Winner Strategies in Crisis

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Abstract.

Research background: Since the publication of Markowitz' Portfolio Selection Theory, researchers and practitioners have been searching for the optimal structure of investment portfolios. An unlimited number of portfolio-based investment strategies have been created since 1952. However, none of these strategies seem to continuously generate overperformance over a long time period. This may also be due to the strong dynamics of economic development and other external factors.
Purpose of the article: The aim of this article is to analyze which strategies are successful in generating winning portfolios in times of crisis. Three types of crises are considered: first, the bursting of the dot-com bubble in 2001, second, the financial crisis of 2008, and finally, the performance impact of the corona crisis.
Methods: The data of the S&P 500 and STOXX Europe 600 companies are analyzed. The first step is the statistical review of the performance of companies in different periods with the focus on the analysis of the crisis years. Subsequently, the formation of portfolios is carried out according to known key figures such as high-low PE ratio, high-low market-to-book ratio, and others. In the form of a regression analysis, selected fundamental data are used to statistically check their relevance for performance.
Findings & Value added: The results shows that all crises have similarities in certain factors. However, they also show that companies with a digital business model are able to manage crises better than those without a digital business model.

Keywords: *portfolio theory; investment in crisis*

JEL Classification: *G11; G40*

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1 Introduction

The last 20 years have been largely shaped by three global crises on the capital markets: the dot-com bubble in 2001, the 2008 financial crisis, and currently, the corona crisis. The European sovereign debt crisis of 2010 to 2012 could be named as a fourth crisis.

During the dot-com bubble of the 1990s, many market participants questioned the value of basic financial information for investment decision-making purposes. Shares were traded at a record multiple of earnings. Indeed, many companies that were not making any profits saw their share prices rise sharply in the second half of the 1990s. A number of academic studies have documented a decline in the linear relationship between earnings and stock return. [1-4] Some argued that profits no longer mattered and that other metrics such as number of clicks or page views were more appropriate in the new economy. [5] Others argued that poor accounting and accounting standards contributed to the bull market of the 1990s. [6-7] Penman (2003) describes the bubble period of the 1990s as a pyramid-shaped chain letter in which momentum investments displaced fundamental investments. [5]

The great financial crisis of 2008 is now considered to be one of the longest and most significant economic crises the world has ever seen. [8] It has dramatically changed the business environment of the 21st century, which had already seen the turbulent waves of the digital revolution, against the backdrop of ever-increasing globalization. Many factors contributed to this financial crisis, notably an increase in debt due to the introduction of new financial instruments, the creation of a real-estate bubble (mortgage bubble), irresponsible risk-taking, and negligent oversight. [9] The main effects of the crisis have been a declining (or slowlier growing) economy in developed countries, persistently high unemployment, continued deleveraging in the private sector, large deficits and public sector debt, a much greater influence of politics on the economy, a marked decline inflation, very low interest rates, and accelerated migration of growth and prosperity dynamics. [10] As a result, the 2008 financial crisis can be interpreted as creative destruction, [11] which is a characteristic form of capitalist development with a series of ups and downs that create opportunities for profit and downturns that leave room for restructuring. [12] The euro crisis at this point is only seen as a consequence of the financial crisis, in which the insolvency of individual euro countries was prevented.

The last and current crisis was caused by the COVID-19 pandemic and its consequences are hardly foreseeable. In the short term, a crash was observed on the capital markets in the first quarter of the year, but prices recovered by the third quarter of 2020. Studies on this are still rare due to the topicality of the crisis. At this point, the contribution by Paresh et al. (2020), who analyze the impact of government measures on excess returns in the markets in the G7 countries, is to be taken into account. According to Paresh et al., government measures have a positive effect on returns. [13] The second study by Hetkamp et al. (2020) focuses on the analysis of psychological effects, such as sleep disorders, anxiety, and the DAX development. Aim of this web-based survey was to assess the mental health burden of the German public over a period of 50 days after the COVID-19 outbreak. 16,245 individuals responded regarding sleep disturbances, COVID-19 fear, and Generalized Anxiety Disorder (GAD-7). Data were put in relation to infection rates, number of deaths, and the German stock index. However, significant relationships could not be derived. [14]

The present article is based on the analysis of the fundamental data. This is due to the fact that a digitalization boom similar to that of the late 1990s can be felt. Thus, the central question arises as to the substance of the values on the capital market, which should be proven by fundamental data. A number of selected key figures, such as high-low dividend, high-low PE ratio etc. are analyzed for the period from 1995 to 1999.

2 Literature review

Numerous scientific studies show that active portfolio management can outperform passive strategies. [15-17] The focus of the present work is based on the question which performance can be generated in times of crisis by the strategies based on fundamental data. In this context, selected literature contributions from the area of value strategies and momentum strategies are presented. In addition, literature dealing with price bubbles and their consequences such as 2001 or 2008 is discussed.

2.1 Value strategies

The content of the fundamental or value strategies is the investigation of the fundamental economic relationships that are responsible for the fair pricing on stock markets. This fair pricing could be influenced by microfactors or macroeconomic relationships, such as economic development, private consumption, inflation rates, or interest rates. [18] Due to the fact that markets are inherently inefficient, [19] a fundamental investment strategy can generate outperformance.

The first studies to be conducted show that shares with high profit-to-price ratios or high book-to-market equity values generate higher returns.[20-27] The explanation for this outperformance is provided by Fama & French (1992, 1993), who argue that due to the higher risk of value strategies, higher returns must be realized as a risk premium.[26, 28] Chan (1988) and Ball & Kothari (1989) express similar views. [29-30] Lakonishok, Shleifer & Vishny (1994) explain these excess returns by the ability of investors to identify undervalued stocks and not because compensation is paid for the risks taken. [27]

2.2 Momentum strategies

The focus of the momentum strategy as a procyclical investment strategy lies in the hypothesis that the winning shares of the past will most likely develop in the same direction in the near future. The same is assumed for the performance of the loser shares. [31-32] The technical trading rules of relative strength according to Levy (1967) provide the basis for this approach. [16] The momentum strategy can thus offer investors an opportunity to outperform the market. [17]

The first empirical studies on the momentum strategy refer to the US market. Between 1960 and 1965, Levy (1967) examined a sample of 200 stocks on the New York Stock Exchange (NYSE) whose weekly closing prices over a 260-week period were used as the data basis for the analysis and provided scientific evidence of the success of the momentum strategy.[16, 34] Jegadeesh & Titman (1993) showed that a medium-term procyclical investment strategy leads to excess returns of up to 12.01% p.a. on average for the US market. At the same time, however, the study makes it clear that the excess returns of the investment universe are reduced by up to half in the long-term observation period of 24 months after the holding period.

August, Schiereck & Weber (2000) analyzed the price data for 418 stocks on a weekly and monthly basis, which were listed in official trading between 1973 and 1997. [33] A successful momentum strategy has been demonstrated for risk-adjusted returns. In accordance with existing studies, a six- and twelve-month formation and test period is proving to be promising. It is noticeable that in comparison to other studies, winners and losers show an excess return of 6.12% and 6.25% respectively. In addition, seasonal return patterns become clear. Previous studies conducted for the German market refer equally to the superiority of the momentum strategy. [35-41]

2.3 Asset price bubbles

For the years 2001 and 2008, two events based on the asset price bubble effect are examined. [42] In this section, this term will be discussed in more detail. In the broader sense of the word, the literature uses the term asset price bubble to describe a situation on the market in which the market values deviate considerably from the fundamental values. [43-46] At the same time, however, the literature refers to the problem that an exact determination of the fundamental value at the time of occurrence is hardly possible. [44] Siegel (2003) suggests measuring an asset price bubble based on deviations in expected and realized returns over a defined period of time. [47] This can only be done in retrospect as the returns cannot be predicted with certainty. Pastor & Veronesi (2004) expand this perspective to include uncertainty. [48] They suggest that taking uncertainty into account gives a more realistic picture of cash flow risk, especially during the dot-com bubble. This was true for companies in the internet, biotechnology, and telecommunications segment in the 2001 dot-com bubble. [48] Soft factors such as human capital, strategic alliances, joint ventures, and internet popularity are also gaining in importance. [49-50] These are included in market expectations in the form of cash flow forecasts. For example, a study by O'Brien & Tian (2006) showed that financial analysts were more optimistic about internet stocks during the dot-com bubble. [51] It was precisely in this phase that fundamental values became irrelevant for investors. [43, 49]

3 Empirical analysis: Methodology and Results

This paper deals with the question of the performance of fundamental investment strategies in times of crisis. The companies of the S&P 500 and companies of the STOXX Europe 600 are examined.

3.1 Data

The data are taken from the EIKON database and are collected as of October 2020. Overall, the period from 1997 to 2020 is considered on a quarterly basis. The fourth quarter in 1997 is the first in the time series and the third quarter 2020 is the last. Thus, 92 quarters are analyzed.

3.2 Methodology

A total of six key figures (market capitalization, PE ratio, dividend yield, market-to-book value, cash flow-to-sales ratio, and price-to-sales ratio) are considered. The high and low values are considered independently once according to the median and once according to the 75% (high) and 25% (low) quartile. This means that 24 different indicator-based scenarios are considered once for crises and once outside the crisis periods.

The dot-com bubble (starting in March 2000), the financial crisis of 2008 (starting on September 15, 2008 with the Lehman bankruptcy), and the corona crisis (starting in March 2020 with a significant increase in the number of patients) are considered separately. It is assumed that each crisis has a duration of four quarters. This assumption is supported by literature.[52] In the case of the corona crisis, only two quarters, the second and third of 2020, are considered, as no figures are yet available for the fourth.

In addition, the digital companies are compared with the non-digital companies. The "digitals" are those companies from the Thomson Reuters Business Clasification Sector (BTRC Sector) that belong to either the "Software & IT Services" or "Technology

Equipment" group. Amazon is assigned to the "digitals" despite the fact that it is also a retailer.

To gain additional insight, the top 30 performers are identified for each crisis quarter. Their quarterly returns (dependent variable) are explained using regression analyses. As independent variables, the six analysed fundamental ratios and the affiliation to the "digitals" are defined as a dummy variable.

$$y_{\text{top30,t}} = \alpha_{\text{t}} + MC_{\text{t}}\beta_{1,\text{t}} + PER_{\text{t}}\beta_{2,\text{t}} + Div_{\text{t}}\beta_{3,\text{t}} + MB_{\text{t}}\beta_{4,\text{t}} + CFS_{\text{t}}\beta_{5,\text{t}} + PS_{\text{t}}\beta_{6,\text{t}} + D_t\beta_{7,\text{t}} \quad (1)$$

with:

$y_{\text{top30,t}}$	Quarterly Performance der Top 30 Krisenoutperformer
MC_{t}	Market Capitalization
PER_{t}	Price to Earnings
MB_{t}	Market to Book Ratio
Div_{t}	Dividend Yield
CFS	Cashflow per Sales
PS_{t}	Price to Sales
D_{t}	Dummy Digitals

For all crises, the regression analyses are examined individually. For the corona crisis, the regression equation is reduced by cash flow per sales and price-to-sales due to missing variables.

$$y_{top30,t} = \alpha_t + MC_t\beta_{1,t} + PER_t\beta_{2,t} + Div_t\beta_{3,t} + MB_t\beta_{4,t} + D_t\beta_{5,t} \quad (2)$$

In addition, in the form of a panel data analysis, all crises are analyzed together for the top 30 companies in the latter regression function.

3.3 Results

In the following, the results for the US market are presented first. The analysis of the period from 1998 to the third quarter of 2020 of the companies of the S&P 500 shows that out of 92 examined quarters, the three observed crises occupied 10 quarters. In the remaining 82 quarters, no crises were observed. Among the S&P 500 companies, the dividend yield low 25%, the PE ratio high 75% and the market-to-book high 75% performed best in crisis-free times.

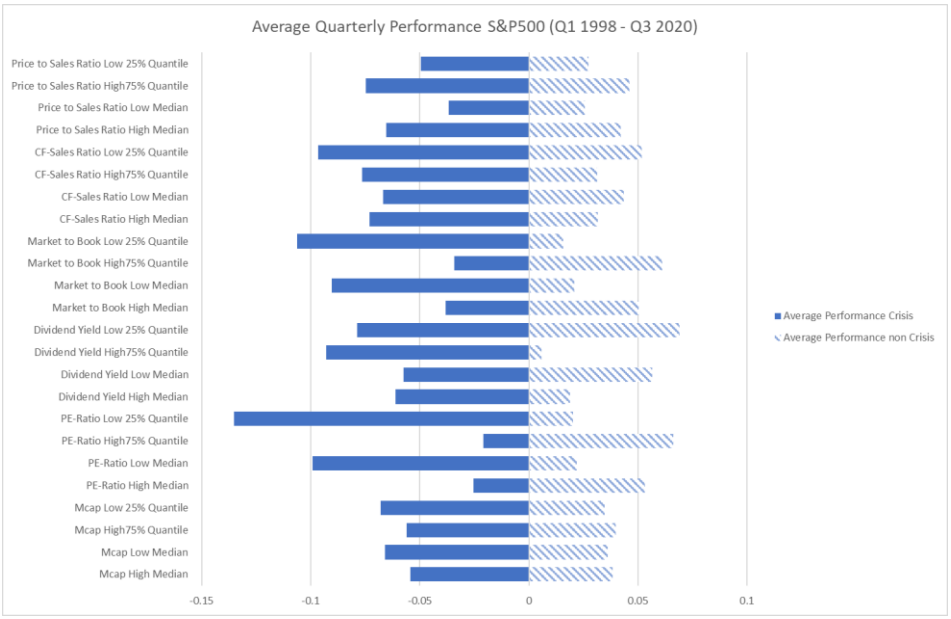

Fig. 1. Average quarterly performance S&P 500 (Q1 1998 – Q3 2020). (Source: Own calculation).

In contrast, all strategies show negative performance in times of crisis. The PE ratio high 75% and the PE ratio high median are the strategies with the lowest losses in times of crisis.

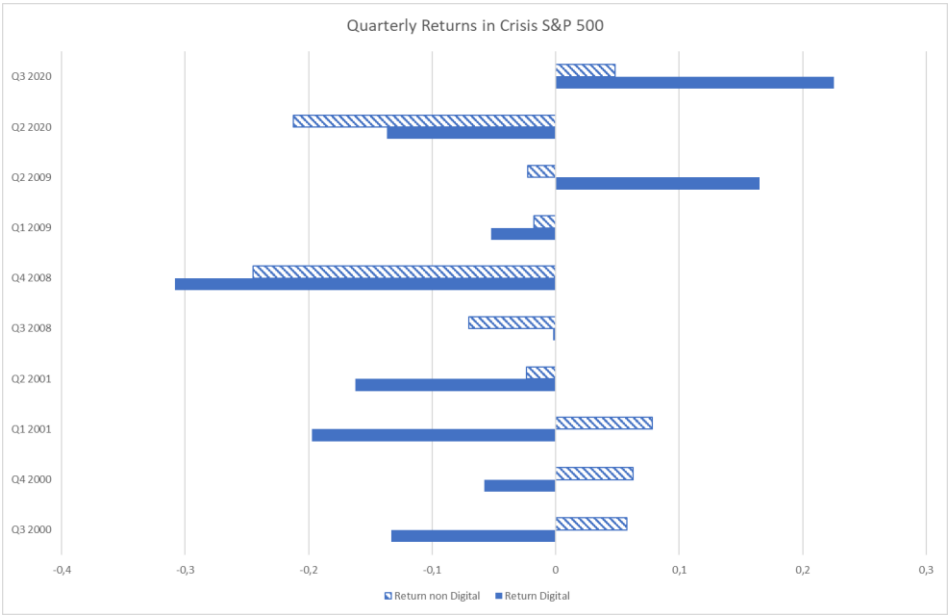

Fig. 2. Quarterly return in crisis S&P 500. (Source: Own calculation).

A closer analysis of digital companies compared to non-digital companies shows that digital companies were able to generate a clearly positive performance, particularly in the second quarter of the corona crisis. The digital companies also succeeded in doing so at the

defined end of the financial crisis in Q2 2009. By contrast, as expected, the digital companies were significant losers during the dot-com crisis.

A total of four models are considered in the regression analyses. The model S&P 500 (excl. corona), represented by the functional relation in equation (1), the model S&P 500 (incl. corona) represented by the relation in equation (2). The last two models aim at verifying the influence of the dummy variable "digitals" on the performance by two additional regression analyses. In all models, the top 30 performers were identified individually for each crisis quarter. The aim is to check which of the examined key figures explain the good crisis performance.

Table 1. Regression model summary S&P 500. (Source: Own calculation).

Model	Adjusted R Square	df Residual	Sig.
S&P 500 (excl. corona)	0.071	172	0.006
S&P 500 (incl. corona)	0.041	287	0.004
S&P 500 (digital excl. dot com)	0.056	171	0.011
S&P 500 (only digital)	0.048	178	0.002

The regression S&P 500 (digital excl. dot com) is represented by equation (2). In the S&P 500 (digital only) model, the performance is explained exclusively by means of a univariate regression analysis through the independent dummy variable "digitals". The dot-com crisis is not taken into account.

Table 2. Regression output S&P 500. (Source: Own calculation).

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics
		B	Std. Error			VIF
S&P 500 (excl. corona)	(Constant)	0.414	0.023	17.960	0.000	
	Dummy Digital	0.024	0.051	0.466	0.642	1.231
	Mcap	-9.497E-10	0.000	-1.051	0.295	1.139
	PE Ratio	0.000	0.000	0.786	0.433	1.096
	Dividend Yield	-0.026	0.009	-2.994	0.003	1.195
	Market-to-Book	-0.001	0.001	-0.593	0.554	1.172
	CF-Sales Ratio	-0.041	0.087	-0.467	0.641	1.355
	Price-to-Sales Ratio	0.005	0.004	1.463	0.145	1.363
S&P 500 (incl. corona)	(Constant)	0.392	0.019	20.554	0.000	
	Dummy Digital	0.047	0.037	1.282	0.201	1.073
	Mcap	-8.905E-11	0.000	-0.810	0.418	1.033
	PE Ratio	0.000	0.000	0.654	0.513	1.033
	Dividend Yield	-0.024	0.007	-3.390	0.001	1.074
	Market-to-Book	0.000	0.001	-0.282	0.778	1.011
S&P 500 (digital excl. dot com)	(Constant)	0.323	0.024	13.273	0.000	
	Dummy Digital	0.112	0.043	2.626	0.009	1.097
	Mcap	4.103E-11	0.000	0.382	0.703	1.078
	PE Ratio	0.000	0.000	-1.496	0.136	1.084
	Dividend Yield	-0.015	0.009	-1.754	0.081	1.087
	Market to Book	0.000	0.001	-0.609	0.544	1.049
S&P 500 (digital excl. dot com)	(Constant)	0.290	0.017	16.702	0.000	
	Dummy Digital	0.129	0.040	3.175	0.002	1.000

The results show a high overall model significance for all four models, but with low explanatory power (R squared) between 4% and 7%. In addition, dividend yield was the only significant variable found in the S&P 500 (excl. corona) model and the S&P 500 (digital excl. dot com) model. The performance decreases by 2.6% and 2.5%, respectively when the dividend yield increases by one unit. For the two "digitals" models, in addition to the dividend yield, membership of the digital business sector is a significant variable. In the S&P 500 (digital excl. dot com) model, sector affiliation generates a return of 11.2%. In the univariate regression, the dummy variable generates a return of 12.9%.

The STOXX Europe 600 companies show a partly different picture regarding the individual strategies. Companies with a CF-to-sales ratio high 75% and market-to-book high 75% manage to generate positive performance in times of crisis.

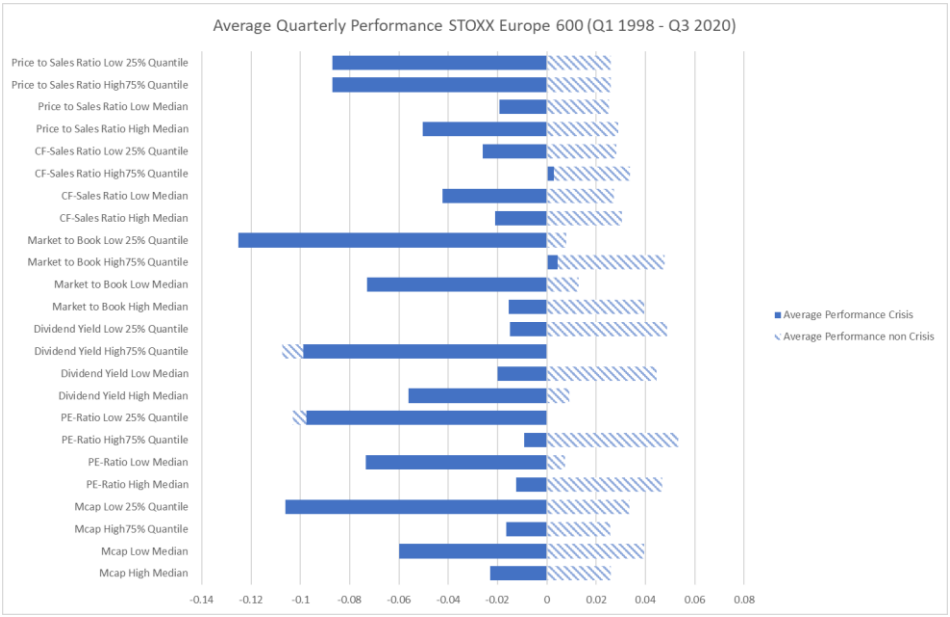

Fig. 3. Average quarterly performance STOXX Europe 600 (Q1 1998 – Q3 2020). (Source: Own calculation).

At the same time, however, the negative performance of the dividend yield high 75% and PE ratio low 25% outside the crises is also surprising compared to US companies.

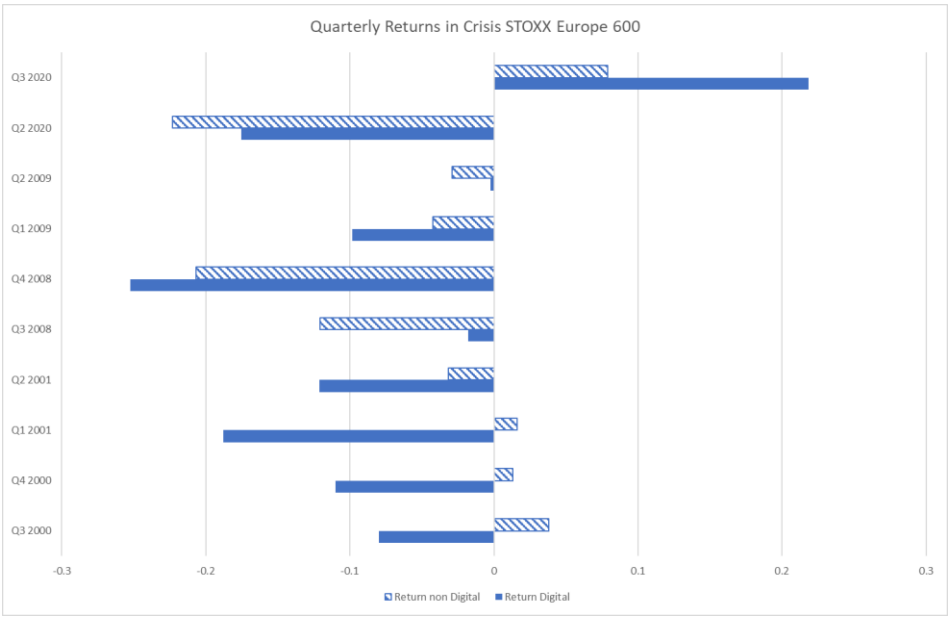

Fig. 4. Quarterly return in crisis STOXX Europe 600. (Source: Own calculation).

The balances of the digital companies are also worse for the European values compared to the US values. Europeans only manage to generate a positive performance in the third quarter of 2020. The American digital companies have already generated positive performance in the second quarter of the corona crisis.

Table 3. Regression model summary STOXX Europe 600. (Source: Own Calculation).

Model	Adjusted R Square	df Residual	Sig.
STOXX E600 (excl. corona)	-0.012	221	0.750
STOXX E600 (incl. corona)	-0.003	287	0.525
STOXX E600 (digital excl. dot com)	-0.002	171	0.455
STOXX E600 (only digital)	-0.004	178	0.605

The results of the regression analyses of European companies are similarly negative and lacking interpretation possibilities. Without a good explanation and without significance of the models, the examined relationships cannot be statistically proven for the European market.

Table 4. Regression output STOXX Europe 600. (Source: Own Calculation).

Model		Unstandardized Coefficients		t	Sig.	Collinearity Statistics
		B	Std. Error			VIF
STOXX E600 (excl. corona)	(Constant)	0.309	0.017	18.657	0.000	
	Dummy Digital	-0.008	0.084	-0.100	0.920	1.005
	Mcap	-2.759E-12	0.000	-0.267	0.790	1.103
	PE Ratio	0.000	0.000	0.938	0.349	1.706
	Dividend Yield	0.005	0.003	1.399	0.163	1.088
	Market-to-Book	0.000	0.001	0.458	0.647	1.016
	CF-Sales Ratio	0.000	0.000	-0.790	0.431	1.001
	Price-to-Sales Ratio	0.000	0.000	0.127	0.899	1.724

STOXX E600 (incl. corona)	(Constant)	0.306	0.015	21.046	0.000	
	Dummy Digital	0.044	0.063	0.698	0.486	1.002
	Mcap	-1.002E-12	0.000	-0.099	0.921	1.061
	PE Ratio	0.000	0.000	1.705	0.089	1.020
	Dividend Yield	0.003	0.003	0.917	0.360	1.081
	Market-to-Book	0.000	0.001	0.450	0.653	1.018
STOXX E600 (digital excl. dot com)	(Constant)	0.281	0.021	13.391	0.000	
	Dummy Digital	0.040	0.075	0.530	0.597	1.005
	Mcap	-1.385E-11	0.000	-0.850	0.397	1.140
	PE Ratio	0.000	0.000	1.019	0.310	1.030
	Dividend Yield	0.007	0.004	1.800	0.074	1.160
	Market-to-Book	-0.001	0.001	-0.620	0.536	1.018
STOXX E600 (digital excl. dot com)	(Constant)	0.305	0.016	19.360	0.000	
	Dummy Digital	0.039	0.075	0.518	0.605	1.000

These results are partly explained by the fact that while 47 of the 300 data sets in the US can be assigned to "digitals", this applies to only 9 of the 300 European companies.

4 Summary

The present article analyzed the performance of S&P 500 and STOXX Europe 600 companies in the period from the first quarter of 1998 until the third quarter of 2020 on the basis of fundamental indicators. No systematic crisis outperformance could be identified for the fundamental indicators in the period under review. A closer analysis of top 30 outperformers in the respective crisis months shows a significant negative influence of the dividend yield and a positive significant influence of the affiliation to the "digital" business sector for the US market. No evidence of statistical relationships could be found for the European companies.

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