 3.

12 Following the approach of *Gebhardt* et al. (2001) would result in different infinite growth rates for different companies. This type of approach implies the unrealistic result that earnings of the company with the highest growth rate would be greater than the combined earnings of all companies with a lower growth rate in the distant future.

addresses some main problems with the regression beta, namely the impact of a significant single event and the change in a company's risk. On September 30, 2004, Merck announced the withdrawal of its top selling drug, Vioxx, which had been approved five years previously by the FDA (Food and Drug Administration in the US). Merck's withdrawal followed the results of a clinical trial which showed that high doses of Vioxx may cause a heightened risk of cardiovascular complications, such as heart attacks and strokes. On the day of this announcement, Merck lost more than 25 percent of its market value and the share price dropped from 45.07 US-$ to 33 US-$ (impact of a significant event). The drop in share price was driven by two main factors: First, earnings expectations fell significantly following the withdrawal of Vioxx, because the drug represented more than 10 percent of Merck's annual sales (2.55 bn $ sales of Vioxx compared to 22.49 bn $ total sales in 2003). According to I/B/E/S consensus estimates, the earnings expectations per share for the fiscal year 2004 (2005, 2006) fell from 3.14 US-$ (3.34 US-$, 3.31 US-$), before the withdrawal, to 2.61 US-$ (2.57 US-$, 2.54 US-$) two months after the withdrawal. Second, the risk of the stock increased, as lawsuits were expected to be filed against Merck for personal injury caused by Vioxx. As a consequence, a multi-billion-dollar settlement against Merck was expected, albeit with a highly uncertain outcome.[13] Such a risk should generate a higher variance of future returns. Assuming that the correlation of the return between Merck and the market remains constant, the cost of capital should increase. If, however, the market interprets this risk as purely idiosyncratic, the higher variance should be offset by a lower correlation. In this case, the cost of capital should not change.

Merck's corporate bond prices directly reflected an increase in risk as bond prices fell and the bond spreads (i. e. a measure of the cost of debt) increased in the weeks following the announcement. Table 1 shows that, two months after the announcement, Merck's corporate bond spread had widened to 69 basis points from 50 basis points (one month before the announcement). This increase indicates that the bond market did not regard the risk as purely idiosyncratic. Therefore, it seems reasonable to assume that the decrease in the stock price had also partly reflected an increase in systematic risk. The implied beta in fact reflects an increase

[13] In August 2005, the first verdict penalized Merck with a fine of 253 million US-$. Altogether, as of August 2005, more than 4,200 cases still stood to be decided.

in the cost of equity, as it rose from 0.680 one month before the announcement to 0.870 two months after the announcement. Thus, the impact of the falling stock price on the implied beta factor was larger than the impact of the falling earnings expectations was. The regression beta actually suggests a falling beta from 0.426 one month before the announcement to 0.308 two months after the announcement. This decrease in the regression beta was caused mainly by two monthly returns (September 2004: –25.34 percent, and October 2004: –15.24 percent) in the regression (see also Appendix B). The lower regression beta suggests that a lower cost of equity contradicts the increase in Merck's corporate bond spreads (synonymous with a higher cost of debt). Thus, it seems likely that the regression beta wrongly estimates the cost of equity, as negative returns, which were partly driven by an increase in Merck's fundamental risk, in fact lowered the regression slope and, therefore, the regression beta.

Table 1

Corporate Bond Spread, Regression Beta and Implied Beta of Merck Before and After the Withdrawal of Vioxx (Announced on September 30, 2004)

Date	Corporate bond spread[a)] (bp)	$\hat{\beta}_{it}^{OLS}$ [b)]	$\hat{\beta}_{it}^{IMP}$ [c)]	π_{it}^{IMP} (bp)
September 1, 2004	0.50	0.426	0.680	2.72
September 30, 2004		Withdrawal of Vioxx		
October 1, 2004	0.54	0.375	0.855	3.42
November 1, 2004	0.64	0.303	0.883	3.53
December 1, 2004	0.69	0.308	0.870	3.48

a) The corporate bond spread is computed by the difference in bond yields of Merck's 4 3/8% bond (due in 15/02/2013) and the US Treasury bond 3 7/8% (due in 15/02/2013)

b) $\hat{\beta}_{it}^{OLS}$ is calculated by OLS over the last 60 months. The risk-free rate is proxied by the yield of a 1-month treasury bill note.

c) $\hat{\beta}_{it}^{IMP}$ is calculated by (5). For simplicity's sake, it is assumed that the market risk premium was constant from September 1, 2004 to December 1, 2004.

III. Betas and the Cross Section of Stock Returns

In this section, implied betas and regression betas will be calculated for a large sample of stocks. On the basis of the cross section approach of *Fama/MacBeth* (1973), it will be investigated as to whether the implied beta systematically reflects a company's risk better than the regression beta does.

1. Data and Calculation Details

The sample of firms consists of all German companies at the intersection of (i) constituents of the Datastream Total Market Index Germany and (ii) companies which are followed by I/B/E/S. Data for stock prices, book values and stock returns are from Datastream. Data for earnings estimates are from I/B/E/S (mean consensus estimates). I require firms to have a positive book value and one-year-ahead, two-years-ahead and three-years-ahead earnings per share forecasts from I/B/E/S. If the three-years-ahead earnings per share are missing, they will be approximated by the expected return on equity for fiscal year two. As can be seen from the summary statistics in Table 2, the extrapolation of fiscal year two's return on equity for fiscal year 3 was applied in the case of more than half of the companies in the sample for the early 90s and of about one fifth of the companies in the sample for the early 00s. The forecast requirement limits the sample to the time period from 1990 to 2004. For pre-1990, I/B/E/S earnings estimates are either not available or their coverage by analysts is low. The calculation of the regression beta additionally requires data on returns 60 months prior to the calculation date. This further restricts the size of the sample of firms as, for example, newly listed firms cannot be included until after five years of return data. As a result, the number of firms for which a regression and an implied beta can be calculated varies from between 42 and 120 (see the last column of Table 2).

Regression betas and implied betas are calculated each year on July 1. In the case of the implied beta, a time lag between the date of computation and the fiscal year end has to be considered. According to (2), the present value refers to the fiscal year end of a firm, which is usually December 31, and not July 1. The time lag between these two dates is considered by equating the fundamental value (of the fiscal year end) to the discounted price as follows:

$$P_t = PV_{fiscal\ year\ end} \cdot \left(1 + r_t^{(e)}\right)^{(t - fiscal\ year\ end)/365}. \tag{6}$$

Replacing the present value by (5), equation (6) can be solved for the implied beta.

Table 2

Summary Statistics of a Number of Firms for which Earnings Estimates for Fiscal Years One, Two and Three are Available (Columns 2 to 4) and of a Number of Firms for Which an Implied Beta and Regression Beta Coefficient has been Calculated (Column 5)

Year	Fiscal year one	Fiscal year two	Fiscal year three	Implied and regression beta
1990	69	53	10	42
1991	74	69	22	54
1992	85	78	35	62
1993	85	82	38	63
1994	90	92	59	69
1995	93	91	59	71
1996	96	96	26	77
1997	99	97	59	79
1998	112	109	60	89
1999	118	117	75	102
2000	134	132	100	109
2001	142	141	114	120
2002	146	142	105	120
2003	137	130	93	109

2. *Cross Section Regression*

The CAPM implies that the beta is the only factor that explains the cross section of stock returns. To test this implication, *Fama/MacBeth* (1973) suggest the following cross sectional regression equation, which is run in each year from 1991 to 2004:[14]

(7) $$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t} \cdot \hat{\beta}_{it-1} + \varepsilon_{it}, \ \forall \ t = 1991, \ldots, 2004.$$

[14] A cross section regression could not be run in 1990, as this would have required data on July 1, 1989, which were not available for calculating the implied beta.

$R_{it} - R_{ft}$ refers to the stock's excess return from July in year $t-1$ to July in year t, where R_{ft} is the risk-free return from July in year $t-1$ to July in year t (calculated from default-free government bonds). The estimated parameters $\hat{\gamma}_{0t}$ and $\hat{\gamma}_{1t}$ are then aggregated in the time dimension:

$$\hat{\gamma}_0 = \frac{1}{\tau} \cdot \sum_{t=1}^{\tau} \hat{\gamma}_{0t} \tag{8}$$

$$\hat{\gamma}_1 = \frac{1}{\tau} \cdot \sum_{t=1}^{\tau} \hat{\gamma}_{1t} \tag{9}$$

The CAPM implies that the aggregated parameter $\hat{\gamma}_1$ estimates the market risk premium and should therefore be significantly greater than zero if the average investor is risk-averse. Furthermore, $\hat{\gamma}_0$ should not be significantly different from zero, as the beta is the only factor that should explain differences in the cross section of returns. Regression (7) will be run separately for regression betas and implied betas and in a multivariate approach, resulting in the following three regression equations:

$$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t}^{OLS} \cdot \hat{\beta}_{it-1}^{OLS} + \varepsilon_{it},\ \forall\, t = 1991, \ldots, 2004. \tag{7a}$$

$$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t}^{IMP} \cdot \hat{\beta}_{it-1}^{IMP} + \varepsilon_{it},\ \forall\, t = 1991, \ldots, 2004. \tag{7b}$$

$$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t}^{OLS} \cdot \hat{\beta}_{it-1}^{OLS} + \gamma_{1t}^{IMP} \cdot \hat{\beta}_{it-1}^{IMP} + \varepsilon_{it},\ \forall\, t = 1991, \ldots, 2004. \tag{7c}$$

To increase the precision of regression betas, stocks are, in general, grouped into portfolios (i. e. decile portfolios). Potential estimation errors should, therefore, cancel out among stocks in each portfolio. I abstain from this approach because the sample size of between 42 and 120 seems to me to be too small for the grouping approach. However, applying the cross sectional approach to single stocks (instead of stock portfolios) should not substantially alter the conclusions drawn from the results.

3. Cross Sectional Results and Implications for the Market Risk Premium

The results for cross sectional regressions (7) are summarized in Table 3. Panel A displays the results of the cross section regression for the regression beta. Panel B shows the results for the implied beta. Panel C displays the results for the multivariate regression. Results, in general, do not depend on the proxy for the market index. Thus, I focus the discussion of the results on two stock market indexes: the Datastream Total Market Index Germany (DTM) and the MSCI World Index (MSCI).

a) The Regression Beta

If the stock's excess return is regressed on the OLS regression beta, the estimated parameter $\hat{\gamma}_1^{OLS}$ is significantly smaller than zero (t-value = –1.889) when DTM is used as the market proxy, and $\hat{\gamma}_1^{OLS}$ is not significantly smaller than zero when MSCI is used as the market proxy (although the estimated parameter is also negative). This implies a negative or a flat market risk premium (Table 2, Panel A). A negative or flat market risk premium contradicts the implications of the CAPM and confirms the results of other studies that regression betas seem to be unable to describe the cross section of stock returns. The intercept, $\hat{\gamma}_0$, in general, is not significantly different from zero. Using market proxies other than DTM and MSCI produces slopes that are negative, although in most cases, not significantly smaller than zero. This result is confirmed by the conclusions of other studies investigating the cross section relation between the regression beta and the stock return in the German market. In general, quantile portfolios sorted on the regression beta display no unambiguous difference in the portfolio return.[15]

b) The Implied Beta

If the cross section regression is run with the implied beta, the estimated parameters are compatible with the implications of the CAPM. The slope $\hat{\gamma}_1^{IMP}$ is significantly greater than zero (t-value = 2.092). The result suggests a market risk premium of 4.21 percent. The intercept ($\hat{\gamma}_0^{IMP}$ = –3.91 percent) is not significantly smaller than zero (t-value = –0.775). It should be noted that the cross section regression (7b) is run with only one market proxy. This proxy is computed by the weighted average of the implied risk premiums of all companies included in the sample. The application of the implied beta approach to other indexes was not possible, as index constituents were not available.

[15] See *Winkelmann* (1984), *Möller* (1988), *Warfsmann* (1993), *Ulschmid* (1994), *Kosfeld* (1996), *Wallmeier* (2000) and *Daske* et al. (2006) for evidence for the German stock market. In the US, there is also a flat relation between the regression beta and the stock return (e.g. *Fama/French* (1992)).

c) The Regression Beta and the Implied Beta

When the stock's excess return is regressed on both the regression beta and the implied beta, estimated slope parameters change only slightly. For example, when the DTM is used as a market proxy, $\hat{\gamma}_1^{IMP}$ rises from 4.21 percent (regression (7b)) to 4.26 percent (regression (7c)). These results suggest that the regression beta and the implied beta are not significantly correlated and, therefore, they indirectly confirm those of *Gebhardt* et al. (2001) and *Daske* et al. (2006), who document that the correlation between the implied risk premium (implied beta) and a firm's regression beta is weak and not significantly different from zero. Other market proxies yield similar results for $\hat{\gamma}_1^{IMP}$, ranging from 3.93 percent to 4.34 percent. Appendix C provides the estimated coefficients of the yearly regression (7c) in the case of the MSCI as the market proxy.

4. The Relation Between the Implied Risk Premium and the Price-to-Book Ratio

The valuation equation (2) implies that the implied risk premium (and therefore the implied beta) should be related to the price-to-book ratio of a stock. By equating $PV_t = P_t$, the following price-to-book ratio is obtained:

$$\frac{P_t}{B_t} = 1 + \sum_{\tau=1}^{\infty} \left[\frac{E_t\left[\left(roe_{t+\tau} - r_t^{(e)}\right)\right]}{\left(1 + r_t^{(e)}\right)^{\tau}} \cdot \frac{B_{t+\tau-1}}{B_t} \right]. \tag{10}$$

The relationship between the price-to-book ratio P_t/B_t and the implied risk premium can be seen in Figure 1.[16] The price-to-book ratio is negatively related to the implied risk premium: a lower (higher) price-to-book ratio tends to be associated with a higher (lower) risk premium. Empirical evidence in different equity markets suggests that the price-to-book ratio is a predictor of future stock returns (*Fama/French* (1998)). However, the interpretation of why this ratio predicts stock returns remains controversial. The first line of arguments attributes the predictability to the fundamental risk associated with an investment. For example, *Fama/French* (1992) argue that stocks with a low price-to-book ratio are fundamentally riskier than stocks with a high ratio. Therefore, the price-to-book ratio seems to be a measure of systematic risk. The im-

[16] The author would like to thank an anonymous referee for suggesting this relationship.

Table 3

Summary Results for the Cross Section Regression (7)

(7a) $$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t}^{OLS} \cdot \hat{\beta}_{it-1}^{OLS} + \varepsilon_{it},\ \forall\, t = 1991, \ldots, 2004.$$

(7b) $$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t}^{IMP} \cdot \hat{\beta}_{it-1}^{IMP} + \varepsilon_{it},\ \forall\, t = 1991, \ldots, 2004.$$

(7c) $$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t}^{OLS} \cdot \hat{\beta}_{it-1}^{OLS} + \gamma_{1t}^{IMP} \cdot \hat{\beta}_{it-1}^{IMP} + \varepsilon_{it},\ \forall\, t = 1991, \ldots, 2004.$$

DTM denotes the Datastream Total Market Germany, MSCI denotes the MSCI World Index, RPI denotes the Rex Performance Index and NAR denotes the Nareit Equity Total Return Index (Nareit = National Association of Real Investment Trusts)

Proxy for market index	$\hat{\gamma}_0$ [a]	(t-value)	$\hat{\gamma}_1^{OLS}$ [a]	(t-value)	$\hat{\gamma}_1^{IMP}$ [a]	(t-value)
Panel A: Regression results from (7a)						
DTM	5.56	(1.095)	–4.61	(–1.889)		
MSCI	1.54	(0.315)	–1.47	(–0.416)		
50% DTM, 50% RPI	4.26	(0.820)	–1.92	(–1.640)		
50% MSCI, 50% RPI	2.06	(0.422)	–0.82	(–0.451)		
33% DTM, 33% RPI, 33% NAR	5.29	(1.008)	–2.64	(–1.913)		
33% MSCI, 33% RPI, 33% NAR	2.78	(0.544)	–1.38	(–0.794)		
Panel B: Regression results from (7b)						
DTM[b]	–3.91	(–0.775)			4.21	(2.092)
Panel C: Regression results from (7c)						
DTM	0.60	(0.110)	–4.34	(–1.727)	4.26	(2.241)
MSCI	–3.53	(–0.688)	–0.64	(–0.187)	4.28	(2.184)
50% DTM, 50% RPI	–0.68	(–0.125)	–1.87	(–1.508)	4.11	(2.182)
50% MSCI, 50% RPI	–3.04	(–0.579)	–0.54	(–0.292)	4.37	(2.209)
33% DTM, 33% RPI, 33% NAR	0.55	(0.099)	–2.54	(–1.787)	3.93	(2.055)
33% MSCI, 33% RPI, 33% NAR	–2.46	(–0.444)	–1.17	(–0.653)	4.34	(2.193)

[a] percent

[b] The market risk premium is calculated by the value-weighted implied risk premium of all stocks included in the sample. An implied market risk premium for the MSCI World Index could not be calculated, as the constituents of the index and data for them were not available to the author.

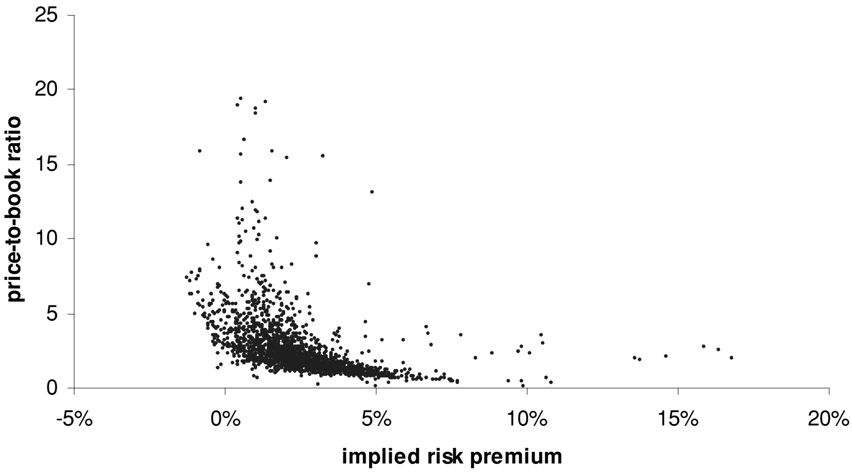


Figure 1: Relationship Between Implied Risk Premiums and Book-to-market Ratios

plied beta follows this line of argumentation, but gives a more intuitive interpretation of the measuring of a stock's risk in terms of a CAPM beta factor. However, these arguments rely on the assumption that capital markets do efficiently price stocks and that the stock price reflects the true value of the company.[17] *Ballwieser* (2005) argues that this assumption does not seem to be justified in certain cases (e.g. takeover premiums) and, therefore, regression results should be interpreted with more caution. The second argument assumes inefficient stock markets, which implies that price ratios (such as the price-to-book ratio) could also reflect some measure of misevaluation. Low prices relative to fundamentals (such as the book value) then indicate an undervaluation. For example, *Lakonishok* et al. (1994) argue that the extrapolation of past trends too far into the future by naïve investors cause market prices to deviate from fundamental values. According to (10) a low price-to-book ratio also results, ceteris paribus, in a high risk premium. Therefore, in an inefficient stock market, implied betas can also have a component of misevaluation. However, the distinction of whether the price-to-book ratio measures a systematic risk component of a stock or indicates a mis-

[17] In the derivation of the implied beta it was assumed that the present value (i.e. fundamental value) equals the current market price.

evaluation is still an open debate in the finance literature. The same arguments therefore apply to the concept of implied betas, and cross section regression results could be interpreted against the background of misvaluation.

5. Discussion

The regression analysis suggests that implied betas are better suited than regression betas for explaining the cross section of stock returns. While the implied beta produces a significant market risk premium of between approximately 4 percent and 4.5 percent, the regression beta yields an estimate for the market risk premium in the order of between –0.5 percent and –4.5 percent. Assuming that investors are, on average, risk-averse, only the cross sectional implications of the implied beta are compatible with a positive market risk premium.

However, the implied beta approach has three additional advantages: First, implied betas can be calculated for stocks whose information on historical returns is not useful for estimating a regression beta. To illustrate this issue, consider the following two examples: Newly listed companies usually lack historical returns. If one were to follow the standard approach of estimating the regression beta over five years of monthly data, a beta calculation within the first five years after the initial public offering would not be possible. Additionally, the situation of a company that undergoes a major structural change is not comparable with the past (for both return and risk characteristics). Therefore, in this case, it is obvious that the past is not representative of the future, resulting in a meaningless regression beta. Both problems can be avoided by the concept of implied beta. Second, implied betas can be calculated for companies that are expected to change their risk characteristics in the future. For example, consider how a drug company, whose patents are due to expire in five years, might apply different discount rates to its cash flows. For cash flows over the next five years it is likely to apply a low beta (low discount rate), and a higher beta (high discount rate) to cash flows over more than five years because the latter are more uncertain (i.e. they involve a higher risk due to the competition of generic drugs and the uncertain development of new drugs). As a result, time-varying betas have to be implemented. This is easily done with the implied beta approach. Therefore, the implied beta in (5) has to be dependent on fiscal year t. This results in a term structure of betas. A regression approach would not allow a term structure of this kind. Third, the implied beta approach is consistent with asset pricing theory calling for expected returns. Implied betas rely solely on market expectations (future earnings) and current data (price and book value) and, therefore, employ no historical data.

On the other hand, the implied beta approach has also its drawbacks: First, the application of implied betas requires earnings estimates. Therefore, the concept is limited to those companies that are covered by financial analysts. Implied betas for those companies for which no earnings estimates are available can be calculated by an approach suggested by *Gebhardt* et al. (2001). They derive implied risk premiums from a cross section regression. Company-specific ratios (e.g. price-to-book ratio) are related to the risk premiums. This relation is also shown in Figure 1. The estimated regression coefficients are then used for estimating the implied risk premium for firms from company-specific ratios. The same approach can also be adopted for estimating implied betas. Second, if earnings forecasts from sell side analysts are used such as I/B/E/S estimates, which is the common approach, the quality of earnings estimates is also an issue. There is a large literature documenting a bias in analysts' estimates.[18] However, the impact of the bias can be neglected if the bias is approximately the same across firms. This can easily be recognized when looking at Equation (3). A similar bias in earnings estimates for each firm influences both the company's risk premium and the market risk premium. If both components of risk premiums contain a similar bias, the quotient of the risk premiums reduces the bias. As a result, part of the bias should cancel out.

Apart from these advantages and disadvantages, the implied beta approach, when it is applied to diversified companies, suffers from the same problems as the regression beta does. Both approaches estimate a beta coefficient for a company as a whole. If a company has to decide on a project that has a systematic risk which is not comparable to that of the company, the CFO has to rely, for example, on the beta of a pure-play company. This pure-play technique can also been applied for the divisional beta of diversified companies.[19] However, the implied beta approach offers a second solution: If earnings estimates are available for each division, implied betas can be separately calculated according to

18 See, e.g., *Jacob* et al. (1999), *Michaely/Womack* (1999) and *Hong/Kubik* (2003).

19 See, e.g., *Fuller/Kerr* (1981), *Bufka* et al. (1999) and *Bufka* et al. (2004).

(5). The researcher simply has to allocate the appropriate fraction of the company's market value to each division.

IV. Conclusion

This study has proposed an alternative method for estimating CAPM betas, a method which does not rely on historical returns. On the basis of a residual income model, an implied beta is computed, using analysts' earnings estimates and current stock prices. When a large sample of German stocks is investigated, the cross sectional relation between the implied beta and excess stock returns yields a positive relation, as implied by the CAPM. The results suggest a market risk premium of about 4 percent. In contrast, using the standard regression beta in the cross sectional analysis yields either a flat or a negative relationship. These results indicate that implied betas reflect the market's perception of a firm's risk better than the regression betas do.

The implied beta approach is based on implied risk premiums which have been investigated in related areas. *Claus/Thomas* (2001) investigated the implied risk premiums of aggregated stock indexes. The implied cost of capital of single stocks has been addressed by *Gebhardt* et al. (2001) in the US and by *Daske* et al. (2006) in Germany. *Gebhardt* et al. (2001) also found that implied risk premiums are able to explain the cross section of future stock returns especially over longer horizons (of up to 3 years). However, their approach was based on quintile portfolios. Furthermore, portfolio strategies based on implied risk premiums have been investigated (e.g. *Frankel/Lee* (1998); *Dechow* et al. (1999); *Stotz* (2004)). These studies have shown that investment strategies of this kind have significantly outperformed passive benchmark indexes.

To sum up, implied betas seem to reflect the market participants' contemporaneously expected rates of return for providing equity capital and offer an alternative to regression betas. This allows, for example, a company's CFO to compare the market view of the cost of capital, either with the company's own view or with that of the company's industry peers, possibly revealing a discrepancy between the market's perception of the cost of capital and the company's own view of it. The divergence of expectations provides the investor relation officer with the relevant figures to enhance communication between the capital market and the company involved.

Appendix A

According to the residual income model, the price of a stock is

$$P_t = B_t + \sum_{\tau=1}^{\infty} \frac{E_t\left[\left(roe_{t+\tau} - r_t^{(e)}\right) \cdot B_{t+\tau-1}\right]}{\left(1 + r_t^{(e)}\right)^{\tau}}. \tag{A1}$$

Assuming that the return on equity is in steady state and, therefore, expected to be constant in all future periods, i.e. $roe_t = roe_{t+\tau}, \forall\tau$, (A1) can be simplified as follows:

$$P_t = B_t + \sum_{\tau=1}^{\infty} \frac{E_t\left[\left(roe_t - r_t^{(e)}\right) \cdot B_{t+\tau-1}\right]}{\left(1 + r_t^{(e)}\right)^{\tau}}. \tag{A2}$$

With a constant payout ratio, q, and clean surplus, the growth rate of the book value is

$$g = roe \cdot (1 - q). \tag{A3}$$

Replacing $B_{t+\tau-1}$ in (A2) with $B_{t-1} \cdot (1+g)^{\tau}$ and rearranging yields for the price-to-book ratio

$$\frac{P_t}{B_t} = 1 + \frac{E_t\left[roe_t - r_t^{(e)}\right]}{r_t^{(e)} - g}. \tag{A4}$$

The expected excess return on equity over the cost of capital is

$$E_t\left[roe_t - r_t^{(e)}\right] = \left(\frac{P_t}{B_t} - 1\right) \cdot \left(r_t^{(e)} - g\right). \tag{A5}$$

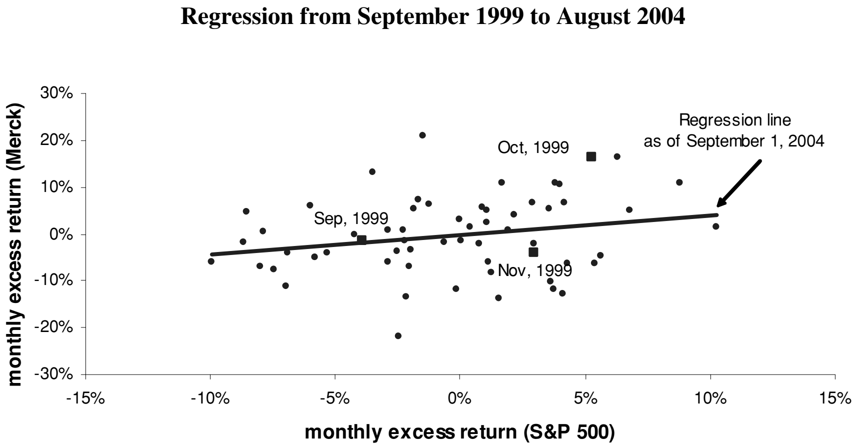
The expected excess return on equity over the risk free rate equals then

$$E_t[roe_t - r_{f,t}] = \underbrace{r_t^{(e)} - r_{f,t}}_{\text{risk premium}} + \left(\frac{P_t}{B_t} - 1\right) \cdot \left(\underbrace{r_t^{(e)} - r_{f,t}}_{\text{risk premium}} + r_{f,t} - g\right). \tag{A6}$$

The price-to-book ratio in Germany has averaged to approximately 1.75 since 1980, $\left(r_{f,t} - g\right)$ approximately equals 1.6% (since 1970). Assuming a risk premium of 2.7% (*Claus/Thomas,* 2001), $E_t[roe_t - r_{f,t}$ equals $E_t[roe_t - r_{f,t}] = 2.7\% + 0.75 \cdot (2.7\% + 1.6\%) = 5.92\% \approx 6\%$.

Appendix B

The underlying returns for estimating regression betas before (September 1999 to August 2004) and after (December 1999 to November 2004) Merck's withdrawal of Vioxx are shown in Figure B.1. The sample periods between the two regressions differ because of three monthly returns which are highlighted in Figure B.1.



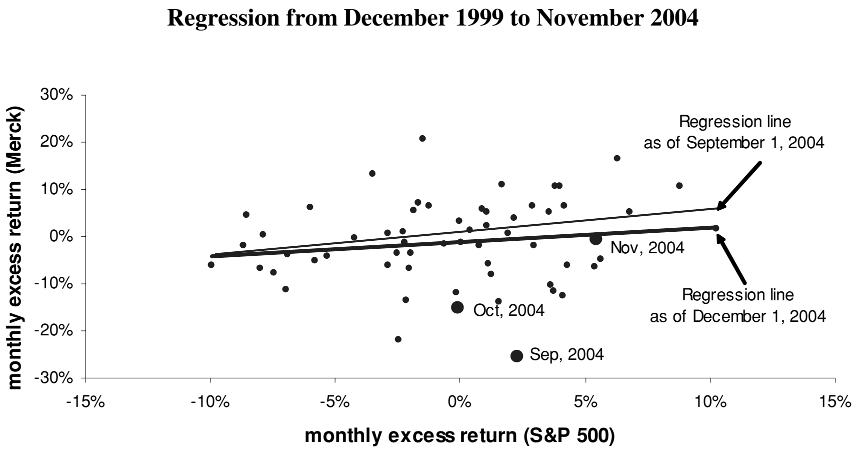


Figure B.1: Regression of Merck's Monthly Excess Return on the S&P 500 Monthly Excess Return

Appendix C

Yearly regression coefficients of

$$R_{it} - R_{ft} = \gamma_{0t} + \gamma_{1t}^{OLS} \cdot \hat{\beta}_{it-1}^{OLS} + \gamma_{1t}^{IMP} \cdot \hat{\beta}_{it-1}^{IMP} + \varepsilon_{it},\ \forall\, t = 1, \ldots, \tau. \tag{7c}$$

are given in the Table C.1. While γ_{1t}^{OLS} is negative in 8 years (out of 14), γ_{1t}^{IMP} is negative only in two years. Although the sample is limited to 14 years, the results seem to indicate that implied betas yield a positive market risk premium.

Table C.1

Yearly Regression Coefficients of (7c) in the Case of MSCI as a Proxy for the Market Index

year	γ_{0t}	γ_{1t}^{OLS}	γ_{1t}^{IMP}
1991	–0.1828	0.1386	0.0091
1992	–0.0777	–0.0350	0.0362
1993	–0.1163	–0.0784	0.0202
1994	0.2718	–0.1193	–0.0369
1995	–0.0610	–0.0657	0.0030
1996	0.0577	–0.3062	0.0168
1997	0.3620	0.1091	–0.0187
1998	0.0981	0.1930	0.0486
1999	–0.2106	–0.0679	0.0028
2000	0.0020	–0.0183	0.0091
2001	–0.0966	0.0548	0.0670
2002	–0.4131	–0.1283	0.1886
2003	–0.2548	0.2116	0.0485
2004	0.0919	0.0158	0.2472
mean	–0.0353	–0.0064	0.0428
t-value	–0.6880	–0.1836	2.1843

References

Alexander, G. J./*Chervany,* N. L. (1980): On the estimation and stability of beta, Journal of Financial and Quantitative Analysis, 15, 123–137. – *Ballwieser,* W. (2005): Die Ermittlung impliziter Eigenkapitalkosten aus Gewinnschätzungen und

Aktienkursen: Ansatz und Probleme. *Schneider,* D./*Rückle,* D./*Küpper,* H.-U./*Wagner,* F. W. (Eds.): Kritisches zur Rechnungslegung und Unternehmensbesteuerung, Festschrift für Theodor Siegel, 321–337, Duncker & Humblot, Berlin. – *Banz,* R. (1981): The relation between return and market value of common stocks, Journal of Financial Economics, 9, 3–18. – *Beaver,* W./*Kettler,* P./*Scholes,* M. (1970): The association between market determined and accounting determined risk measures. The Accounting Review, 45, 654–682. – *Bos,* T./*Newbold,* P. (1984): An empirical investigation of the possibility of stochastic systematic risk in the market model, Journal of Business, 57, 35–41. – *Bruner,* R. F./*Eades,* K. M./*Harris,* R. S./*Higgins,* R. C. (1998): Best practices in estimating the cost of capital: Survey and synthesis, Financial Practice and Education, Spring/Summer, 13–28. – *Bufka,* J./*Kemper,* O./*Schiereck,* D. (2004): A Note on estimating the divisional cost of capital for diversified companies – An empirical evaluation of heuristical approaches, European Journal of Finance, 10, 68–80. – *Bufka,* J./*Schiereck,* D./*Zinn,* K. (1999): Kapitalkostenbestimmung für diversifizierte Unternehmen – Ein empirischer Methodenvergleich, Zeitschrift für Betriebswirtschaft, 69, 115–131. – *Chan,* L./*Lakonishok,* J. (1992): Robust measurement of beta risk, Journal of Financial and Quantitative Analysis, 27, 265–282. – *Chan,* L./*Karceski,* J./*Lakonishok,* J. (2003): The Level and Persistence of Growth Rates, Journal of Finance, 58, 643–684. – *Claus,* J./*Thomas,* J. (2001): Equity premia as low as three percent? Evidence from analysts' earnings forecasts for domestic and international stock markets, Journal of Finance, 56, 1629–1666. – *Daske,* H./*Gebhardt,* G./*Klein,* S. (2004): Estimating the expected cost of equity capital using analysts' consensus forecasts, Schmalenbach Business Review, 58, 2–36. – *Dechow,* P./*Hutton,* A./*Sloan,* R. (1999): An empirical assessment of the residual income valuation model, Journal of Accounting and Economics, 26, 1–34. – *Fama,* E. F./*French,* K. R. (1988): Permanent and temporary components of stock prices, Journal of Political Economy, 96, 246–273. – *Fama,* E. F./*French,* K. R. (1992): The cross-section of expected stock returns, Journal of Finance, 47, 427–465. – *Fama,* E. F./*French,* K. R. (1998): Value versus growth: The international evidence, Journal of Finance, 53, 1975–1999. – *Fama,* E. F./*French,* K. R. (2000): Forecasting profitability and earnings, Journal of Business, 73, 161–175. – *Fama,* E. F./*French,* K. R. (2002): The equity premium, Journal of Finance, 57, 637–659. – *Fama,* E. F./*MacBeth,* J. (1973): Risk, return, and equilibrium: Empirical tests, Journal of Political Economy, 81, 607–636. – *Frankel,* R./*Lee,* C. M. C. (1998): Accounting valuation, market expectation, and cross-sectional stock returns, Journal of Accounting and Economics, 25, 283–319. – *Freeman,* R. N./*Ohlson,* J. A./*Penman,* S. H. (1982): Book rate-of-return and prediction of earnings changes: An empirical investigation, Journal of Accounting Research, 20, 639–653. – *Fuller,* R. J./*Kerr,* H. S. (1981): Estimating the divisional cost of capital: An analysis of the pure-play technique, Journal of Finance, 36, 997–1009. – *Gebhardt,* W. R./*Lee,* C. M. C./*Swaminathan,* B. (2001): Toward an implied cost of capital, Journal of Accounting Research, 39, 135–176. – *Graham,* J. R./*Campbell,* H. R. (2001): The theory and practice of corporate finance: evidence from the field, Journal of Financial Economics, 60, 187–243. – *Hong,* H./*Kubik,* J. D. (2003): Analyzing the analysts: career concerns and biased earnings forecasts, Journal of Finance, 58, 313–351. – *Jacob,* J./*Lys,* T./*Neale,* M. (1999): Expertise in forecasting performance of security analysts, Journal of Accounting and Economics, 28, 51–82. – *Kosfeld,* R. (1996): Kapitalmarktmodelle und Aktienbewertung:

Eine statistisch-ökonometrische Analyse, Wiesbaden. – *Lakonishok,* J./*Shleifer,* A./*Vishny,* R. W. (1994): Contrarian investment, extrapolation, and risk, Journal of Finance, 49, 1541–1578. – *Lintner,* J. (1965): The valuation of risky assets and the selection of risky investments in stock portfolios and capital budgets, Review of Economics and Statistics, 47, 13–37. – *Michaely,* R./*Womack,* K. L. (1999): Conflict of interest and the credibility of underwriter analyst recommendations. Review of Financial Studies, 12, 653–686. – *Möller,* H. P. (1988): Die Bewertung risikobehafteter Anlagen an deutschen Wertpapierbörsen, Zeitschrift für betriebswirtschaftliche Forschung, 40, 779–797. – *Ritter,* J. R. (2002): The biggest mistakes we teach, Journal of Financial Research, 25, 159–168. – *Roll,* R. (1977): A critique of the asset pricing theory's tests' part I: on past and potential testability of the theory, Journal of Financial Economics, 4, 129–176. – *Rosenberg,* B./*Guy,* J. (1976a): Prediction of beta from investment fundamentals, Financial Analyst Journal, 32, May–June, 60–72. – *Rosenberg,* B./*Guy,* J. (1976b): Prediction of beta from investment fundamentals: Part II, Financial Analyst Journal, 32, July–August, 62–70. – *Sharpe,* W. (1964): Capital asset prices: A theory of market equilibrium under conditions of risk, Journal of Finance, 19, 425–442. – *Smith,* K. V. (1978): The effect of intervaling on estimating parameters of the capital asset pricing model, Journal of Financial and Quantitative Analysis, 13, 313–332. – *Stotz,* O. (2004): How to profit from mean reverting risk premiums: Implications for stock selection, Journal of Asset Management, 5, 192–202. – *Ulschmid,* C. (1994): Empirische Validierung von Kapitalmarktmodellen: Untersuchungen zum CAPM und zur APT für den deutschen Aktienmarkt, Frankfurt am Main. – *Wallmeier,* M. (2000): Determinanten erwarteter Renditen am deutschen Aktienmarkt – Eine empirische Untersuchung anhand ausgewählter Kennzahlen, Zeitschrift für betriebswirtschaftliche Forschung, 52, 27–57. – *Warfsmann,* J. (1993): Das Capital Asset Pricing Model in Deutschland: univariate und multivariate Tests für den Kapitalmarkt, Wiesbaden. – *Welch,* I. (2000): Views of financial economists on the equity premium and on professional controversies, Journal of Business, 73, 501–537. – *Winkelmann,* M. (1984): Aktienbewertung in Deutschland, *Göppl,* H./*Opitz,* O. (Ed.): Quantitative Methoden der Unternehmensplanung, Königstein/Ts.

Summary

Regression Betas and Implied Betas: Their Respective Implications for the Equity Risk Premium

This study proposes an alternative method for estimating a company's CAPM beta. A discounted residual income model is used to deduce market implied betas. Compared to the commonly used ordinary least squares (OLS) regression beta, the market implied beta is much better suited to explaining the cross section of realized returns. The implied beta yields a positive market risk premium of about 4 percent, while the regression beta yields a flat or negative market risk premium. Thus, when the implied beta is used, the CAPM seems to be a valid model for describing the cross section of stock returns. (JEL C21, G12)

Zusammenfassung

Regressionsbetas, implizite Betas und ihre Implikationen für die Aktienrisikoprämie

In diesem Beitrag wird eine alternative Methode zur Schätzung des CAPM-Betafaktors vorgestellt. Aus einem Residual-Income-Modell werden implizite Betafaktoren abgeleitet, die mit den Schätzungen auf Basis üblicher Regressionsmethoden (OLS) verglichen werden. Die empirischen Ergebnisse zeigen, dass implizite Betafaktoren realisierte Querschnittsrenditen von Aktien besser erklären können als Regressionsbetas. Implizite Betafaktoren führen am deutschen Aktienmarkt zu einer positiven Marktrisikoprämie von ca. 4%, während Regressionsbetas zu keiner positiven bzw. negativen Marktrisikoprämie führen.