Financial Crisis to Enhance Optimism? – The Impact of the Financial Crisis on the Earnings per Share Forecast Error

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The authors investigate the impact of the financial crisis that started in 2008 on the earnings per share forecast error. There is a large body of evidence from the 1980s that analysts' earnings per share forecasts systematically exceed the actual figures, i.e. they are generally optimistic. Other investigations support that the earnings per share forecast error is greater under uncertain environmental circumstances, while still others proved that analysts underreact negative information in making their forecasts. The financial crisis has brought about an abundance of negative information for analysts to consider in their earnings per share forecasts, and it has also increased the level of uncertainty for the entire economy. As a result, the crisis may be assumed to have increased the earnings per share forecast error in the optimistic direction. The study focuses on Hungarian companies listed on the stock exchange and their Austrian counterparts. Regarding the temporal focus of the research, it compared the five-year period directly preceding the financial crisis with the first two and a half years of the crisis. An interesting conclusion of the analysis is that there had been systematic pessimism in the five-year period before the crisis, whereas the earnings per share forecasts in the years of the crisis have been, in line with previous research findings, optimistic.

KEYWORDS:
Financial crisis.
Earnings per share.
Forecast.

We talk about overoptimism with respect to financial plans when forecasted data systematically deviate from actual values in the positive direction, i.e. sales revenues are overestimated, while costs are underestimated (*Lovallo et al*. [2007], *Kahneman–Lovallo* [2003], *Haw–Jung–Ruland* [1994], *Duru–Reeb* [2002]).[1] The error in financial planning is studied relative to profitability. In the case of companies listed on the stock exchange, studies focus on earnings per share (net earnings / number of outstanding shares – EPS) forecasts. Analysts work with financial models similar to those employed by managers in corporate financial planning. EPS is a popular indicator reflecting and comparing shareholding companies' income generation capacity. It helps investors to judge a company's profitability and ability to reach its targets.

EPS forecasts always refer to a particular year and may even be made on a daily basis.[2] One can distinguish between individual forecasts, i.e. those made by one analyst, and the average of forecasts for a particular company in respect of a given period, which is called "consensus" EPS forecast. EPS forecasts are often used to project a shareholding company's future performance. Managers and analysts also make it for particular shareholding companies for one year, two years or three years ahead. It is adjusted several times in the light of information that has become available in the meantime.

EPS forecasts have been a subject of study since the early 1980s. One of the early analyses was *Zacks*' [1979] research. He wanted to examine the effect of EPS *forecasts on share prices. He found that EPS forecasts were systematically optimistic. The following studies conducted in developed industrial countries all examined the bias* in EPS forecasts and confirmed their systematic optimism.

> *1*. The majority analysed EPS forecasts for companies listed on American stock exchanges (*Zacks* [1979], *De Bondt–Thaler* [1990], *Dreman–Berry* [1995], *Clayman–Schwartz* [1994], *Easterwood–Nutt* [1999], *Brown* [1993]).
>
> *2*. Some researchers examined EPS forecasts for Western European stock exchange listed companies (*Capstaff–Paudyal–Rees* [2001], *Beckers–Steliaros–Thomson* [2004], *Becchetti et al*. [2007]).
>
> *3*. *Djatej et al*. [2008], *Tan–Wang–Welker* [2011] examined the impact of the introduction of the International Financial Reporting

[1] *Sedor* [2002] measured optimism by the extent of increase compared to baseline data. In his case it was not possible to make a plan versus actual comparison, as he carried out laboratory research. With this approach, however, he arrived at measurable data, and the study was suitable for examining and measuring psychological effects.

[2] For a detailed description of EPS, see *Virág–Fiath* [2010].

Standards (IFRS) on the accuracy of EPS forecasts, and found that the new accounting system had improved analysts' accuracy, provided that the given country had already introduced it.

In the following, a detailed account of those of the formerly mentioned studies is given that are particularly relevant to the present paper.

Zacks [1979] studied the EPS consensus forecasts of 260 companies of the S&P 500 index to see how the degree of the projected versus actual variance influenced share prices. Prices in those portfolios in which the actual growth of companies was higher than projected rose at a higher-than-average rate compared to benchmark data. Wherever the forecasted EPS value exceeded the actual value, the extent of the portfolio's growth remained below the market growth. The point of the research was to prove market effectiveness, i.e. the fact that information (EPS forecast) is incorporated in the price. An interesting finding of the research from the aspect of this paper is that EPS forecasts were overall exaggerated and optimistic.

DeBondt–Thaler [1990] analysed EPS forecasts between 1976 and 1984 using the Institutional Brokers' Estimate System (IBES) international database; the forecasts were made for institutional investors and the factual data were provided by Compustat database. Companies involved in the study had been profitable in the preceding three years and closed their financial year in December. EPS values were available for ten years back in both databases. The authors looked at securities analysts' one-year or two-year EPS forecasts and concluded that they were optimistic and exaggerated. They found greater optimism in the case of two-year outlook horizons than for one-year outlooks.

Clayman–Schwartz's [1994] study focused on monthly and annual EPS forecasts for 399 companies between 1982 and 1992.[3] They demonstrated that the EPS forecasts for the next year were higher than the actually realised values and that forecast optimism, i.e. the variance between projected and actual values, declined as the year-end approached. This conclusion (i.e. as the time horizon shortens so decreases the EPS forecasting error (hereinafter EPSerr)) accords with the findings of *Sedor* [2002] and *De Bondt–Thaler* [1990], who observed that optimism grows with longer time horizons, i.e. the further ahead forecasts were made, the greater the projected versus actual variance was and that forecasted values were usually better than actual figures. On an annual basis, one month before the end of the year, they still detected an average overestimation of 11.9%. The greatest degree of overestimation was discovered with firms that ultimately realised negative earnings in the given period. That finding coincides with *Sedor*'s [2002] conclusion that years' profitability influences analysts in making financial forecasts, i.e. they fail to make adequate corrections. Another interesting area of research is whether prognosis accuracy is linked to the number of forecasts

[3] The database was provided by Zacks Investment Research.

underlying the EPS consensus forecast. *Clayman–Schwartz* [1994] did not find any correlation between the number of forecasts and prognosis accuracy.

Capstaff–Paudyal–Rees [2001] looked into overoptimism in EPS forecasts in 9 Western-European countries including the United Kingdom (UK), Belgium, France, Germany, Ireland, Italy, the Netherlands, Spain and Sweden. They assumed that forecasting was more difficult in cases where EPS forecasts were more volatile in respect of time and the company.[4] In the study they compared 500 000 EPS forecasts for the period 1987–1994. EPS forecasts were characterised by a +16.9% forecasting error on average.[5] The greatest degree of systematic error was found in the case of-Spain, France and Italy, while the most accurate forecasts were made in the UK, Ireland and the Netherlands. The reason was, as they concluded, that the correlation between forecasts and share prices was the strongest in these latter three countries. Overall, the study drew conclusions in accordance with those of American studies.

Beckers–Steliaros–Thomson [2004] studied the accuracy of EPS forecasts made by European analysts with a special focus on the bandwagon effect, i.e. the extent to which analysts took into account the EPS consensus forecast of the preceding period in predicting the next EPS values.

1. Uncertainty

A number of studies have looked into the impact of growing uncertainty on planning fallacy[6]. Early research (*Marks* [1951]) provided proof that when success was indeed a matter of good luck (heads or tails, or 50%-50%) then the anticipation of success was the greatest. However, as the objective probability of success dropped, so did the inclination to optimism.

Duru–Reeb [2002] also drew similar conclusions; the more a company engages in international trade, the more optimistic financial plans are made. Wide-ranging international trading operations make forecasting more complicated. A reason for that is that analysts are more familiar with their home countries than other countries, and thus the judgement of other countries' macro-environment – politics, culture and the firm's competitive environment – adds to uncertainty (*Ashbaugh–Pincus* [2001]), and language barriers increase information asymmetry between analysts and managers.

[4] Data were provided by the Institutional Brokers' Estimate System for the study.

[5] Prognoses 20 months before and 3 months after the end of the year were analysed.

[6] Overoptimism in planning as a serious problem and phenomenon arises on behalf of company analysts and risk analysts in standard bank credit processes and especially in long-term structured financing. See *Walter* [2014a], [2014b].

Similarly, greater EPS forecasting optimism was discovered with those companies whose historical share prices showed greater scatter (*Ackert–Athanassakos* [1997]). In their research, *Haw–Jung–Ruland* [1994] found evidence that optimism rose after fusions. Directly after the fusion, the effect of synergies on income generation is yet unknown and uncertain, thus forecasting income (EPS) is more difficult. In addition to that, the forecasting error also grew with the gearing ratio (the proportion of a company's debt to its equity) and diversification. Fusions usually involve raising additional capital, which may raise the gearing ratio, and merging two companies' differing international activities might increase the overall degree of international diversification, which is also a complicating factor. The extent of optimism usually returned to pre-fusion levels after four years.

Lehavy–Feng–Merkley [2011] examined the impact that the legibility of 10-K reports had on analysts' EPS estimates.[7] They found that less legible reports increased uncertainty, which manifested itself in the increased scatter and inaccuracy of forecasts. *Yeung* [2009] looked into the effect of accounting reports on the revision of EPS forecasts, and proved that there was a positive correlation between the uncertainty of income and the degree to which analysts revised their EPS estimates.

Ali–Klein–Rosenfeld [1992] and *Klein* [1990] found that *optimism after a loss-making year is greater* than after a profitable year, since uncertainty is also greater. *Sedor* [2002] calls this phenomenon *asymmetrical optimism* as profit-making years are overrated, while the results of loss-making years are underrated.

Yet another uncertainty factor is *time horizon*; *as it increases, so does optimism* (*De Bondt–Thaler* [1990], *Kadous–Krische–Sedor* [2006]). *Tan–Wang–Welker* [2011] analysed the forecasts of 1 700 analyst firms and 40 000 analysts for 21 723 companies between 1998–2007, across 25 countries. They sought to answer whether employing a uniform accounting system (IFRS) reduces, by decreasing the uncertainty of forecasts, the EPS forecast error. Their findings showed that the analysts who had already worked with the IFRS system before gave more accurate estimates, while those who had not, produced a higher forecasting error after the company had implemented the IFRS accounting system.

2. Hypotheses

First, we set out to establish whether in the two periods, 2003–2007 and 17 September 2008–2010, one can speak of *systematic optimism* in respect of the EPSerr.

[7] The Form 10-K is an annual report required by the United States Securities and Exchange Commission, which provides a comprehensive summary of a firm's performance.

Hypothesis 1 (H1): On the analysed database, individual EPS forecasts are generally optimistic, i.e. the EPSerr exceeds zero in the period 2003–2007.

Hypothesis 2 (H2): On the analysed database, individual EPS forecasts are generally optimistic, i.e. the EPSerr exceeds zero in the period 17 September 2008–2010.

Next, comparing the two periods, we investigate whether the systematic optimism of the EPSerr increases as a result of the crisis.

Hypothesis 3 (H3): On the analysed database, the optimism of the EPSerr is greater in the crisis years (17 September 2008–2010) than in the pre-crisis period (2003–2007).

3. Methodology

The following equation is routinely used to measure the EPSerr:

$$EPS_{fc,t} - EPS_{ac,t} = Err\,, \qquad /1/$$

where *Err* signifies the forecasting error, *fc* means forecast, *ac* is for actual and *t* is for forecasted year. If there is no systematic forecasting error then the equation is equal to zero.

To ensure the comparability of the EPSerr across companies and currencies, the relative value of the error must be determined. The formerly defined EPSerr must be compared with an arbitrary value. We have found several methods for that examination in previous research.[8] It was the relative error definition /2/ of *Capstaff–Paudyal–Rees* [2001] that we found to be the most suitable for studying planning fallacy, as the denominator (actual EPS) remains the same throughout any one period and so the extent of the error only depends on the magnitude of the absolute error.

$$Rel.Err = \frac{EPS_{fc,t} - EPS_{ac,t}}{\left|EPS_{ac,t}\right|}\,. \qquad /2/$$

[8] *Easterwood–Nutt* [1999] compared the relative planning error to the current share price and the price at the start of the year. *Ashbaugh–Pincus* [2001], *De Bondt–Thaler* [1990] compared it to the actual value of the preceding period.

We have used descriptive statistical tools to study the changes in the EPSerr.

For the analysis of H1 and H2, we applied *De Bondt–Thaler*'s [1990] groundbreaking research method, considered to have opened a whole new line of thought in this domain. They used cross-sectional data to study the EPS forecasts, whereby they performed a regression analysis of the actual and forecasted change in EPS. The relative change in actual earnings was expressed in terms of the relative change in forecasted earnings as follows:

$$AC = \alpha + \beta \cdot FC\,, \qquad /3/$$

$$AC_T = \frac{EPS_{acT} - EPS_{acT-1}}{EPS_{acT-1}}\,, \qquad /4/$$

$$FC_T = \frac{EPS_{fcT,h} - EPS_{acT-1}}{EPS_{acT-1}}\,, \qquad /5/$$

$$\frac{EPS_{acT} - EPS_{acT-1}}{EPS_{acT-1}} = \alpha + \beta \frac{EPS_{fcT,h} - EPS_{acT-1}}{EPS_{acT-1}}\,, \qquad /6/$$

where AC stands for actual relative change in EPS value, FC means forecasted relative change in EPS value, T signifies forecasted year, and h is for the date the forecast was made.

The forecast is accurate if $(\alpha, \beta) = (0,1)$, i.e. if the actual ΔEPS is equivalent to the forecasted ΔEPS :

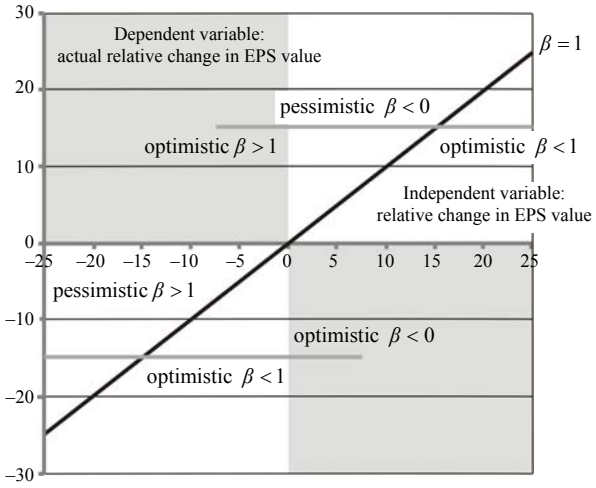
$$AC = 0 + 1 \cdot FC\,, \qquad AC = FC\,.$$

If $\alpha < 0$ then the estimation is too optimistic, if $\alpha > 0$ then it is too pessimistic.

De Bondt–Thaler [1990] evaluated the value of β in the following way. If $\beta < 1$ then the forecast was „too extreme", by which the authors meant that the value provided by the analyst was more favourable than the actual figure – hereinafter, let us call this optimism. If $\beta > 1$ then it was not „extreme" enough, the analyst underestimated the actual value, that is, he/she was pessimistic. De Bondt and Thaler hypothesised that $\beta < 1$ whenever the projected change (FC) is exaggerated, that is, when it exceeds the actual growth (AC). The studies concentrated on the value of β, and they framed the hypotheses also with changing the value of β. Their research has demonstrated the optimism of EPSerr. More importantly, the use of regression analysis was considered a novelty in verifying the accuracy of EPS forecasts.

In Figure 1, the 45 degree line passing through the origin is the linear graph representing accurate forecasts. In the case of optimist forecasts, if the line shifts in a parallel fashion, then it is a downward shift and $\alpha < 0$. If the prognoses are pessimistic, then the opposite happens, i.e. $a > 0$. If the shift is not a parallel one, that means that the value of β has changed: for optimistic forecasts $\beta < 1$, while for pessimistic prognoses $\beta > 1$. Evaluation becomes problematic when $\alpha < 0$ and $\beta < 1$, or $a > 0$ and $\beta < 1$. In such cases, one has to find the point where the resulting line and the 45 degree line intersect. The part of the graph below the 45 degree line represents optimistic forecasts, whereas the part above signifies pessimistic ones. This makes the evaluation of results rather complicated, which is why researchers generally followed the steps of De Bondt and Thaler and focused on the value of β; a practice that we ourselves have partly adopted, as well, though we also devote a couple of thoughts to the value of α.

Figure 1. The value of α and β and the direction of the forecasting error in the formula of De Bondt and Thaler[9]



After its publication, regression analysis became a favoured method of analysing EPS forecasts. *De Bondt–Thaler* [1990] studied EPS forecasts made for American companies in the period 1976–1984. *Capstaff–Paudyal–Rees* [2001] conducted the same study for nine European countries for the period 1987–1994, based on which both descriptive statistics and the values of β and α confirmed forecasting optimism.

[9] *De Bondt–Thaler* [1990].

In their study, *Capstaff–Paudyal–Rees* [2001] used another method to analyse the EPSerr. They used naive forecasts as the baseline in which the forecast value agrees with the actual value of the preceding period.

$$EPS_{fc,t} = EPS_{ac,(t-1)} \qquad /7/$$

The authors examined whether analysts corrected their forecasts downward as the publication date of actual values was approaching, thereby further confirming the fact of systematic optimism.

$$\frac{EPS_{fc(T,h)} - EPS_{fc(T,h-1)}}{EPS_{ac(T)}} = \alpha + \beta\left(\frac{EPS_{fc(T,h-1)} - EPS_{ac(T-1)}}{EPS_{ac(T)}}\right) + \varepsilon \qquad /8/$$

If the forecast is accurate, there is no need for correction, and thus $\beta = 0$. Should the analyst deem the previous forecast too optimistic in the light of information, they would correct it downward, and thus $\beta < 0$, while if they thought they had made it too pessimistic, the correction would be upward, $\beta > 0$.

In equation /8/, the value of β is hard to interpret and the study also revealed that there is no linear relationship between the variables. (See Section 5.2.)

In equation /9/, the dependent variable also shows the forecasted change, and the equation similarly verifies the extent of correction. In this case, the values of α and β can be evaluated similarly to De Bondt and Thaler's equation, i.e. if $(\alpha, \beta) = (0,1)$, it indicates the lack of revision; the combination $\alpha < 0$ and $\beta < 1$ suggests a downward correction, while $a > 0$ and $\beta > 1$ implies an upward correction.

$$\frac{EPS_{fc(T,h)} - EPS_{ac(T-1)}}{EPS_{ac(T)}} = \alpha + \beta\left(\frac{EPS_{fc(T,h-1)} - EPS_{ac(T-1)}}{EPS_{ac(T)}}\right) + \varepsilon \qquad /9/$$

4. Database

Our cross-sectional study involved three Hungarian and four Austrian companies. There are 72 firms listed on the Budapest Stock Exchange, yet the stocks of only three of them are liquid enough to make it worthwhile for analysts to prepare EPS

forecasts, therefore we decided to extend the analysis to these companies' Austrian counterparts, as well.

Data were provided by FactSet[10] (financial database) and we strived to cover the longest possible time interval, therefore all EPS forecasts between 1998 and 2010 were procured. Only those EPS forecasts were considered in our examination, which were prepared during the 15 months directly preceding and the three months directly following the year in question. The data were generated by 63 analyst firms from 21 countries, based on the home countries of the analyst firms' parent companies. Forecasts were typically available for the period 2002–2010. For Hungarian Telecom Ltd. (Matáv) and Hungarian Oil and Gas Trust Ltd. (MOL), several analyst firms began preparing EPS prognoses as early as 1998, and for OTP Bank Ltd. (OTP), it was 2000. OMV AG (OMV) was the "early bird" among the Austrian companies with 1999, while Raiffeisen Bank International AG (RBI) only joined in as late as 2005. There was a minor crisis in 2001, and several of our analyses required actual figures for the year $T-1$, which would, however, be distorted by the crisis-induced setback. Compensated factual EPS data were taken from the Bloomberg[11] database. In the case of missing values, we took over undiluted factual EPS data from annual reports.

Due to the former reasons, the EPS forecasts prepared for the years 1998–2002 were excluded from the analysis, and only the estimates for 2003–2010 were considered. This interval was divided into two sub-periods. We distinguished between the five calm, recession-free years before the crisis (2003–2007) and the period after the collapse of Lehman Brothers, as a date generally considered to have been the starting point of the crisis (2008–2010). If its outbreak can be associated with any specific date at all, the generally accepted view is that the global economic crisis "emerged in Hungary after the failure of Lehman Brothers, in October 2008…" (*Banai–Király–Nagy* [2010] p. 105.). The international literature attaches great significance to the collapse of Lehman Brothers, as well:

> "The crisis became acute after the failure of Lehman Brothers in September 2008, which destroyed the widespread belief in financial markets that governments would not allow any systemically important financial institution to fail, and thereby dramatically heightened perceptions of credit risk among trading counterparties in financial markets." (*Allen–Moessner* [2011] p. 184.)

The number of forecasts subject to study (hereinafter: *N*) was 2 793, of which 1 045 were made for Hungarian and 1 748 for Austrian companies. Three industries

[10] FactSet was established in 1978; its main activities are the collection and analysis of financial data.
[11] Bloomberg is a leading business and financial information news website.

were examined, namely telecommunications ($N = 752$), the oil industry ($N = 943$), and the banking sector ($N = 1\,098$). The database is exhaustive (not sample-based).

We excluded from the analysis those forecasts for the year 2008 that had been made before 17 September 2008, as up until that day, analysts had not taken into account the impact of the global financial crisis, and therefore those data could have biased our conclusions. In line with the international literature, EPS forecast errors above 200% were considered outliers and, accordingly, also excluded from the analysis.

Table 1

Number of database items by company and year

Company/Industry	2003	2004	2005	2006	2007	2008	2009	2010	*Total*
Matáv	32	43	41	34	34	35	37	30	*286*
TKA	34	51	53	45	62	67	81	73	*466*
Telecommunication	*66*	*94*	*94*	*79*	*96*	*102*	*118*	*103*	*752*
MOL	34	43	51	58	50	43	55	53	*387*
OMV	53	61	67	68	59	70	93	85	*556*
Oil	*87*	*104*	*118*	*126*	*109*	*113*	*148*	*138*	*943*
OTP	29	46	46	46	36	51	59	59	*372*
RBI			13	31	42	55	45	52	*238*
EBS	35	54	57	60	60	72	76	74	*488*
Bank	*64*	*100*	*116*	*137*	*138*	*178*	*180*	*185*	*1098*
Total	*217*	*298*	*328*	*342*	*343*	*393*	*446*	*426*	*2793*
Hungarian									*1045*
Austrian									*1748*

Note. Matáv: Hungarian Telecom Ltd., TKA: Telekom Austria AG, MOL: Hungarian Oil and Gas Trust Ltd., OMV: OMV AG, OTP: OTP Bank Ltd., RBI: Raiffeisen Bank International AG, EBS: Erste Group Bank AG.

Geographically, the study analyses EPS forecasts made for three Hungarian and four Austrian companies. Hungarian firms: *1*. Matáv, *2*. MOL, *3*. OTP; Austrian firms: *1*. Telekom Austria AG (TKA), *2*. OMV, *3*. RBI, and *4*. Erste Group Bank AG (EBS).

As opposed to earlier research studies proving the systematic optimism of the EPSerr, the research we carried out is different in both its temporal focus (post-2003 years) and geographical scope (Hungary and Austria). All the EPS forecasts prepared for the selected companies during the period in question were considered, that is, the entire population was included in the analysis.

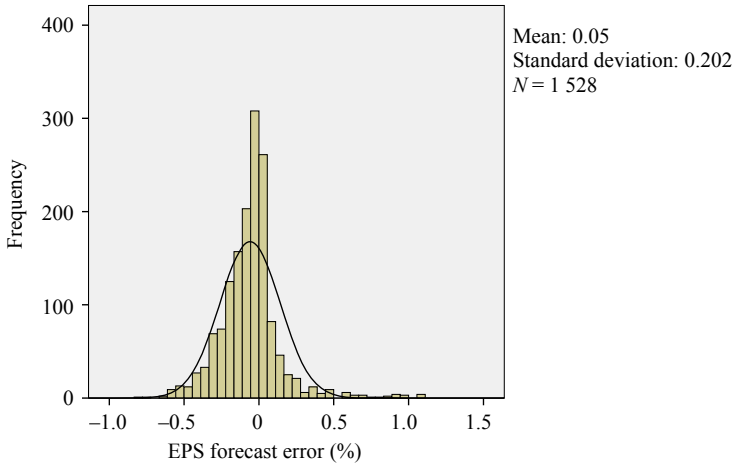
5. Results

We first present the findings of descriptive statistics in respect of the EPSerr for the periods 2003–2007 and 17 September 2008–2010. Then we present and evaluate the results of our regression analyses.

5.1. Descriptive statistics

Table 2 shows the results of descriptive statistics. It is conspicuous that, contrary to expectations, the average EPSerr (forecast versus actual gap expressed as a percentage) is –5.93% for the period 2003–2007, i.e. EPS forecasts were pessimistic in the period under review. This finding is confirmed by the median, –4.94%, but the mode is 0%. It is more pointed compared to a normal distribution (excess kurtosis),[12] which follows from the high number of 0% values and is inclined to the left, which again is indicative of an EPSerr shift in the negative direction.

Figure 2. EPS forecast error, 2003–2007



For the period 2008–2010, the average of the EPSerr is, in contrast, +5.29%, and its median (+1.32%) is also positive; the mode is, once again, 0%. The standard deviation of the EPSerr increased 1.5 times (from 20.19% to 36.68%) compared to the

[12] In the SPSS software suite, the kurtosis index is displayed as excess kurtosis, its value is 0 for normal distributions, while for anything else, its a positive or negative number. Hereinafter, the concept of kurtosis (i.e. pointedness/peakedness) will be used accordingly. On the difference between the raw and excess kurtosis indices, see the study of *Hunyadi* [2009].

period 2003–2007, which can be explained by uncertainty. Accordingly, the range also grew from 1.9027 to 3.5657. The EPSerr for this period is more peaked than the normal distribution, as well, just like it was the case with the preceding interval. Yet, this time, the distribution is inclined to the right, which infers that the EPSerr is shifted in the positive direction.

Kurtosis was particularly high for both periods, which is acceptable in this very case since the indicator in question is the difference of an estimate and an actual value. The typical EPSerr value appears to be around zero, which is why the kurtosis value is so high for both time intervals.

Figure 3. EPS forecast error, 2008–2010

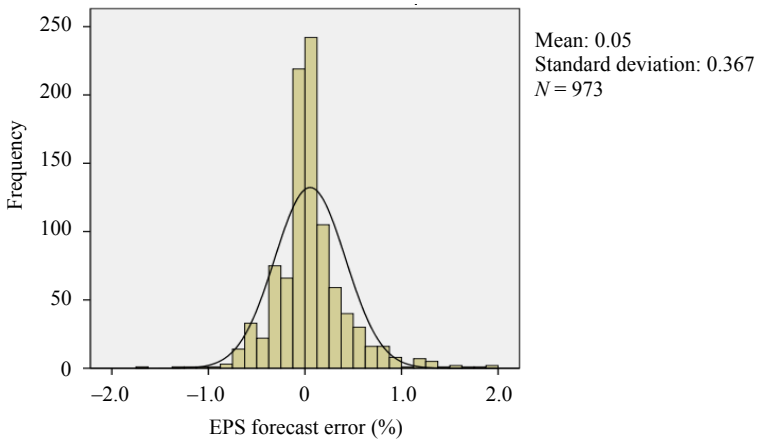


Table 2

Systematic optimism, descriptive statistics

EPS forecasting error	2003–2007	2008–2010
Mean (%)	–5.93	5.29
Standard error	0.0052	0.0118
Median (%)	–4.94	1.32
Mode (%)	0.00	0.00
Skewness	1.2698	0.8896
Kurtosis	6.6116	4.1512
Range (%)	190.27	356.57
Minimum (%)	–79.56	–163.64
Maximum (%)	110.71	192.93

The difference of the means for the two periods follows from the figures in Table 2. Accordingly, the pre-crisis period is characterised by below-zero EPSerr values (i.e. by pessimistic forecasts), while for the time of the crisis, they are typically above zero (i.e. prognoses were optimistic).

It is worth looking at whether the individual companies demonstrate the same tendencies. Figure 4 shows the EPSerr by company for the periods 2003–2007 vs. 2008–2010. For the first period, the EPSerr is positive for two companies, Matáv and RBI, while it is negative for all the other five firms. Similarly, for the period 2008–2010, we also see five companies having a positive EPSerr, Matáv's value is practically zero, while RBI appears to have received pessimistic forecasts.

Figure 4. EPS forecast error by company, 2003–2007 and 2008–2010

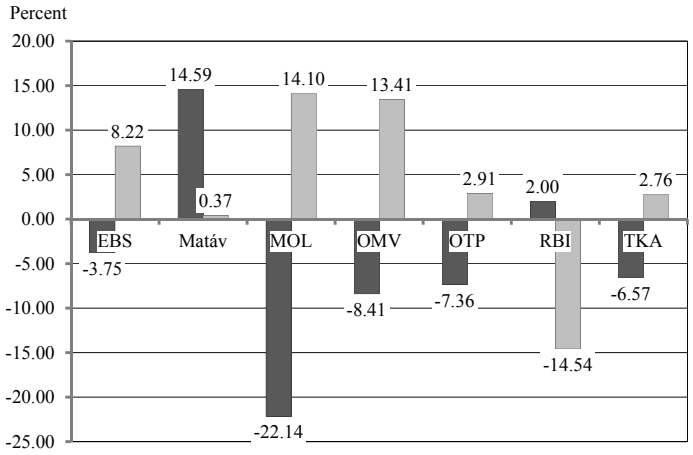


Table 3

Mean and standard deviation of the EPS forecast error by company
(percentage)

Company	2003–2007		2008–2010	
	Mean	Standard deviation	Mean	Standard deviation
EBS	–3.75	11.25	8.22	30.24
Matáv	14.59	28.97	0.37	15.47
MOL	–22.14	18.00	14.10	51.57
OMV	–8.41	16.40	13.41	30.49
OTP	–7.36	9.73	2.91	26.11
RBI	2.00	26.13	–14.54	53.22
TKA	–6.57	14.49	2.76	29.65

Based on the standard deviation of the forecasting error, one can draw conclusions about the level of uncertainty surrounding the forecasts. As it is evinced by Table 3, it was the two outlying companies, Matáv (EPSerr standard deviation = 0.2897) and RBI (EPSerr standard deviation = 0.2613) that analysts were the most uncertain about.

Figure 5. Changes in the EPSerr along the increasing standard deviation, 2003–2007

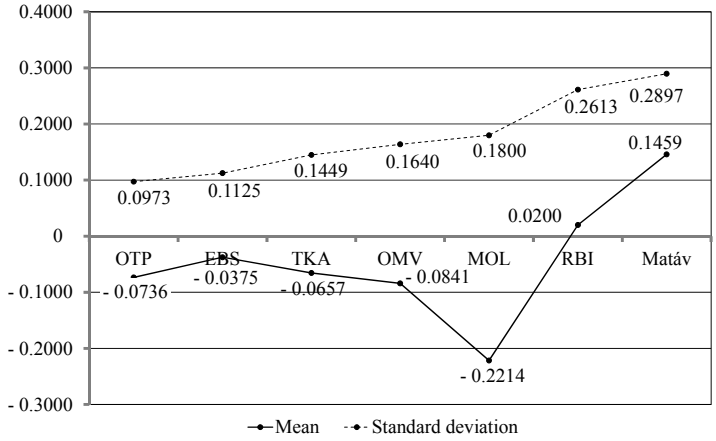


Figure 6. Changes in the EPSerr along the increasing standard deviation, 2008–2010

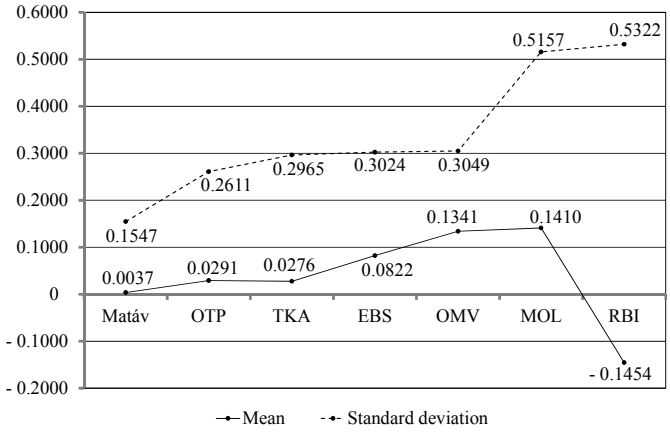


Figure 5 illustrates the changes in the EPSerr with increasing standard deviation in the period 2003–2007. The scatter of the forecasting error is the lowest for OTP at 0.0973, while the third highest value, following Matáv and RBI, is 0.1800 for MOL, coupled with a mean EPS forecast error of –0.2214. Interestingly, the two oil firms, MOL and OMV, feature a moderate standard deviation, yet MOL shows the highest mean EPSerr,

lagging far behind all the other values. Further analyses would be needed to establish the source of this uncertainty that however falls outside the scope of this paper. It is nevertheless worth noting that the standard deviations of the two oil firms are close to each other, and so are those of two of the banks, OTP and EBS, whereas the third bank, RBI, was characterised by a much higher scatter and, hence, forecasting uncertainty.

Considering the crisis period, MOL (0.5157) and OMV (0.3049) are, once again, listed next to each other, yet the standard deviation of the forecasts for the former is more than one and a half times that for the latter. In comparison to the period 2003–2007, Matáv is characterised by a lower standard deviation – actually the lowest among the seven companies in this period –, and its forecasting error is 0.0037, which can be considered just about accurate. Yet it is still RBI that has the highest EPSerr standard deviation (0.53219), and it is, in contrast to all the other firms, characterized by an average forecasting error of negative direction.

On the whole, EPS forecasts for Matáv were less affected by the crisis and the general economic environment than those for the other companies. Prognoses about RBI not only differ from those concerning other industries, but they do not even share the tendency that the forecasts for the other two banks demonstrate. This is most probably caused by reasons unique to RBU.

On the basis of the former results, Hypothesis 1 is rejected based on the analysis of the EPSerr, as forecasts were significantly pessimistic on average during the period 2003–2007.

However, we accept Hypothesis 2, as the EPSerr was, with respect to both its average and median values, positive for the period 2008–2010.

5.2. Regression analysis

Table 4 below presents the results of three regression analyses that were used to examine forecasts. *De Bondt–Thaler*'s method analyses the relationship between forecasted and actual ΔEPS, while that of *Capstaff–Paudyal–Rees* and the present paper – making use of the equation we adjusted – scrutinise the revision of EPS forecasts.

By *De Bondt–Thaler*'s [1990] method the value of Pearson's correlation coefficient between the dependent and independent variables is very high for both periods examined: 0.943 and 0.847 for 2003–2007 and 2008–2010, respectively. The results of the linear regression analysis confirm those of descriptive statistics. In the period 2003–2007, the values of $\alpha = 0.122$ and $\beta = 1.044$ suggest pessimistic forecasts. The crisis period is not that simple to evaluate, as the value of $\alpha = 0.091$ is close to zero, but still in the positive domain, as opposed to the negative value found in earlier studies. However, the value of $\beta = 0.983$ indicates slight optimism. Given that the

descriptive analysis also revealed moderate optimism, the value of β around one and that of α around zero are acceptable.

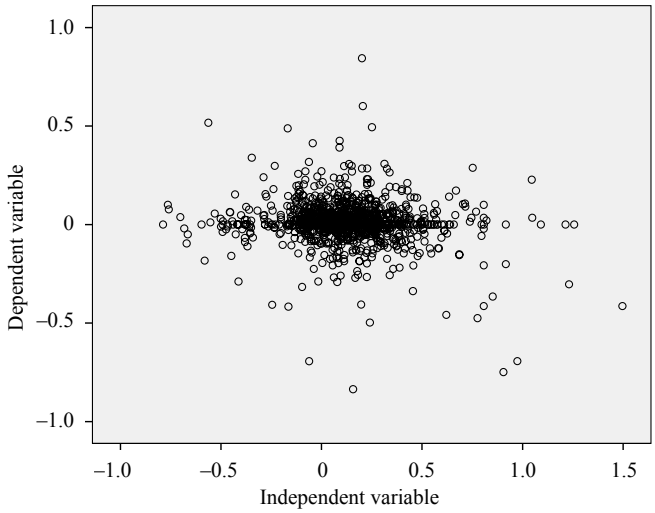
Table 4

Results of the regression analyses

Indicator	DeBondt–Thaler's method		Capstaff–Paudyal–Rees' method		Jáki–Neulinger's method	
	2003–2007	2008–2010	2003–2007	2008–2010	2003–2007	2008–2010
α	0.122	0.091	0.018	–0.015	0.018	–0.015
t-test	9.160	4.532	5.732	–0.642	5.732	–0.642
Significance	0.000	0.000	0.000	0.521	0.000	0.521
β	1.044	0.983	–0.061	–0.010	0.939	0.990
t-test	110.499	49.748	–5.148	–0.631	78.713	64.615
Significance	0.000	0.000	0.000	0.529	0.000	0.000
R^2 (%)	88.89	71.82	1.94	0.05	82.20	82.69
N	1 528	973	1 344	876	1 344	876
Pearson correlation coefficient	0.943	0.847	–0.139	–0.021	0.907	0.909
Significance (2-sided)	0.000	0.000	0.000	0.529	0.000	0.000

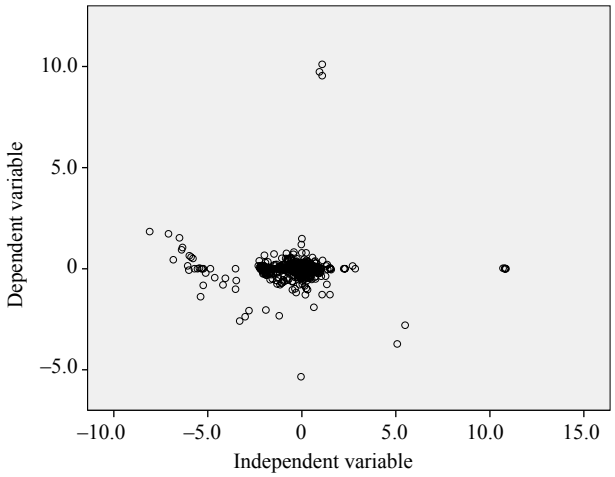
Note. For the methods, see *De Bondt–Thaler* [1990] and *Capstaff–Paudyal–Rees* [2001].

Figure 7. Scatter plot of the dependent and independent variables by Capstaff–Paudyal–Rees' method, 2003–2007



Note. For the method, see *Capstaff–Paudyal–Rees* [2011].

Figure 8. Scatter plot of the dependent and independent variables by Capstaff–Paudyal–Rees' method, 2008–2010



Note. For the method, see *Capstaff–Paudyal–Rees* [2011].

Between the dependent and independent variables of *Capstaff–Paudyal–Rees*' [2001] method, however, the value of Pearson's correlation coefficient is very low: –0.139 for 2003–2007 and –0.021 for 2008–2010, and not even significant in the latter case. All in all, there is no relationship between the dependent (extent of revision) and the independent (FC) variable, which is also confirmed by the scatter plots of the relevant data sets. (See Figures 7 and 8.)

The part of our analyses performed using these mentioned authors' methodology cannot be evaluated due to the lack of correlation between the variables. Undoubtedly, it is an interesting finding given that the research methodology employed and the conclusions published in their article are well-accepted in the domain, and cited frequently.

Studying the extent of revision, *Capstaff–Paudyal–Rees* [2001] examined optimistic forecasts, where downward corrections led to lower EPSerr values. However, in the period 2003–2007, pessimistic forecasts were made and here it was an upward revision that reduced the EPSerr in absolute terms. It should be stressed that the relationship between dependent and independent variables by Capstaff–Paudyal–Rees's method is very weak based on Pearson's coefficient, and it is not significant for the period 17 September 2008–2010, nor are the values of α and β for that period. That is why it would be pointless to evaluate the results.

Capstaff–Paudyal–Rees [2001] examined whether analysts adjusted their forecasts downwards as the publication date of the actual values was approaching. The denominator is the actual value for the preceding $(T-1)$ period ($EPS_{ac(T)}$).

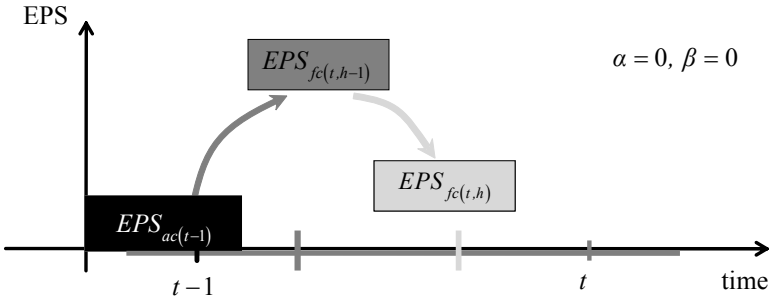
$$\frac{EPS_{fc(T,h)} - EPS_{fc(T,h-1)}}{EPS_{ac(T)}} = \alpha + \beta\left(\frac{EPS_{fc(T,h-1)} - EPS_{ac(T-1)}}{EPS_{ac(T)}}\right) + \varepsilon \qquad /10/$$

The denominator is the only difference between this independent variable and the one that *De Bondt–Thaler* [1990] used.

$$FC_T = \frac{EPS_{fcT,h} - EPS_{acT-1}}{EPS_{acT-1}} \qquad /11/$$

The dependent variable, however, compares the change to the previous forecast, and thus might be the reason for the lack of correlation.

Figure 9. Capstaff–Paudyal–Rees' regression analysis

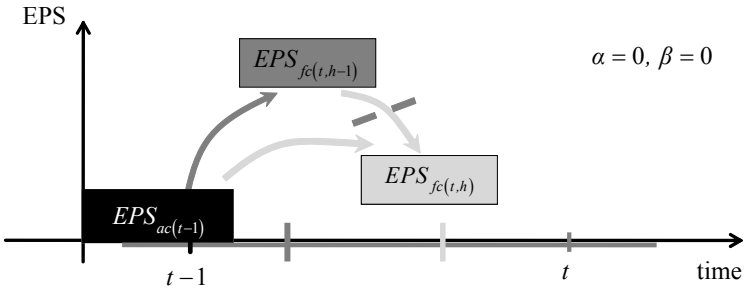


In order to strengthen the correlation between the variables, we altered the dependent variable. More specifically, in formula /10/ we replaced the previous forecast ($EPS_{fc(T,h-1)}$) with the actual EPS value of the preceding period (i.e. the naive forecast, $EPS_{ac(T-1)}$), which had already been present in the independent variable. By virtue of this amendment, the analysis turned more similar to that of *De Bondt–Thaler* [1990], except that it is not the accuracy of the EPS forecast, but the revision that we investigate, since it is the analyst's next forecast that is contained in the dependent variable.

$$\frac{EPS_{fc(T,h)} - EPS_{ac(T-1)}}{EPS_{ac(T)}} = \alpha + \beta\left(\frac{EPS_{fc(T,h-1)} - EPS_{ac(t-1)}}{EPS_{ac(T)}}\right) + \varepsilon \qquad /12/$$

The changes made to the formula are illustrated by Figure 10. Unlike in Figure 9, the arrow pointing at $EPS_{fc(T,h)}$ does not start at $EPS_{fc(T,h-1)}$ but at $EPS_{ac(T-1)}$.

Figure 10. Our own regression analysis



In this case, the values of α and β can be evaluated similarly to De Bondt and Thaler's equation ($(\alpha,\beta)=(0.1)$) that indicates the lack of revision; the combination $\alpha<0$ and $\beta<1$ suggests a downward correction, while $\alpha>0$ and $\beta>1$ imply an upward correction. The presence of a linear relationship between the dependent and independent variables is evident from the scatter diagrams of Figures 11 and 12. Further, Pearson's coefficient at 0.907 and 0.909 for 2003–2007 and 2008–2010, respectively, also supports a strong positive relationship, as also evinced by the scatter graphs of Figures 11 and 12.

Figure 11. Scatter plot of our own dependent and independent variables, 2003–2007

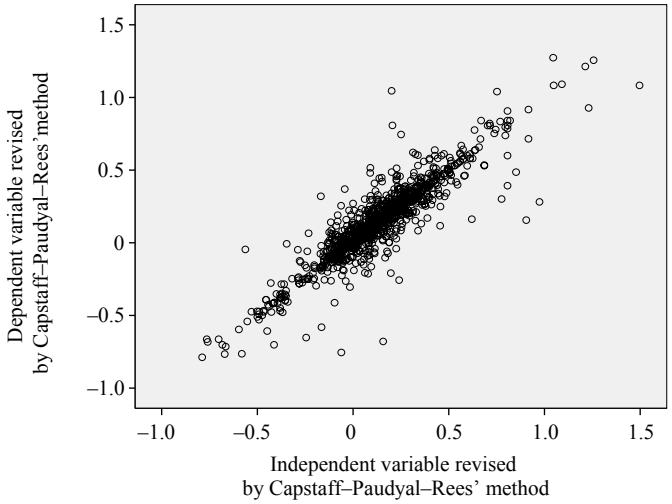


Figure 12. Scatter plot of our own dependent and independent variables, 2008–2010

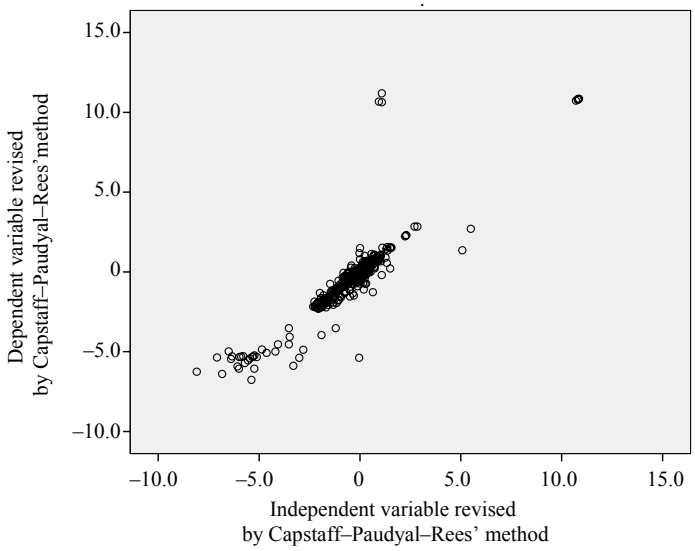


Table 5

Descriptive statistics of the dependent variable proposed by Capstaff–Paudyal–Rees

Dependent variable revised by Capstaff–Paudyal–Rees' method	2003–2007	2008–2010
N	1 344	876
Mean (%)	1.06	1.33
Standard deviation	0.1042	0.7006
Median (%)	0.00	0.00
Mode (%)	0.00	0.00
Skewness	–0.7239	8.5071
Kurtosis	15.2020	136.3263
Range (%)	167.99	1 544.81
Minimum (%)	–83.58	–533.87
Maximum (%)	84.41	1 010.95

The evaluation of the results is, however, anything but straightforward. The values $\alpha = -0.015$ and $\beta = 0.990$ for the period 2008–2010 indicate that analysts made almost no adjustments at all, apart from a minimal downward correction. The coefficient $\alpha = 0.018$ indicates a slight upward correction, and $\beta = 0.939$ a moderate downward correction in the period 2003–2007, which makes it difficult to form an

opinion. A more convenient way to interpret the extent of the revisions to analyse the dependent variable proposed by *Capstaff–Paudyal–Rees* [2001] using descriptive statistics.

$$\frac{EPS_{fc(T,h)} - EPS_{fc(T,h-1)}}{EPS_{ac(T)}} \qquad /13/$$

In the period 2003–2007, the revisions were in the positive direction, which is hardly a surprise given the pessimistic forecasts, while they were in the negative direction in the period 09 September 2008–2010, for which the EPSerr was positive. In the second period under review, the standard deviation of the revisions was seven times higher than in the pre-crisis period (70% vs. 10.42%), i.e. analysts made significant adjustments to their forecasts under those uncertain circumstances. This is confirmed by the range of the revisions, which grew from 167.99% to 1544.81%.

All in all, the regression analysis confirmed the results of the descriptive statistical analysis.

6. Summary

The present article examined how the global economic crisis of 2008 affected the EPS forecast error in regard of Hungarian and Austrian stock exchange-listed companies. We defined two periods to be scrutinized, one comprising the five years preceding the crisis (2003–2007), the other involving the first two and a half years of it (2008–2010). The failure of Lehman Brothers was regarded as the starting point of the crisis.

A number of earlier studies have confirmed the systematic optimism of the EPS forecast error. An uncertain environment, or even analysts' inclination to underreact to negative news may act to further increase this optimism. Besides having been a major source of negative news for everyone, the global economic crisis of 2008 also introduced a significant degree of uncertainty into economic life. Analysts had to incorporate an abundance of negative information into their EPS forecasts, and do so in an uncertain environment. Our research examined the effect of negative news and uncertainty on the direction and the extent of the EPS forecast error in a real-life environment, which has, to our knowledge, been unprecedented in previous research in this field.

An interesting result was that concerning the period 2003–2007, *we found the EPS forecast error to demonstrate*, contrary to any previous research findings, *sys-*

tematic pessimism. It would certainly be worthwhile to explore the reasons in a follow-up study.

For the years of the crisis, the database examined showed a positive EPS forecast error, thus Hypothesis 2 has been accepted. As was the case with Hypothesis 3, since the optimism of the EPS forecast error increased as a consequence of the crisis, that is, the forecasted figures consistently exceeded the actual values during the years of the crisis.

It would be useful to extend the geographic scope of the study to larger parts of Europe, for example, to Central Eastern European and Western European countries and compare the two regions. Another possible research avenue is to subject oil firms to closer scrutiny and examine the effect of crude oil price hikes (as positive news from an income generation perspective) on the EPS forecast error. Repeating the analyses for 2011 and the subsequent years would also carry the potential for interesting findings.

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