Influential Article Review - Examining the Nature of German Stock Market Returns

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This paper examines the economy and investments. We present insights from a highly influential paper. Here are the highlights from this paper: The characteristics book-to-market equity ratio, size and momentum are highly correlated with the average returns of common stocks. Fama and French (J Financ Econ 33(1):3–56, 1993), (J Finance 50(1):131–155, 1995) and (J Finance 51(1):55–84, 1996) argue (for size and the book-to-market equity ratio) that the relation between returns and characteristics arises because the characteristics are proxies for exposures to common risk factors. We examine the question whether the characteristics or the covariance structure of returns explain the cross-sectional dispersion in German stock market returns. Our results suggest that widely accepted factors SMB, HML or WML are not priced. For our overseas readers, we then present the insights from this paper in Spanish, French, Portuguese, and German.

Keywords: Asset pricing, Risk factor model, Characteristics model, German stock market returns, Stock market anomalies

SUMMARY

- Our null hypothesis is that the FFC-model explains the cross section of stock returns while the alternative hypothesis is a characteristics model for the German stock market. Distinguishing between these two hypotheses can be difficult since characteristics and risk factor loadings are likely to be cross sectionally correlated causing multicollinearity problems in Fama and MacBeth regressions . These problems can be avoided by the Daniel and Titman test procedure that forms portfolios of stocks exhibiting a low correlation between their factor loadings and their characteristics. In our analysis we will focus on the CB portfolios that have similar characteristics but different factor loadings. We will not discuss the question whether the market factor is priced since there is no obvious characteristic on which the market factor is constructed.
- BE/ME-adjusted average monthly returns for portfolios formed from sorts on size and SMB slopes. The empirical evidence in the literature on the role of SMB for explaining the cross section of German stock market returns and on the existence of a size effect is mixed. Previous studies by Schlag and Wohlschieß , Breig and Elsas , Artmann et al. and reject the existence of a size effect.

- Size-adjusted average monthly returns for portfolios formed from sorts on BE/ME and HML slopes. Virtually all German studies provide empirical evidence that a BE/ME anomaly exists and that HML helps to explain the differences in the cross section of the German stock market returns. In various previous studies a BE/ME effect is shown. Furthermore, previous results indicate that HML plays a major role for explaining the cross section of the German stock market returns.
- Size-adjusted average monthly returns for portfolios formed from sorts on momentum and WML slopes. Momentum is one of the most puzzling anomalies because it suggests that the market is not even weak-form efficient. Consequently, the momentum effect is one of the most intensively debated topics in finance. Similarly to the BE/ME effect, there is a large body of literature documenting the momentum effect for the German stock market . In a recent study, Artmann et al. provide evidence by the means of Fama-McBeth regressions that WML is priced.
- Average characteristic-adjusted monthly returns, regression coefficients and their t-statistics for final CB and final FB portfolios
- A final test which is commonly applied to distinguish between rational pricing and mispricing is to calculate the equal-weight average of the CB portfolios . The CB portfolio can be viewed as a «high minus low exposure» portfolio that is neutral in characteristics and has a spread between high and low factor loadings. We extend previous research and calculate the equal-weight average of our FB portfolios. We refer to the equal-weight average of the CB/FB portfolios as to «final» CB/FB portfolios. Columns one and two of Table 8 show the average characteristic-adjusted monthly returns, their standard deviations and their significance levels of the final portfolios. These figures confirm our earlier findings according to which SMB, HML and WML are not priced and that returns are related to the characteristics book-to-market equity ratio and momentum instead.
- The remaining columns of the Table 8 present the coefficients, their t-statistics and $R2$ from a time-series regression of the four factors from the FFC-model on the returns of the final portfolios.

HIGHLY INFLUENTIAL ARTICLE

We used the following article as a basis of our evaluation:

Fieberg, C., Varmaz, A., & Poddig, T. (2016). Covariances vs. characteristics: what does explain the cross section of the German stock market returns? Business Research, 9(1), 27–50.

This is the link to the publisher's website:
https://link.springer.com/article/10.1007/s40685-016-0029-4

INTRODUCTION

The aim of the paper is to empirically analyze if the exposures from the four-factor model proposed by Carhart (1997) or the respective characteristics explain the dispersion in the average German stock returns. Over the past decades investors in stocks of small, high book-to-market equity ratio and high momentum firms ("weak" firms) have outperformed investors in stocks of big, low book-to-market equity ratio and low momentum firms ("strong" firms). The persistent performance advantage of the former stocks over the latter ones can arise either because of differences in systematic risk (covariances, exposures) or as a result of mispricing. The distinction between these two hypotheses is at the core of modern asset pricing research (Lin and Zhang 2013: 351) and has important implications for how investors should form portfolios (Daniel and Titman 1998: 24). If the return premium associated with stocks of weak firms arises due to higher systematic risk, investors can do no better than holding a combination of risk factors. For example, if expected returns are consistent with the three-factor model of Fama and French (1993) or the four-factor model of Carhart (1997), investors should hold a combination of the respective model factors. But, in contrast, if differences in stock returns are not related to differences in systematic risk (but in

characteristics), investors should hold portfolios that are long in weak firms' stocks and short in strong firms' stocks.

There is, to the best of our knowledge, no study trying to distinguish between covariances and characteristics for the German stock market. The overall aim of this paper is to close this gap. For this purpose we apply the Daniel and Titman (1997) test which has become the workhorse for "disentangling" risk versus mispricing in asset pricing (Lin and Zhang 2013: 352). The test of Daniel and Titman (1997) is based on sorting stocks on characteristics like the book-to-market equity ratio and covariances like the exposure to HML. Following the traditional asset pricing theory portfolios of stocks with similar characteristics, but different risk factor exposures should exhibit different returns while portfolios of stocks with similar risk factor exposures but different characteristics should not. This testing procedure requires to maximize the spread in characteristics and exposures to distinguish between an asset pricing model and mispricing. Furthermore, to find variation in factor loadings that is unrelated to other characteristics multiple sorts on characteristics might be necessary. For example, Daniel and Titman (1997) and Davis et al. (2000) triple sort the stocks based on two characteristics (size and book-to-market equity) and the exposure to HML to control for the influence of size on the returns when analyzing the HML factor. These two issues require to choose the number of test portfolios as high as possible. However, the number of portfolios used is restricted by the number of firms available. In the case of Germany the number of firms is way lower than for the U.S. stock market. Instead of raw returns we therefore use "characteristic-adjust" returns to circumvent these issues. For example, when testing whether or not HML is a priced factor for the book-to-market equity ratio effect we use size-adjusted returns to control properly for the influence of firm size on returns.

Our results suggest that the factors SMB, HML and WML from the Carhart (1997) four-factor model are not priced. This finding is different to the recent literature which indicates that these factors are priced, conducting however a different empirical approach (Fama-McBeth-regression) which potentially suffers from the high correlation between characteristics and exposures (e.g. Artmann et al. 2012a). The characteristics book-to-market equity ratio and momentum explain in our analysis the cross-sectional differences in stock returns confirming the findings of, among others, Schrimpf et al. (2007), Schiereck et al. (1999), and Glaser and Weber (2003). Furthermore, we find no empirical evidence that SMB is priced or that the firm size explains the cross-sectional returns. The lack of the size effect supports the recent literature which does not find a size anomaly for Germany (e.g. Artmann et al. 2012a, b; Schrimpf et al. 2007; Ziegler et al. 2007). Our empirical results suggest that German stock market investors can do better than holding a combination of commonly used risk factor portfolios SMB, HML and WML.

The remainder of this paper proceeds as follows. In Sect. 2 we introduce into the covariances versus characteristics debate and the factor model considered in our paper. In Sect. 3 we derive some empirically testable hypotheses to distinguish between the rational pricing story and the mispricing story. In Sect. 4 we present the data and describe the firm characteristics. Then in Sect. 5 we provide empirical evidence on the central test of the null hypothesis of a risk factor model against the alternative hypothesis of a characteristics model for the German stock market. Section 6 summarizes and concludes.

CONCLUSION

We analyze the question if the cross-sectional dispersion in average German stock market returns is due to characteristics or the exposures to the risk factors of the FFC-model. The persistent performance advantage of some "weak" firm characteristic stocks compared to some "strong" firm characteristic stocks can either arise because they are riskier or because the differences in performance are due to mispricing (Daniel and Titman 1998: 24, 25). We find that neither there is a size effect nor that SMB is a priced risk factor. Our results indicate that HML and WML are not priced and that stock returns are related to characteristics rather than to exposures. These findings are robust to choices of the methodology. A German stock market investor is seemingly better of if she invests into firms with "weak" firm characteristics and ignores exposures to the commonly used risk factors.

APPENDIX

TABLE 1
AVERAGE NUMBER OF FIRMS

Period	Average number of firms	Period	Average number of firms
1975–1977	124	1996–1998	439
1978–1980	129	1999–2001	631
1981–1983	130	2002–2004	551
1984–1986	148	2005–2007	600
1987–1989	259	2008–2010	581
1990–1992	415	2011–2014	553
1993–1995	420		

The table reports the average number of firms for 3-year time periods of our sample period from 1975 to 2014. Financial firms are excluded from the sample and only firms with valid stock prices for December of the year $t-1$ are included in our data sample

TABLE 2
DESCRIPTIVE STATISTICS FOR THE CHARACTERISTICS

	Mean	Std. dev.	Median	Percentiles		Correlation		
				25 %-th	75 %-th	Momentum	Size	BE/ME
Momentum	0.08	0.38	0.03	-0.15	0.25	1	0.054	-0.073
Size	1297.24	5864.74	98.18	31.29	405.45	0.054	1	-0.068
BE/ME	0.73	0.69	0.55	0.33	0.89	-0.073	-0.068	1

The table reports the mean, the standard deviation, the median, the 25 and the 75 %-th percentile and the correlation calculated in June of each year t for the characteristics included in our study. The variables are: size (in millions), proxied by firm's market value as of June of year t, the book-to-market equity ratio (BE/ME) calculated as of December of year $t-1$, and momentum in month m of a year t, calculated as cumulative equal-weight past returns from month $m-12$ to $m-2$

TABLE 3
MONTHLY AVERAGES AND STANDARD DEVIATIONS OF EQUAL-WEIGHT PORTFOLIO RETURNS FROM SINGLE SORTS ON CHARACTERISTICS

		Low	2	3	4	5	6	7	8	9	High	High–Low
Size	μ	0.83	0.55	0.70	0.58	0.38	0.48	0.68	0.71	0.89	0.87	0.05
	σ	3.94	4.68	3.90	4.20	4.56	4.52	4.35	4.48	4.45	4.96	4.14
BE/ME	μ	0.16	0.24	0.57	0.67	0.61	0.71	0.76	0.88	0.98	1.00	0.84***
	σ	4.22	4.17	4.31	4.19	4.44	4.52	4.18	4.56	4.78	4.57	3.57
Momentum	μ	−0.02	−0.05	0.29	0.37	0.77	0.68	0.83	1.04	1.13	1.45	1.52***
	σ	6.13	5.06	4.81	4.30	4.14	4.02	3.90	3.85	3.96	4.53	4.93

The table reports the means (μ) and the standard deviations (σ), both in percent, of ten portfolios sorted on firm characteristics and an arbitrage portfolio (High–Low), that goes long in portfolio 'High' and short in portfolio 'Low'. The characteristics are described in Table 2. The portfolios (except Momentum) are formed in June of each year t on information available in June of year t and then held for 1 year from July of year t to June of year t+1. The Momentum portfolio is rebalanced each month on the firm's momentum from the month $m-2$

∗ (∗∗, ∗∗∗) indicates for the High–Low portfolio 10 % (5, 1 %) significance level from a t-test against the null hypothesis of zero average

TABLE 4
MONTHLY AVERAGES, STANDARD DEVIATIONS AND PAIR-WISE CORRELATIONS OF THE FACTOR MIMICKING PORTFOLIOS

	$R_m - R_f$	SMB	HML	WML
Panel A: Descriptive statistics				
Mean	0.59*	−0.01	0.60***	0.91***
Std. dev.	4.39	3.19	2.88	3.86
25th Percentile	−0.82	−1.85	−1.19	−1.09
Median	0.29	−0.11	0.57	1.10
75th Percentile	2.94	1.98	2.35	3.00

	$r_m - r_f$	SMB	HML	WML
Panel B: Correlation				
$r_m - r_f$	1	−0.62	0.18	−0.19
SMB	−0.62	1	−0.16	0.00
HML	0.18	−0.16	1	0.03
WML	−0.19	0.00	0.03	1

The table reports descriptive statistics (in percent) and pair-wise correlation coefficients for factor mimicking portfolios. The returns on the portfolios are value-weight. The formation of the factors is described in section II. $Rm-Rf$ is the excess return on the market factor, SMB (HML) denotes the "small minus big" ("high minus low") Fama and French (1993) factors and WML is the momentum factor which is formed as described by Fama and French (2012)

∗ (∗∗, ∗∗∗) indicates 10 % (5, 1 %) significance level from a t test against the null hypothesis of zero average

TABLE 5
BE/ME-ADJUSTED AVERAGE MONTHLY RETURNS FOR PORTFOLIOS FORMED FROM SORTS ON SIZE AND SMB SLOPES

SMB factor loading quartiles										
Size quartiles	1	2	3	4	CB	1	2	3	4	CB
	Ret					Std				
1	0.21 %	0.09 %	−0.10 %	−0.17 %	−0.40 %	4.02 %	3.47 %	3.47 %	2.71 %	4.47 %
2	0.01 %	0.11 %	−0.26 %	0.02 %	0.00 %	3.89 %	3.04 %	2.57 %	2.48 %	4.69 %
3	−0.01 %	0.08 %	0.13 %	−0.01 %	−0.01 %	3.21 %	2.09 %	2.05 %	2.68 %	4.35 %
4	0.42 %	0.39 %	0.18 %	0.36 %	−0.05 %	2.27 %	2.00 %	4.08 %	4.38 %	4.60 %
FB	0.34 %	0.31 %	0.23 %	0.50 %*		4.68 %	3.89 %	5.57 %	5.33 %	

	Size				s			
1	0.342	0.273	0.312	0.334	−0.003	0.004	0.008	0.018
2	0.859	0.933	0.906	0.940	−0.003	0.004	0.009	0.017
3	3.231	2.797	2.630	2.307	−0.002	0.004	0.008	0.016
4	80.142	29.258	25.418	19.840	−0.003	0.003	0.008	0.016

We form 16 portfolios as the intersections of four size groups and four SMB factor loading groups and calculate their equal-weight monthly returns. A characteristic-balanced (CB) portfolio goes long in a portfolio of stocks with high factor loadings and short in a portfolio of stocks with low factor loadings while the portfolios have equal characteristics (size). A factor-balanced (FB) portfolio goes long in a portfolio of big firms and short in portfolio of small firms while the portfolios have equal factor loadings (s). The table shows the average monthly BE/ME-adjusted portfolio returns (Ret), the standard deviation of monthly portfolio returns (Std), the average portfolio characteristics (size) (divided by 100) and the average portfolio factor loadings (s) (divided by 100) from the regression $Ri-Rf=ai+bi[RM-Rf]+siSMB+hiHML+miWML+\varepsilon i$ Ri−Rf=ai+bi[RM−Rf]+siSMB+hiHML+miWML+εi

** (****, ******) indicates 10 % (5 %, 1 %) significance level from a t-test against the null hypothesis of zero average

TABLE 6
SIZE-ADJUSTED AVERAGE MONTHLY RETURNS FOR PORTFOLIOS FORMED FROM SORTS ON BE/ME AND HML SLOPES

HML factor loading quartiles										
BE/ME quartiles	1	2	3	4	CB	1	2	3	4	CB
	Ret					Std				
1	−0.21 %	−0.16 %	−0.33 %	−0.39 %	−0.18 %	2.20 %	2.53 %	2.82 %	4.26 %	4.83 %
2	−0.07 %	0.18 %	0.02 %	0.24 %	0.30 %	2.26 %	2.35 %	2.64 %	2.72 %	3.61 %
3	0.22 %	0.44 %	0.11 %	0.28 %	0.06 %	3.09 %	2.62 %	1.98 %	2.35 %	3.84 %
4	0.47 %	0.33 %	0.20 %	0.49 %	0.01 %	3.23 %	2.85 %	2.33 %	2.15 %	3.82 %
FB	0.65 %***	0.52 %***	0.53 %***	0.90 %***		3.95 %	3.73 %	3.58 %	4.76 %	

	BE/ME				h			
1	0.002	0.002	0.002	0.002	−0.007	−0.001	0.003	0.009
2	0.005	0.005	0.005	0.005	−0.006	−0.001	0.003	0.009
3	0.007	0.007	0.007	0.007	−0.006	−0.001	0.003	0.009
4	0.016	0.016	0.015	0.014	−0.007	−0.001	0.003	0.009

We form 16 portfolios as the intersections of four size groups and four HML factor loading groups and calculate their equal-weight monthly returns. A characteristic-balanced (CB) portfolio goes long in a portfolio of stocks with high

factor loadings and short in a portfolio of stocks with low factor loadings while the portfolios have equal characteristics (BE/ME). A factor-balanced (FB) portfolio goes long in a portfolio of high BE/ME firms and short in a portfolio of low BE/ME firms while the portfolios have equal factor loadings (h). The table shows the average monthly size-adjusted portfolio returns (Ret), the standard deviation of monthly portfolio returns (Std), the average portfolio characteristics (BE/ME) (divided by 100) and the average portfolio factor loadings (h) (divided by 100) from the regression $Ri-Rf=ai+bi[RM-Rf]+siSMB+hiHML+miWML+\varepsilon i$

$*$ ($**$, $***$) indicates 10 % (5 %, 1 %) significance level from a t-test against the null hypothesis of zero average

TABLE 7
SIZE-ADJUSTED AVERAGE MONTHLY RETURNS FOR PORTFOLIOS FORMED FROM SORTS ON MOMENTUM AND WML SLOPES

WML factor loading quartiles										
Momentum quartiles	1	2	3	4	CB	1	2	3	4	CB
	Ret					Std				
1	−0.56 %	−0.11 %	−0.79 %	−0.25 %	0.30 %	3.58 %	4.08 %	3.44 %	3.51 %	4.77 %
2	0.03 %	−0.01 %	0.23 %	−0.01 %	−0.04 %	2.64 %	2.36 %	2.61 %	2.36 %	3.52 %
3	0.33 %	0.23 %	0.18 %	0.08 %	−0.25 %	2.70 %	2.43 %	2.38 %	2.52 %	3.63 %
4	0.55 %	0.72 %	0.63 %	0.66 %	0.09 %	2.82 %	2.58 %	2.69 %	2.95 %	3.82 %
FB	1.11 %***	0.81 %***	1.42 %***	0.89 %***		4.65 %	5.15 %	4.61 %	4.84 %	

	Mom				*m*			
1	−0.003	−0.003	−0.003	−0.003	−0.007	−0.002	0.001	0.005
2	0.000	0.000	0.000	0.000	−0.006	−0.002	0.001	0.004
3	0.001	0.001	0.001	0.001	−0.006	−0.002	0.001	0.004
4	0.005	0.005	0.005	0.005	−0.007	−0.002	0.001	0.005

We form 16 portfolios as the intersections of four size groups and four WML factor loading groups and calculate their equal-weight monthly returns. A characteristic-balanced (CB) portfolio goes long in a portfolio of stocks with high factor loadings and short in a portfolio of stocks with low factor loadings while the portfolios have equal characteristics (momentum). A factor-balanced (FB) portfolio goes long in a portfolio of high momentum firms and short in a portfolio of low momentum firms while the portfolios have equal factor loadings (*m*). The table shows the average monthly size-adjusted portfolio returns (Ret), the standard deviation of monthly portfolio returns (Std), the average portfolio characteristics (momentum) (divided by 100) and the average portfolio factor loadings (*m*) (divided by 100) from the regression $Ri-Rf=ai+bi[RM-Rf]+siSMB+hiHML+miWML+\varepsilon i$Ri−Rf=ai+bi[RM−Rf]+siSMB+hiHML+miWML+εi

$**$ ($****$, $******$) indicates 10 % (5 %, 1 %) significance level from a *t*-test against the null hypothesis of zero average

TABLE 8
AVERAGE CHARACTERISTIC-ADJUSTED MONTHLY RETURNS, REGRESSION COEFFICIENTS AND THEIR T-STATISTICS FOR FINAL CB AND FINAL FB PORTFOLIOS

	Ret	Std	*a*	*b*	*s*	*h*	*m*	*t*(*a*)	*t*(*b*)	*t*(*s*)	*t*(*h*)	*t*(*m*)	R^2
Size vs *s*													
CB	−0.21 %	2.55 %	−0.01	0.28	0.31	0.06	−0.07	−5.05	7.71	5.74	1.28	−1.98	0.21
FB	0.43 %	3.07 %	0.00	0.14	−0.40	0.24	−0.09	−0.70	3.81	−7.44	5.22	−2.55	0.47
BE/ME vs *h*													
CB	0.00 %	2.08 %	0.00	0.08	−0.02	0.12	−0.02	−3.47	2.60	−0.49	2.76	−0.81	0.09
FB	0.68 %***	2.25 %	0.00	0.16	0.15	0.39	0.04	0.57	5.44	3.55	9.75	1.46	0.29
Momentum vs *m*													
CB	0.04 %	2.08 %	0.00	−0.03	−0.02	-0.16	0.07	−2.85	−1.10	−0.55	−4.34	2.51	0.08
FB	1.00 %***	3.26 %	0.00	−0.05	−0.02	-0.03	0.57	1.87	−1.47	−0.31	−0.57	17.51	0.49

The CB (FB) portfolio is the equal-weight average of all CB (FB) portfolios formed for a single characteristic (factor loading). The table shows the average monthly adjusted portfolio returns (Ret), the standard deviation of monthly portfolio returns (Std), the regression coefficients(*a*, *b*, *s*, *h*, *m*), their *t*-statistics [*t*(*a*), *t*(*b*), *t*(*s*), *t*(*h*), *t*(*m*)] and the *R*2R2 from the regression $Ri-Rf=ai+bi[RM-Rf]+siSMB+hiHML+miWML+\varepsilon i$Ri−Rf=ai+bi[RM−Rf]+siSMB+hiHML+miWML+εi, where RiRi refers to returns of a final portfolio

** (****, ******) indicates 10 % (5 %, 1 %) significance level from a *t*-test against the null hypothesis of zero average

TABLE 9
AVERAGE MONTHLY RETURNS FOR PORTFOLIOS FORMED FROM SORTS ON SIZE AND SMB SLOPES

SMB factor loading quantiles											
Size quantiles	1	2	3	4	CB	Size quantiles	1	2	3	4	CB
	Ret						Std. dev.				
1	0.69	0.80	0.68	0.60	−0.24	1	4.47	4.58	5.21	4.72	4.57
2	0.51	0.85	0.43	0.73	0.05	2	5.10	4.50	4.45	4.85	4.72
3	0.65	0.74	0.80	0.67	0.02	3	4.63	4.17	4.26	5.24	4.37
4	1.01	0.99	0.65	0.93	−0.09	4	4.57	4.16	5.81	6.94	4.77
FB	0.32	0.12	−0.03	0.23		FB	4.71	3.98	5.72	5.54	

	Size					SMB factor loadings				
1	34.19	27.33	31.16	33.45		1	−0.26	0.40	0.82	1.77	
2	85.91	93.27	90.55	94.04		2	−0.28	0.40	0.85	1.74	
3	323.15	279.74	263.05	230.70		3	−0.20	0.39	0.82	1.64	
4	8014.21	2925.80	2541.83	1984.04		4	−0.25	0.35	0.80	1.57	

We form sixteen portfolios as the intersections of four size groups and four SMB factor loading groups and calculate their equal-weight monthly returns. A characteristic-balanced (CB) portfolio goes long in a portfolio of stocks with high factor loadings and short in a portfolio of stocks with low factor loadings while the portfolios have equal characteristics (size). A factor-balanced (FB) portfolio goes long in a portfolio of big firms and short in a portfolio of small firms while the portfolios have equal factor loadings (*s*). The table shows the average monthly portfolio returns (Ret), the standard deviation of monthly portfolio returns (Std. dev.), the average portfolio characteristics (Size) and

the average portfolio factor loadings (*s*) from the regression $Ri-Rf=ai+bi[RM-Rf]+siSMB+hiHML+miWML+\varepsilon i$ Ri−Rf=ai+bi[RM−Rf]+siSMB+hiHML+miWML+εi

** (****, ******) indicates 10 % (5 %, 1 %) significance level from a *t*-test against the null hypothesis of zero average

TABLE 10
AVERAGE MONTHLY RETURNS FOR PORTFOLIOS FORMED FROM SORTS ON BE/ME AND HML SLOPES

HML factor loading quantiles											
BE/ME quantiles	1	2	3	4	CB	BE/ME quantiles	1	2	3	4	CB
	Ret						Std. dev.				
1	0.45	0.52	0.35	−0.02	−0.31	1	4.21	3.67	4.33	5.56	4.90
2	0.60	0.86	0.67	0.97	0.35*	2	4.37	4.26	4.73	5.25	3.67
3	0.82	1.00	0.71	0.95	0.13	3	5.11	4.24	4.46	4.96	4.08
4	0.98	0.94	0.86	1.10	0.04	4	4.72	4.76	4.60	5.02	3.83
FB	0.58***	0.43**	0.52***	0.95***		FB	3.99	3.78	3.62	4.92	

	BE/ME					HML factor loadings				
1	0.22	0.24	0.23	0.21		1	−0.72	−0.08	0.27	0.91	
2	0.45	0.45	0.46	0.46		2	−0.61	−0.06	0.29	0.88	
3	0.71	0.72	0.71	0.72		3	−0.63	−0.06	0.28	0.87	
4	1.60	1.56	1.48	1.40		4	−0.67	−0.06	0.29	0.89	

We form 16 portfolios as the intersections of four size groups and four HML factor loading groups and calculate their equal-weight monthly returns. A characteristic-balanced (CB) portfolio goes long in a portfolio of stocks with high factor loadings and short in a portfolio of stocks with low factor loadings while the portfolios have equal characteristics (BE/ME). A factor-balanced (FB) portfolio goes long in a portfolio of high BE/ME firms and short in a portfolio of low BE/ME firms while the portfolios have equal factor loadings (*h*). The table shows the average monthly portfolio returns (Ret), the standard deviation of monthly portfolio returns (Std. dev.), the average portfolio characteristics (BE/ME) and the average portfolio factor loadings (*h*) from the regression $Ri-Rf=ai+bi[RM-Rf]+siSMB+hiHML+miWML+\varepsilon i$ Ri−Rf=ai+bi[RM−Rf]+siSMB+hiHML+miWML+εi

** (****, ******) indicates 10 % (5 %, 1 %) significance level from a *t*-test against the null hypothesis of zero average

TABLE 11
AVERAGE MONTHLY RETURNS FOR PORTFOLIOS FORMED FROM SORTS ON MOMENTUM AND WML SLOPES

WML factor loading quantiles											
Mom quantiles	1	2	3	4	CB	Mom quantiles	1	2	3	4	CB
	Ret						Std. dev.				
1	−0.01	0.47	−0.17	0.33	0.34	1	6.07	6.16	5.56	5.61	4.91
2	0.68	0.63	0.82	0.64	−0.04	2	5.13	4.64	4.50	4.60	3.65
3	0.96	0.95	0.83	0.75	−0.21	3	4.88	4.24	4.01	4.00	3.58
4	1.19	1.37	1.27	1.30	0.10	4	4.70	4.39	4.07	4.95	3.81
FB	1.20***	0.87***	1.44***	0.96***		FB	4.77	5.31	4.69	5.05	

	Mom					WML factor loadings				
1	−0.27	−0.25	−0.26	−0.26		1	−0.67	−0.20	0.06	0.51	
2	−0.03	−0.03	−0.03	−0.03		2	−0.64	−0.19	0.06	0.44	
3	0.14	0.14	0.14	0.14		3	−0.64	−0.19	0.06	0.45	
4	0.51	0.47	0.49	0.53		4	−0.66	−0.19	0.05	0.50	

We form 16 portfolios as the intersections of four size groups and four WML factor loading groups and calculate their equal-weight monthly returns. A characteristic-balanced (CB) portfolio goes long in a portfolio of stocks with high factor loadings and short in a portfolio of stocks with low factor loadings while the portfolios have equal characteristics (momentum). A factor-balanced (FB) portfolio goes long in a portfolio of high momentum firms and short in a portfolio of low momentum firms while the portfolios have equal factor loadings (m). The table shows the average monthly portfolio returns (Ret), the standard deviation of monthly portfolio returns (Std. dev.), the average portfolio characteristics (momentum) and the average portfolio factor loadings (m) from the regression $Ri - Rf = ai + bi[RM - Rf] + si\text{SMB} + hi\text{HML} + mi\text{WML} + \varepsilon i$

∗ (∗∗, ∗∗∗) indicates 10 % (5 %, 1 %) significance level from a t-test against the null hypothesis of zero average

TABLE 12
AVERAGE MONTHLY RETURNS, REGRESSION COEFFICIENTS AND THEIR T-STATISTICS FOR FINAL CHARACTERISTIC-BALANCED (CB) AND FACTOR-BALANCED (FB) PORTFOLIOS

Ret	Std. dev.	*a*	*b*	*s*	*h*	*m*	*t*(*a*)	*t*(*b*)	*t*(*s*)	*t*(*h*)	*t*(*m*)	R^2
BE/ME vs h												
CB	2.17	−0.0018	−0.04	−0.02	−0.17	0.07	−1.54	−1.34	−0.49	−4.18	2.52	0.08
FB	2.36	0.0013	0.18	0.34	0.38	0.08	1.03	5.86	7.41	9.10	2.74	0.30
Mom vs m												
CB	2.11	−0.0042	0.07	−0.05	0.11	−0.02	−3.40	2.40	−1.10	2.70	−0.84	0.10
FB	3.41	0.0024	−0.01	−0.06	−0.03	0.60	1.70	−0.33	−1.20	−0.55	17.45	0.48
Size vs s												
CB	2.60	−0.0067	0.29	0.33	0.09	−0.06	−4.72	7.83	6.02	1.93	−1.70	0.22
FB	3.11	−0.0013	0.13	−0.45	0.10	−0.12	−0.89	3.61	−8.44	2.14	−3.58	0.48

The CB (FB) portfolio is the equal-weight average of all CB (FB) portfolios formed for a single factor loading (characteristic). The table shows the average monthly adjusted portfolio returns (Ret), the standard deviation of

monthly portfolio returns (Std. dev.), the regression coefficients (a, b, s, h, m), their t-statistics [t(a), t(b), t(s), t(h), t(m)] and the $R2$ from the regression $Ri-R\text{f}=ai+bi[R\mathbf{M}-R\text{f}]+si\text{SMB}+hi\text{HML}+mi\text{WML}+\varepsilon i$

$*$ ($**$, $***$) indicates 10 % (5 %, 1 %) significance level from a t-test against the null hypothesis of zero average

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TRANSLATED VERSION: SPANISH

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

VERSION TRADUCIDA: ESPAÑOL

A continuación se muestra una traducción aproximada de las ideas presentadas anteriormente. Esto se hizo para dar una comprensión general de las ideas presentadas en el documento. Por favor, disculpe cualquier error gramatical y no responsabilite a los autores originales de estos errores.

INTRODUCCIÓN

El objetivo del documento es analizar empíricamente si las exposiciones del modelo de cuatro factores propuesto por Carhart (1997) o las características respectivas explican la dispersión en los rendimientos medios de las acciones alemanas. En las últimas décadas, los inversores en acciones de pequeña y alta relación entre el libro y el mercado y las empresas de alto impulso ("empresas débiles") han superado a los inversores en acciones de grandes y bajas relaciones entre los libros y el mercado y las empresas de bajo impulso ("empresas fuertes"). La persistente ventaja de rendimiento de las existencias anteriores sobre las segundas puede surgir ya sea por diferencias en el riesgo sistemático (covarianzas, exposiciones) o como resultado de precios erróneos. La distinción entre estas dos hipótesis es el núcleo de la investigación moderna sobre precios de activos (Lin y Zhang 2013: 351) y tiene importantes implicaciones en la forma en que los inversores deben formar carteras (Daniel y Titman 1998: 24). Si la prima de rendimiento asociada a las acciones de empresas débiles surge debido a un mayor riesgo sistemático, los inversores no pueden hacer nada mejor que mantener una combinación de factores de riesgo. Por ejemplo, si los rendimientos esperados son coherentes con el modelo de tres factores de Fama y Francés (1993) o el modelo de cuatro factores de Carhart (1997), los inversores deben tener una combinación de los factores modelo respectivos. Pero, en cambio, si las diferencias en los rendimientos de las acciones no están relacionadas con las diferencias en el riesgo sistemático (sino en las características), los inversores deben tener carteras que son largas en acciones de empresas débiles y cortas en las acciones de empresas fuertes.

No hay, hasta el conocimiento de nuestro conocimiento, ningún estudio tratando de distinguir entre covarianzas y características para el mercado de valores alemán. El objetivo general de este documento es cerrar esta brecha. Para ello aplicamos la prueba Daniel and Titman (1997), que se ha convertido en el caballo de batalla para el riesgo de "desenredado" frente a los precios erróneos de los activos (Lin y Zhang 2013: 352). La prueba de Daniel y Titman (1997) se basa en la clasificación de las acciones en características como la relación entre el libro y el mercado y las covarianzas como la exposición a HML. Siguiendo las carteras tradicionales de teoría de precios de activos de acciones con características similares, pero las diferentes exposiciones de factores de riesgo deben presentar rendimientos diferentes, mientras que las carteras de acciones con exposiciones de factores de riesgo similares, pero características diferentes no deberían. Este procedimiento de prueba requiere maximizar el diferencial en características y exposiciones para distinguir entre un modelo de fijación de precios de activos y un precio incorrecto. Además, para encontrar variación en las cargas de factores que no están relacionadas con otras características podrían ser necesarias varias clasificaciones en las características. Por ejemplo, Daniel y Titman (1997) y Davis et al. (2000) ordenan triplemente las acciones en función de dos características (tamaño y capital de libro a mercado) y la exposición a HML para controlar la influencia del tamaño en los rendimientos al analizar el factor HML. Estas dos cuestiones requieren elegir el número de carteras de pruebas lo más alto posible. Sin embargo, el número de carteras utilizadas está restringido por el número de empresas disponibles. En el caso de Alemania, el número de empresas es mucho menor que el del mercado de valores de los Estados Unidos. Por lo tanto, en lugar de devoluciones en bruto, utilizamos retornos de "ajuste de características" para eludir estos problemas. Por ejemplo, al probar si el HML es o no un factor de precio para el efecto de relación de capital de libro a mercado, utilizamos retornos ajustados por tamaño para controlar adecuadamente la influencia del tamaño de la empresa en los rendimientos.

Nuestros resultados sugieren que los factores SMB, HML y WML del modelo de cuatro factores Carhart (1997) no tienen un precio. Este hallazgo es diferente de la literatura reciente que indica que estos factores tienen un precio, llevando a cabo sin embargo un enfoque empírico diferente (Fama-mcbeth-

regresión) que potencialmente sufre de la alta correlación entre características y exposiciones (por ejemplo, Artmann et al. 2012a). Las características de la relación entre el libro y el impulso explican en nuestro análisis las diferencias transversales en los rendimientos bursátiles que confirman las conclusiones de, entre otros, Schrimpf et al. (2007), Schiereck et al. (1999), y Glaser y Weber (2003). Además, no encontramos evidencia empírica de que las PYME tienen un precio o que el tamaño de la empresa explica los rendimientos transversales. La falta del efecto del tamaño apoya la literatura reciente que no encuentra una anomalía de tamaño para Alemania (por ejemplo, Artmann et al. 2012a, b; 2007; Ziegler et al. 2007). Nuestros resultados empíricos sugieren que los inversores alemanes en el mercado de valores pueden hacerlo mejor que tener una combinación de carteras de factores de riesgo de uso común SMB, HML y WML.

El resto de este documento se realiza de la siguiente manera. En la Secta 2 introducimos en el debate de las covarianzas versus características y el modelo de factor considerado en nuestro documento. En la secta 3 obtenemos algunas hipótesis empíricamente comprobables para distinguir entre la historia de precios racionales y la historia de precios erróneos. En la Secta 4 presentamos los datos y describimos las características firmes. Luego, en la Secta 5, proporcionamos pruebas empíricas sobre la prueba central de la hipótesis nula de un modelo de factor de riesgo contra la hipótesis alternativa de un modelo de características para el mercado de valores alemán. La Sección 6 resume y concluye.

CONCLUSIÓN

Analizamos la cuestión de si la dispersión transversal en los rendimientos medios del mercado bursátil alemán se debe a características o a las exposiciones a los factores de riesgo del modelo FFC. La persistente ventaja de rendimiento de algunas acciones "débiles" características de las empresas en comparación con algunas acciones "fuertes" características de las empresas puede surgir porque son más riesgosas o porque las diferencias en el rendimiento se deben a precios erróneos (Daniel y Titman 1998: 24, 25). Encontramos que ni hay un efecto de tamaño ni que la PYME sea un factor de riesgo a un precio. Nuestros resultados indican que HML y WML no tienen un precio y que los rendimientos de las acciones están relacionados con características y no con exposiciones. Estos hallazgos son sólidos para las opciones de la metodología. Un inversor bursátil alemán es aparentemente mejor de si invierte en empresas con características firmes "débiles" e ignora las exposiciones a los factores de riesgo comúnmente utilizados.

TRANSLATED VERSION: FRENCH

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

VERSION TRADUITE: FRANÇAIS

Voici une traduction approximative des idées présentées ci-dessus. Cela a été fait pour donner une compréhension générale des idées présentées dans le document. Veuillez excuser toutes les erreurs grammaticales et ne pas tenir les auteurs originaux responsables de ces erreurs.

INTRODUCTION

L'objectif de l'article est d'analyser empiriquement si les expositions du modèle à quatre facteurs proposé par Carhart (1997) ou les caractéristiques respectives expliquent la dispersion des rendements moyens des actions allemandes. Au cours des dernières décennies, les investisseurs dans des actions de petites sociétés à forte valeur comptable et boursière et des entreprises à forte dynamique (entreprises « faibles ») ont surperformé les investisseurs dans les actions de grandes sociétés à faible ratio de fonds propres book-to-market et de sociétés à faible élan (entreprises « fortes »). L'avantage de performance persistant des premiers stocks par rapport aux seconds peut découler soit de différences de risque

systématique (covariances, expositions) soit en raison d'une mauvaise évaluation. La distinction entre ces deux hypothèses est au cœur de la recherche moderne sur la tarification des actifs (Lin et Zhang, 2013 : 351) et a d'importantes répercussions sur la façon dont les investisseurs devraient former des portefeuilles (Daniel et Titman, 1998 : 24). Si la prime de rendement associée aux actions d'entreprises faibles résulte d'un risque systématique plus élevé, les investisseurs ne peuvent faire mieux que de détenir une combinaison de facteurs de risque. Par exemple, si les rendements prévus sont conformes au modèle à trois facteurs de Fama et Français (1993) ou au modèle à quatre facteurs de Carhart (1997), les investisseurs devraient détenir une combinaison des facteurs modèles respectifs. Mais, en revanche, si les différences de rendement des actions ne sont pas liées à des différences dans le risque systématique (mais dans les caractéristiques), les investisseurs devraient détenir des portefeuilles qui sont longtemps dans les actions des entreprises faibles et à court d'actions d'entreprises fortes.

Il n'y a, à notre connaissance, aucune étude essayant de faire la distinction entre les covariances et les caractéristiques pour le marché boursier allemand. L'objectif global de ce document est de combler cet écart. À cette fin, nous appliquons le critère de Daniel et Titman (1997), qui est devenu le cheval de bataille du risque de « démêlage » par rapport à la mauvaise tarification des prix des actifs (Lin et Zhang, 2013 : 352). Le test de Daniel et Titman (1997) est basé sur le tri des stocks sur des caractéristiques telles que le ratio de fonds propres book-to-market et les covariances comme l'exposition à HML. Suivant la théorie traditionnelle des prix des actifs portefeuilles d'actions ayant des caractéristiques similaires, mais les différentes expositions aux facteurs de risque devraient présenter des rendements différents tandis que les portefeuilles d'actions présentant des expositions similaires aux facteurs de risque, mais des caractéristiques différentes ne devraient pas. Cette procédure d'essai exige de maximiser l'écart dans les caractéristiques et les expositions afin de faire la distinction entre un modèle de tarification des actifs et une mauvaise évaluation. En outre, il pourrait être nécessaire de trouver des variations dans les chargements de facteurs qui n'ont rien à voir avec d'autres caractéristiques de plusieurs types de caractéristiques. Par exemple, Daniel et Titman (1997) et Davis et coll. (2000) trient les actions en fonction de deux caractéristiques (taille et fonds propres de livre à marché) et de l'exposition à HML pour contrôler l'influence de la taille sur les rendements lors de l'analyse du facteur HML. Ces deux questions exigent de choisir le nombre de portefeuilles de tests aussi élevé que possible. Toutefois, le nombre de portefeuilles utilisés est limité par le nombre d'entreprises disponibles. Dans le cas de l'Allemagne, le nombre d'entreprises est beaucoup plus faible que pour le marché boursier américain. Au lieu de rendements bruts, nous utilisons donc des retours « ajustés aux caractéristiques » pour contourner ces problèmes. Par exemple, lorsque nous testons si HML est ou non un facteur de prix pour l'effet de ratio de fonds propres book-to-market, nous utilisons des rendements ajustés en fonction de la taille pour contrôler correctement l'influence de la taille de l'entreprise sur les rendements.

Nos résultats suggèrent que les facteurs PME, HML et WML du modèle à quatre facteurs de Carhart (1997) ne sont pas évalués. Cette constatation est différente de la littérature récente qui indique que ces facteurs sont évalués, menant toutefois une approche empirique différente (Fama-mcbeth-régression) qui souffre potentiellement de la forte corrélation entre les caractéristiques et les expositions (p. Ex. Artmann et al., 2012a). Le ratio d'actions et l'élan du livre aux marchés expliquent dans notre analyse les différences transversales de rendement des actions confirmant les conclusions de Schrimpf et coll. (2007), Schiereck et coll. (1999) et Glaser et Weber (2003). En outre, nous ne trouvons aucune preuve empirique que la PME est évaluée ou que la taille de l'entreprise explique les rendements transseuges. L'absence de l'effet de taille soutient la littérature récente qui ne trouve pas d'anomalie de taille pour l'Allemagne (par exemple Artmann et coll. 2012a, b; Schrimpf et coll. 2007; Ziegler et coll. 2007). Nos résultats empiriques suggèrent que les investisseurs boursiers allemands peuvent faire mieux que de détenir une combinaison de portefeuilles de facteurs de risque couramment utilisés PME, HML et WML.

Le reste du présent document se déroule comme suit. Dans l'article 2, nous introduisons dans le débat sur les covariances par rapport aux caractéristiques et le modèle de facteur pris en compte dans notre document. Dans l'article 3, nous tirons des hypothèses empiriquement testables pour faire la distinction entre l'histoire rationnelle des prix et l'histoire erronée. Dans l'article 4, nous présentons les données et décrivons les caractéristiques de l'entreprise. Ensuite, dans l'article 5, nous fournissons des preuves

empiriques sur le test central de l'hypothèse nulle d'un modèle de facteur de risque par rapport à l'hypothèse alternative d'un modèle de caractéristiques pour le marché boursier allemand. La section 6 résume et conclut.

CONCLUSION

Nous analysons la question de savoir si la dispersion transversale des rendements boursiers allemands moyens est due aux caractéristiques ou aux expositions aux facteurs de risque du modèle FFC. L'avantage persistant de rendement de certains titres caractéristiques de l'entreprise « faibles » par rapport à certaines actions caractéristiques de l'entreprise « fortes » peut survenir soit parce qu'ils sont plus risqués, soit parce que les différences de rendement sont dues à des erreurs de prix (Daniel et Titman, 1998 : 24, 25). Nous constatons que ni l'un ni l'autre n'a d'effet de taille, ni que la PME n'est un facteur de risque de prix. Nos résultats indiquent que HML et WML ne sont pas évalués et que les rendements des actions sont liés à des caractéristiques plutôt qu'à des expositions. Ces résultats sont solides pour les choix de la méthodologie. Un investisseur boursier allemand est apparemment mieux si elle investit dans des entreprises avec des caractéristiques « faibles » de l'entreprise et ignore les expositions aux facteurs de risque couramment utilisés.

TRANSLATED VERSION: GERMAN

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

ÜBERSETZTE VERSION: DEUTSCH

Hier ist eine ungefähre Übersetzung der oben vorgestellten Ideen. Dies wurde getan, um ein allgemeines Verständnis der in dem Dokument vorgestellten Ideen zu vermitteln. Bitte entschuldigen Sie alle grammatikalischen Fehler und machen Sie die ursprünglichen Autoren nicht für diese Fehler verantwortlich.

EINLEITUNG

Ziel des papiers ist es, empirisch zu analysieren, ob die expositionen aus dem von carhart (1997) vorgeschlagenen vier-faktor-modell oder die jeweiligen merkmale die streuung der durchschnittlichen deutschen aktienrenditen erklären. In den letzten jahrzehnten haben investoren in aktien kleiner, hoher buch-zu-markt-eigenkapitalquote und hochwertiger unternehmen ("schwache" unternehmen) die anleger bei aktien großer, niedriger buch-zu-markt-eigenkapitalquote und unternehmen mit geringer dynamik ("starke" unternehmen) übertroffen. Der anhaltende leistungsvorteil der früheren bestände gegenüber den letztgenannten kann entweder aufgrund von unterschieden im systematischen risiko (kovarianzen, risikopositionen) oder aufgrund von fehlbewertungen entstehen. Die unterscheidung zwischen diesen beiden hypothesen bildet den kern der modernen vermögenspreisforschung (lin und zhang 2013: 351) und hat wichtige auswirkungen darauf, wie investoren portfolios bilden sollten (daniel und titman 1998: 24). Wenn die renditeprämie im zusammenhang mit aktien schwacher unternehmen auf ein höheres systematisches risiko zurückzuführen ist, können anleger nichts besseres tun, als eine kombination von risikofaktoren zu halten. Wenn beispielsweise die erwarteten renditen mit dem drei-faktor-modell von fama und französisch (1993) oder dem vier-faktor-modell von carhart (1997) übereinstimmen, sollten anleger eine kombination der jeweiligen modellfaktoren halten. Wenn jedoch unterschiede bei den aktienrenditen nicht mit unterschieden im systematischen risiko (sondern in den merkmalen) zusammenhängen, sollten anleger portfolios halten, die lange in aktienschwachen unternehmen und kurz in aktienstarken aktien von unternehmen liegen.

Es gibt nach bestem wissen und gewissen keine studie, die versucht, zwischen kovarianzen und merkmalen für den deutschen aktienmarkt zu unterscheiden. Das übergeordnete ziel dieses papiers besteht darin, diese lücke zu schließen. Zu diesem zweck wenden wir den daniel und titman (1997) test an, der zum arbeitspferd für die "entwirrung" von risiken versus fehleinschätzungen bei der vermögenspreisgestaltung geworden ist (lin und zhang 2013: 352). Der test von daniel und titman (1997) basiert auf der sortierung von aktien nach merkmalen wie der book-to-market-eigenkapitalquote und kovarianzen wie der exposition gegenüber hml. Nach der traditionellen vermögenspreistheorie sollten portfolios von aktien mit ähnlichen merkmalen, aber unterschiedlichen risikofaktor-exposures unterschiedliche renditen aufweisen, während portfolios von aktien mit ähnlichen risikofaktor-exposures, aber unterschiedlichen merkmalen nicht berücksichtigt werden sollten. Dieses testverfahren erfordert die maximierung der streuung der merkmale und risikopositionen, um zwischen einem modell für die preisgestaltung von vermögenswerten und fehlbewertungen zu unterscheiden. Darüber hinaus ist es erforderlich, abweichungen bei faktorbelastungen zu finden, die nichts mit anderen merkmalen zu tun haben, die mehrere merkmale aufweisen. Daniel und titman (1997) und davis et al. (2000) sortieren beispielsweise die aktien dreifach nach zwei merkmalen (größe und book-to-market-equity) und der exposition gegenüber hml, um den einfluss der größe auf die renditen bei der analyse des hml-faktors zu kontrollieren. Diese beiden probleme erfordern, die anzahl der testportfolios so hoch wie möglich zu wählen. Die anzahl der verwendeten portfolios wird jedoch durch die anzahl der verfügbaren unternehmen begrenzt. Im falle deutschlands ist die zahl der firmen deutlich niedriger als am us-aktienmarkt. Anstelle von rohrücksendungen verwenden wir daher "merkmalsanpassungs"-rückgaben, um diese probleme zu umgehen. Wenn wir beispielsweise testen, ob hml ein preisfaktor für den book-to-market-eigenkapitalverhältniseffekt ist, verwenden wir größenbereinigte renditen, um den einfluss der unternehmensgröße auf die renditen richtig zu steuern.

Unsere ergebnisse deuten darauf hin, dass die faktoren smb, hml und wml aus dem carhart (1997) vier-faktor-modell nicht preislich sind. Diese feststellung unterscheidet sich von der jüngsten literatur, die darauf hinweist, dass diese faktoren eingepreist sind, indem sie jedoch einen anderen empirischen ansatz (fama-mcbeth-regression) verfolgt, der potenziell unter der hohen korrelation zwischen merkmalen und expositionen leidet (z. B. Artmann et al. 2012a). Die merkmale book-to-market equity ratio und momentum erklären in unserer analyse die querschnittsunterschiede bei den aktienrenditen, die die ergebnisse u.a. Von schrimpf et al. (2007), schiereck et al. (1999) und glaser und weber (2003) bestätigen. Darüber hinaus finden wir keine empirischen belege dafür, dass smb eingepreist ist oder dass die unternehmensgröße die querschnittsrenditen erklärt. Der fehlende größeneffekt unterstützt die aktuelle literatur, die für deutschland keine größenanomalie findet (z.b. Artmann et al. 2012a, b; schrimpf et al. 2007; ziegler et al. 2007). Unsere empirischen ergebnisse deuten darauf hin, dass deutsche börseninvestoren besser können, als eine kombination aus den häufig verwendeten risikofaktorportfolios smb, hml und wml zu halten.

Der rest dieses papiers verläuft wie folgt. In abschnitt 2 führen wir in die kovarianzen versus merkmalsdebatte und das in unserer zeitung betrachtete faktormodell ein. In abschnitt 3 leiten wir einige empirisch testbare hypothesen ab, um zwischen der rationalen preisgeschichte und der fehlpreisgeschichte zu unterscheiden. In abschnitt 4 stellen wir die daten vor und beschreiben die festen merkmale. Dann liefern wir in abschnitt 5 empirische belege für den zentralen test der nullhypothese eines risikofaktormodells gegen die alternativhypothese eines merkmalsmodells für den deutschen aktienmarkt. Abschnitt 6 fasst zusammen und schließt.

SCHLUSSFOLGERUNG

Wir analysieren die frage, ob die querschnittsstreuung der durchschnittlichen deutschen börsenrenditen auf merkmale oder die risikopositionen gegenüber den risikofaktoren des ffc-modells zurückzuführen ist. Der anhaltende leistungsvorteil einiger "schwacher" fester kennaktien im vergleich zu einigen "starken" kennzeichnenden aktien kann entweder entstehen, weil sie riskanter sind oder weil die leistungsunterschiede auf fehlbewertungen zurückzuführen sind (daniel und titman 1998: 24, 25). Wir stellen fest, dass es weder einen größeneffekt noch einen preisrisikofaktor gibt. Unsere ergebnisse zeigen, dass hml und wml nicht preislich sind und dass aktienrenditen eher mit merkmalen als mit risikopositionen

zusammenhängen. Diese ergebnisse sind robust für die wahl der methodik. Ein deutscher börseninvestor ist scheinbar besser, wenn er in unternehmen mit "schwachen" firmenmerkmalen investiert und die expositiongegenübers gegenüber den häufig verwendeten risikofaktoren ignoriert.

TRANSLATED VERSION: PORTUGUESE

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

VERSÃO TRADUZIDA: PORTUGUÊS

Aqui está uma tradução aproximada das ideias acima apresentadas. Isto foi feito para dar uma compreensão geral das ideias apresentadas no documento. Por favor, desculpe todos os erros gramaticais e não responsacule os autores originais responsáveis por estes erros.

INTRODUÇÃO

O documento tem por objetivo analisar empiricamente se as exposições do modelo de quatro fatores proposto pela Carhart (1997) ou as respetivas características explicam a dispersão das declarações médias das existências alemãs. Ao longo das últimas décadas, os investidores em ações de pequenas e altas empresas de capital de mercado e empresas de alta dinâmica (empresas "fracas") superaram os investidores em ações de grandes, baixo rácio de capitais próprios de mercado e empresas de baixa dinâmica (empresas "fortes"). A vantagem persistente de desempenho das existências anteriores sobre as últimas pode surgir quer devido a diferenças de risco sistemático (covariâncias, exposições) quer em consequência de uma má avaliação. A distinção entre estas duas hipóteses está no cerne da investigação moderna sobre preços de ativos (Lin e Zhang 2013: 351) e tem implicações importantes na forma como os investidores devem formar carteiras (Daniel e Titman 1998: 24). Se o prémio de rendibilidade associado às existências de empresas débeis surgir devido a um risco sistemático mais elevado, os investidores não podem fazer melhor do que manter uma combinação de fatores de risco. Por exemplo, se os retornos esperados forem consistentes com o modelo de três fatores da Fama e do francês (1993) ou com o modelo de quatro fatores da Carhart (1997), os investidores deverão manter uma combinação dos respetivos factores-modelo. Mas, pelo contrário, se as diferenças na rentabilidade das ações não estiverem relacionadas com diferenças de risco sistemático (mas em características), os investidores deverão deter carteiras há muito tempo em ações de empresas débeis e curtas em ações de empresas fortes.

Não existe, tanto quanto sabemos, nenhum estudo que tente distinguir entre covariances e características para o mercado bolsista alemão. O objetivo geral deste documento é colmatar esta lacuna. Para o efeito, aplicamos o teste Daniel e Titman (1997), que se tornou o cavalo de trabalho para o risco de "desconseção" contra a má avaliação dos preços dos ativos (Lin e Zhang 2013: 352). O teste de Daniel e Titman (1997) baseia-se na triagem de existências em características como a relação entre os capitais próprios entre livros e mercado e as covariâncias, como a exposição à HML. Seguindo as tradicionais carteiras de teorias de preços de ativos de ações com características semelhantes, mas diferentes exposições de fatores de risco devem apresentar diferentes retornos, enquanto carteiras de ações com exposições de fatores de risco semelhantes, mas características diferentes não devem. Este procedimento de ensaio requer maximizar a propagação em características e exposições para distinguir entre um modelo de preços de ativos e uma má avaliação. Além disso, para encontrar variação nos carregamentos de fatores que não estejam relacionados com outras características, podem ser necessários vários tipos de características. Por exemplo, Daniel e Titman (1997) e Davis et al. (2000) trilam as existências com base em duas características (tamanho e capital de mercado) e a exposição à HML para controlar a influência da dimensão nos rendimentos ao analisar o fator HML. Estas duas questões exigem escolher o número de carteiras de teste o mais elevado possível. No entanto, o número de carteiras utilizadas é limitado pelo número de empresas disponíveis. No caso da Alemanha, o número de empresas é muito inferior ao da bolsa norte-americana.

Em vez de retornos brutos, utilizamos, portanto, retornos "característicos-ajustados" para contornar estas questões. Por exemplo, ao testar se o HML é ou não um fator de preço para o efeito de rácio de capital de mercado entre livros e mercado, utilizamos retornos ajustados à dimensão para controlar adequadamente a influência da dimensão firme nos rendimentos.

Os nossos resultados sugerem que os fatores SMB, HML e WML do modelo de quatro fatores Carhart (1997) não têm preço. Esta constatação é diferente da literatura recente que indica que estes fatores têm preços, conduzindo no entanto uma abordagem empírica diferente (Fama-mcbeth-regressão) que potencialmente sofre da alta correlação entre características e exposições (por exemplo Artmann et al. 2012a). As características entre o rácio de capitais próprios entre as características e o impulso explicam na nossa análise as diferenças transversais nas declarações de ações que confirmam, entre outros, a Schrimpf et al. (2007), a Schiereck et al. (1999) e a Glaser e a Weber (2003). Além disso, não encontramos provas empíricas de que a SMB tem um preço ou que a dimensão da empresa explique os retornos transversais. A falta do efeito de dimensão suporta a literatura recente que não encontra uma anomalia de tamanho para a Alemanha (por exemplo Artmann et al. 2012a, b; Schrimpf et al. 2007; Ziegler et al. 2007). Os nossos resultados empíricos sugerem que os investidores alemães do mercado de ações podem fazer melhor do que manter uma combinação de carteiras de fatores de risco geralmente utilizadas SMB, HML e WML.

O resto deste papel prossegue da seguinte forma. Em Seita. 2 introduzimos nas covariâncias versus características debate e no modelo de fator considerado no nosso artigo. Em Seita. 3 derivamos algumas hipóteses empiricamente testáveis para distinguir entre a história racional dos preços e a história errada. Na Seita. 4 apresentamos os dados e descrevemos as características da empresa. Em seguida, na Seita. 5 fornecemos provas empíricas sobre o teste central da hipótese nula de um modelo de fator de risco contra a hipótese alternativa de um modelo de características para o mercado bolsista alemão. A secção 6 resume e conclui.

CONCLUSÃO

Analisamos a questão de saber se a dispersão transversal nos rendimentos médios do mercado bolsista alemão se deve às características ou às exposições aos fatores de risco do modelo FFC. A vantagem persistente de desempenho de algumas existências característicos "fracas" em comparação com algumas existências característicos "fortes" podem surgir por serem mais arriscadas ou porque as diferenças de desempenho se devem a um mau preço (Daniel e Titman 1998: 24, 25). Constatamos que não existe um efeito de tamanho nem que a SMB é um fator de risco a preços. Os nossos resultados indicam que a HML e a WML não têm preços e que as declarações de stock estão relacionadas com características e não com exposições. Estes resultados são robustos para as escolhas da metodologia. Um investidor alemão na bolsa de valores é aparentemente melhor se investir em empresas com características "fracas" e ignorar as exposições aos fatores de risco geralmente utilizados.