# “Information asymmetries and the value-relevance of cash flow and accounting figures – empirical analysis and implications for managerial accounting”


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# SECTION 3. General issues in management

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# Information asymmetries and the value-relevance of cash flow and accounting figures – empirical analysis and implications for managerial accounting

## Abstract

While some of the modern performance measures used in managerial accounting rely on cash flow based figures, others try to take advantage of the information content of accounting figures. However, whether the additional information content in the accrual components of earnings improves the internal performance measurement is an open empirical question. To shed light on this question, I examine the correlation between operating cash flows and earnings with firm's total shareholder returns. Using fixed firm effects regression methods for a large sample of German listed firms covering some 5,000 firm years, the analysis shows that generally operating cash flow and earnings are both positively correlated with total shareholder return. However, with increasing information asymmetry earnings become less correlated with the firm's stock market performance and operating cash flows dominate earnings in explaining total shareholder return (and vice versa). These results suggest that, the information content of accounting figures is only relevant in settings characterized by low information asymmetries and, thus, there is no one-size-fits-all performance measure for managerial accounting purposes.

**Keywords:** accounting figures, performance measures, total shareholder return, managerial accounting.
**JEL Classification:** G32, M21, M40.

## Introduction

Rappaport's shareholder value approach claims that managerial decisions are to be judged against their effect on shareholder wealth, i.e. their impact on the firm's stock market performance (e.g., Rappaport, 1981, 1998). Adopting that view the (only) relevant performance measure for managerial accounting purposes is total shareholder return to be earned by investments in the firm's stocks. However, from the perspective of *optimal incentive design* using total shareholder return (TSR) as a performance measure has a serious drawback, since it is well-known that a substantial part of the variation in TSR is due to exogenous events beyond control of the management. Thus, although Rappaport's shareholder value approach seems widely accepted today, there is an ongoing debate about appropriate internal performance measures to be taken to evaluate managerial decisions and to be used in managerial accounting.

From an agency perspective, optimal incentives rely on performance metrics that use i) variables that are clearly aligned with the objectives of the firm (i.e. shareholder value) and ii) variables that measure the outcome of managerial decisions sufficiently well (e.g., Kaplan and Atkinson, 1998). In particular, there should be a direct link between managerial decisions and the performance variable. Now, many consulting firms have invented specific performance measures with the common goal to provide a metric that measures the outcome of management decisions, i.e. the firm's operating performance, in such a way that internal performance as measured by the metric is highly correlated with the firm's stock market performance.

While all these performance measures have a common goal, there is substantial heterogeneity with respect to their structure. For instance, there are, on the one hand, cash flow based figures like Cash Value Added (CVA) promoted by the Boston Consulting Group and, on the other hand, accounting based figures like Economic Value Added (EVA), which is a trademark by Stern Stewart[1]. From a general management perspective both performance metrics, i.e. CVA and EVA, rely on a common premise: They are based on some measure of operating performance which is compared to the costs of the resources required to generate the performance. From an accounting perspective, however, CVA and EVA represent two polar approaches to measure operating performance: While CVA measures operating performance in terms of (operating) cash flows, EVA measures operating performance in terms of accounting profits. Thus, while CVA relies on cash flow based figures, EVA

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I am grateful for encouraging comments of Michael Wolff and valuable discussions with Bernhard Gegenfurtner. The usual caveat applies.

[1] Boston Consulting Group promotes a performance measure called CVA that is basically an extension of Cash Flow Return on Investment (CFROI). Initially, Ottosson and Weissenrieder (1996) and Weissenrieder (1997) pioneered a slightly different performance measure that also relies on cash flows and is also called Cash Value Added. Young and O'Byrne (2001) discuss the performance measure EVA. McKinsey also promotes an accounting figure based performance measure called Economic Profit (EP). See Ryan and Trahan (1999, 2001), Claes (2008), Erasmus (2008), or Friedl and Kettenring (2009) for a general discussion of value-based performance measures.

tries to take advantage of the information content of accounting figures. However, whether the additional information content in the accrual components of earnings improves the internal performance measurement is an open empirical question[1].

To shed light on this question, I examine the correlation of operating cash flows and earnings with firm's total shareholder returns. Using fixed firm effects regression methods for a large sample of German listed firms covering some 5,000 firm years, the analysis shows that generally operating cash flow and earnings are both positively correlated with total shareholder return. However, with increasing information asymmetry earnings become less correlated with the firm's stock market performance, and operating cash flow dominates earnings in explaining total shareholder return (and vice versa). These results suggest that, from a managerial accounting perspective the information content of accounting figures is only valuable in settings characterized by low information asymmetries. In sum, there is no one-size-fits-all performance measure for managerial accounting purposes, since shareholders have to trade-off the benefits due to the information content of accounting figures against the costs arising from earnings management, which seem particularly relevant in settings characterized by high information asymmetries.

The remainder of the paper is structured as follows: Section 1 develops the hypotheses and discusses the methodology used in the empirical analysis. Section 2 describes the data set and provides some descriptive statistics. Section 3 presents the empirical analysis and the last section concludes.

## 1. Hypotheses and methodology

This section develops the hypotheses and introduces the methodology used in the empirical analysis.

**1.1. Development of key hypotheses.** The central problem examined in this study is the question whether the additional information content in the accrual components of earnings figures makes earnings figures superior to cash flow figures in explaining a firm's stock market return and, thus, whether accounting figures represent the preferred starting point for a performance metric used in managerial accounting[2].

A naïve person might argue that cash flow figures representing the periodical surplus of cash generated by a firm should be a good predictor of its stock market performance. This view, which is in parts supported by proponents of the discounted cash flow method of firm valuation, hypothesizes a positive correlation between a firm's cash flow performance and its stock market performance[3].

One might, however, argue that cash flows are a rather noisy signal of actual firm performance and add that accounting figures with their *accrual component* aim to provide additional information beyond the information provided by pure cash flow figures (e.g., Dechow, 1994)[4]. This fact is known as the *informativeness* of accounting figures and the central idea is to evenly distribute (accounting) profits over a projects lifetime. With this idea in mind, the accountant might argue that accounting figures should outperform pure cash flow figures in explaining a firm's stock market performance (see Ball and Brown (1968) or Dechow (1994) and Vorstius (2004) for German evidence). This view is summarized in the following hypothesis:

*Hypothesis 1: Accounting figures outperform pure cash flow figures in explaining a firm's stock market performance.*

While there might be good reasons to argue that in theory accounting figures might be superior to cash flow figures in explaining a firm's stock market performance, from a practical point of view there are several obstacles for this argument to stand an empirical test. The main impediments are *information asymmetries* between management and shareholders and various incentives for *earnings management* by executives (e.g., Sloan, 1996)[5].

Keeping in mind the informativeness of accounting figures perspective, it seems reasonable to argue that with increasing information asymmetry, the additional information embedded in the accrual component becomes more value relevant. This view is summarized in the following hypothesis:

*Hypothesis 2a: As information asymmetries increase, accounting figures become even more dominant in explaining a firm's stock market return (compared to pure cash flow figures).*

[1] This question becomes particularly interesting, if one notes that the information content of the accrual component, although regulated by accounting standards, involves a high degree of subjectivity which has to be judged by the management itself (e.g. Dechow et al., 1995; Dechow, 1996; Sloan, 1996; Warfield et al., 1995).

[2] There is a substantial amount of literature discussing value-based performance measures, e.g. Stewart (1994), Stern, Stewart and Chew (1995), Grant (1996), O'Byrne (1996), Chen and Dodd (1997, 2001), Biddle et al. (1997, 1999), Kleinman (1999), KPMG Consulting (1999), Ryan and Trahan (1999, 2007), Worthington and West (2001), Young and O'Byrne (2001), Keef and Roush (2002), Lovata and Costigan (2002), Athanassakos (2007). My study, however, differs in that I focus on the empirical question whether the additional information embedded in the accrual component of accounting earnings improves the alignment of accounting figures and a firm's stock market performance and derives implications for the optimal design of (value-based) performance measures. See Pfaff (2004) for a discussion of the literature discussing the problem from a theoretical perspective.

[3] See Koller et al. (2005) for a discussion of the discounted cash flow method.

[4] The accrual component of accounting figures is the difference between accounting earnings and operating cash flows (e.g., Dechow et al., 1995 or Sloan, 1996).

[5] See Lev (1989), Dechow et al. (1995) and Dechow and Skinner (2000) for a general discussion of earnings management.

However, as information asymmetries increase incentives for opportunistic earnings management will also increase, since punishment of opportunistic behavior by outside shareholders is less likely (Günther et al., 2009). Accordingly, discretionary options embedded in the accrual component of accounting figures become more valuable for management, and from the perspective of shareholders, the information value of accruals fades away. This view is summarized in the following hypothesis:

*Hypothesis 2b: As information asymmetries increase, accounting figures become less relevant in explaining a firm's stock market return (compared to pure cash flow figures).*

Obviously, Hypothesis 2b represents a competing hypothesis to Hypothesis 2a and it remains an open empirical question which of the two will stand the test.

**1.2. Methodology.** To examine the above Hypotheses I conduct an empirical analysis in which I regress a firm's stock market performance on cash flow and accounting figures and various controls, i.e. I estimate a range of variants of the following empirical model:

$$R_{it} = \alpha + \beta_1 x\, EAR_{it} + \beta_2 x\, CF_{it} + \gamma_1 x\, K_{1it} + \ldots + \gamma_n x\, K_{nit} + \varepsilon_{it}, \quad (1)$$

where $\boldsymbol{R_{it}}$ = stock market performance of firm $i$ in year $t$; $\boldsymbol{EAR_{it}}$ = (standardized) accounting earnings of firm $i$ in year $t$; $\boldsymbol{CF_{it}}$ = (standardized) cash flow of firm $i$ in year $t$; and $\boldsymbol{K_{1it}, \ldots, K_{nit}}$ = various firm- and time-specific controls[1].

Model (1) is a straight-forward generalization of the well-known value relevance models to study the informativeness of earnings figures (e.g., Warfiled et al., 1995; Pronobis et al., 2008 or Günther et al., 2009), where instead of using EAR only, I use EAR and CF (simultaneously) as explanatory variables.

Value relevance studies generally are interested in the *cross-sectional* informativeness of earnings figures, and, thus, rely on (pooled) cross-sectional analyses. Instead I am interested in the firm-specific value relevance of a performance metric. Accordingly, I use panel data analyses, more specifically two-way fixed effects regression models with fixed firm- and year-effects[2]. My firm-specific effects control for any (unobservable) firm heterogeneity either due to the management style, its business model or even its accounting behavior (see Pronobis et al. (2008) for a similar approach). My period-specific effects control for any change in the overall valuation level in the stock market.

Moreover, note that value-relevance studies rarely use any controls in their analyses (e.g., Warfiled et al., 1995 or Pronobis et al., 2008). However, there are numerous studies that show that there are various firm characteristics that might help to explain some variation in the firm's stock market performance. For instance, Fama and French (1993) show that beside the classical CAPM β-coefficient, firm-size and market-to-book ratio add explanatory power when explaining a firm's stock market performance. Thus, I estimate both a *simple value-relevance specification*

$$R_{it} = \alpha + \beta_1 x\, EAR_{it} + \beta_2 x\, CF_{it} + \varepsilon_{it}, \quad (2)$$

as well as an extended value-relevance specification

$$R_{it} = \alpha + \beta_1 x\, EAR_{it} + \beta_2 x\, CF_{it} + \gamma_1 x\, BETA_{it} + \gamma_2 x\, SIZE_{it} + \gamma_3 x\, MTB_{it} + \gamma_4 x\, ETP_{it} + \gamma_5 x\, LEV_{it} + \gamma_6 x\, DOMINATED_{it} + \varepsilon_{it}, \quad (3)$$

where I follow Günther et al. (2009) and control for firm-risk (BETA), firm size (SIZE), valuation levels (market-to-book ratio MTB and earnings-to-price ratio ETP) and leverage (LEV). Moreover, I also control for differences in ownership structures (DOMINATED), since ownership structures are often claimed to affect a firm's stock market performance (e.g., Holderness, 2003).

To test my key hypotheses I run a range of variants of the above specifications. While Hypothesis 1 is easily analyzed by estimating variants of specifications (2) and (3) on all firms, testing the two polar Hypotheses 2a and 2b is more difficult. In this study I adopt a straight-forward but rather simple two-step approach. In the first step, I define various dummy variables proxying information asymmetries and use each of these variables to split my sample into two subsamples. This procedure results in various pairs of subsamples, where one subsample is characterized by low information asymmetry and the other by high information asymmetry. In the second step, I estimate the extended value-relevance specification on each of the subsamples and compare the coefficients $\beta_1$ and $\beta_2$ as well as their statistical significance for each pair of subsamples[3].

## 2. Data set and descriptive statistics

This section describes the data selection process, introduces the variables and provides some descriptive statistics.

[1] Model (1) aims to explain a relative performance figure. Thus, I use relative figures as explanatory variables. I *standardize* my accounting earnings and cash flow figures by deflating them with total assets of the firm.

[2] See Wooldridge (2002) for a discussion of cross-sectional and panel data analyses.

[3] Alternative econometric approaches are so-called stability tests like Chow's breakpoint test. These methods are not applied here, because their interpretation is not as straight-forward as the results of the approach adopted in here.

**2.1. Sample description and data sources.** The sample is derived as follows: I start from all German firms listed in the EU-regulated *General Standard* of Deutsche Börse AG, which is the dominant German stock exchange. These firms are the constituents of the broadest German stock index, called Composite DAX (CDAX). My sample period is from 1998 to 2008. This first step results in 885 firms and 9,735 possible firm year observations.

Then, I follow the standard approach of related studies and remove all financial firms from my sample, since their accounting behavior differs significantly. I use the Industry Classification Benchmark (ICB) classification of Dow Jones Indexes and FTSE as provided by Thomson ONE Banker to identify financial firms. This procedure results in 746 firms with 8,206 possible firm year observations.

For these 746 firms I collect accounting data and stock price information from Thomson Worldscope and Datastream and ownership data from Thomson ONE Banker. This procedure results in a panel-data set in which I remove two sources of inconsistencies: First, I remove all firm years, where the corresponding fiscal year has less than 300 calendar days or more than 400 calendar days, since it is unclear how to annualize the corresponding accounting and cash flow figures[1]. Second, I remove all firm years where the corresponding fiscal year ends in the first six month of the calendar year, since more than one half of the operating activities took place in the year before[2]. Table 1 below illustrates the sample selection procedure and the distribution of firm year observation with various levels of available data over time.

Table 1. Sample description

| YEAR | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # Firms | 885 | 885 | 885 | 885 | 885 | 885 | 885 | 885 | 885 | 885 | 885 | 9 735 |
| # Non-financial firms | 746 | 746 | 746 | 746 | 746 | 746 | 746 | 746 | 746 | 746 | 746 | 8 206 |
| # Non-financial firms with TSR and regular fiscal year | 290 | 357 | 459 | 532 | 485 | 461 | 440 | 434 | 429 | 435 | 424 | 4 746 |
| # Non-financial firms with TSR, regular fiscal year and data on EAR and CF | 280 | 337 | 422 | 502 | 469 | 442 | 425 | 423 | 420 | 429 | 416 | 4 565 |
| # Non-financial firms with TSR, regular fiscal year, and data on EAR and CF as well as other controls | 190 | 180 | 154 | 147 | 168 | 232 | 268 | 254 | 251 | 243 | 257 | 2 344 |

Note: The table illustrates the sample selection procedure that starts from all German firms listed in the EU-regulated General Standard of Deutsche Börse AG at least once during the sample period from 1998 to 2008. In the analysis, I adopt the standard procedure and consider only non-financial firms. For these firms I collect accounting data and stock price information from Thomson Worldscope and Datastream and ownership data from Thomson ONE Banker. Finally, I remove non-regular fiscal years. Variables are explained in detail in Table 6 in the Appendix.

**2.2. Variable selection.** In the analysis I use several variables which are explained below. All data are collected from Thomson databases (Worldscope, Datastream and ONE Banker).

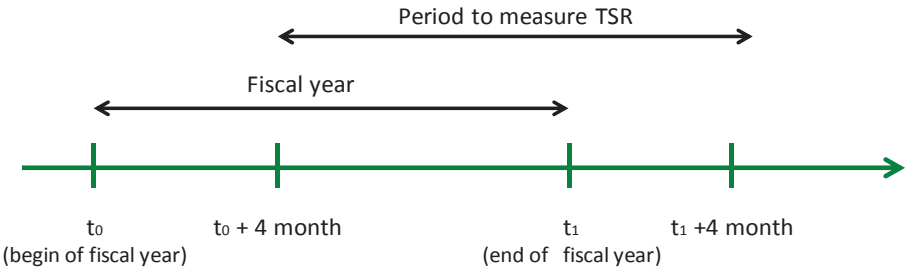
*2.2.1. Endogenous variables.* The key endogenous variable in my analysis is total shareholder return (TSR), which measures shareholder's return from investment in the firm's stock as the sum of capital gains plus dividends of the stock. I measure TSR over a 12-month period starting four months after the beginning of the corresponding fiscal year. Note that firms generally issue their annual report within two to four months after the end of the fiscal year[3]. Thus, the four-month-lag procedure, which is illustrated in Fig. 1, allows the stock market to internalize accounting and cash flow information from the annual report[4].

[1] This might either be the case when a) a firm changes its fiscal year end or b) there is a data problem in the database.

[2] Otherwise this would produce problems when I use period-fixed effects in my regression analyses.

[3] While German law requires firms to issue annual reports within a four-month period, the German code of good governance (German Corporate Governance Code) recommends releasing the report within three months time.

[4] Warfield et al. (1995) use a three-month-lag approach for US firms. However, the release time for German firms is slightly longer than that for US firms. Accordingly, Günther et al. (2009) use a four month-lag approach and Pronobis et al. (2009) use even a five-month-lag approach.




Note: The figure illustrates the four-month-lag procedure to calculate total shareholder return. The approach allows investors to internalize all relevant earnings and cash flow information from annual reports released within two to four months after the end of the fiscal year.

**Fig. 1. Four-month-lag procedure to calculate total shareholder return**

In robustness tests I challenge my results by using three other endogenous variables. First, I use a second total shareholder return measure, which is calculated over a 12-month period, starting 5 months after the beginning of the corresponding fiscal year. Second, I use two excess return measures calculated as total shareholder return (calculated based on the four-month-lag and five-month-lag procedure) minus the return of a buy-and-hold strategy investing in the CDAX.

*2.2.2. Exogenous variables.* The central exogenous variables are cash flow and accounting performance. Cash flow performance is measured by operating cash flow. Accounting performance is measured by earnings before interest and taxes (EBIT). To estimate their impact on stock market performance, both performance measures are deflated by average total assets of the firm in the corresponding firm year[1]. The cash flow performance measure is denoted as CF, the accounting measure as EAR.

Besides that, I use several other controls. Firm size (SIZE) is measured as logarithm of 1 plus total assets. To control for the current level of firm value, I use two variables: MTB measures the market-to-book ratio of equity and ETP measures the current earnings-to-price ratio. Since CF and EAR measure firm performance but TSR measures performance of an equity investment, I also use leverage (LEV) defined as total debt deflated by total assets as an additional control. Finally, to account for heterogeneity in ownership structures, I define a dummy variable DOMINATED, which takes the value 1 if the firm's free float is lower than 50%.

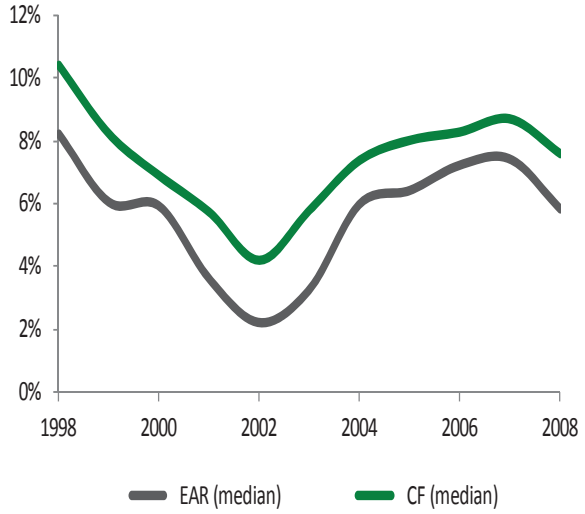
*2.2.3. Variables splitting the sample into subsamples.* To examine the Hypotheses 2a and 2b I define four dummy variables that allow me to split the sample into subsamples. First, I define a dummy variable MCAP, which takes the value 1 if the firm has an above median market capitalization in the particular year. Second, I define dummy variable RND, which takes the value 1 if the firm has positive RND expenditures in the particular year. Third, I define a dummy variable INTANG, which takes the value 1 if the firm has an asset structure with an above median fraction of intangible assets in the particular year. Finally, I define DOMINATED as explained above. All four dummy variables proxy information asymmetries arising from firm size and complexity as well as from external monitoring. Specifically, while the first three dummy variables aim to proxy firm size and complexity the forth variable proxies external monitoring.

**2.3. Descriptive statistics.** An analysis of the correlation between operating performance and shareholder returns must cover boom and recession phases (see Pronobis et al., 2008). As Fig. 2 illustrates, my sample period (1998 to 2008) covers both: the new economy boom phase as well as its burst and the boom phase from 2004 to 2007, as well as the first part of the credit crises.

Note: The figure illustrates the development of the German CDAX index during the sample period. The index represents all German firms listed in the EU-regulated General Standard of Deutsche Börse AG the dominant German stock exchange.

**Fig. 2. Development of CDAX**

[1] As usual, average total assets are calculated as the arithmetic mean of total assets at the beginning of the fiscal year and its equivalent at the end of the fiscal year (see Günther et al., 2009).




Note: The figure illustrates the development of standardized accounting earnings EAR (calculated as EBIT deflated by average total assets) and standardized operating cash flow CFO (calculated as operating cash flow deflated by average total assets) measured in terms of median values over all firms. Variables are explained in detail in Table 6 in the Appendix.

**Fig. 3. Development of standardized accounting earnings and operating cash flows**

These cycles are also reflected in the development of firms' earnings and cash flows. This is illustrated in Fig. 3, where median values of EAR and CF are reported for each year of the sample period. Moreover, the figure illustrates that standardized cash flows are larger than standardized earnings throughout the sample period. This difference, however, often called *accruals*, varies over time. It is particularly small in boom phases (2000, 2004 and 2006) and particularly large in 2002, after the bust of the dot-com era (e.g., Gegenfurtner et al., 2009). Details on the development of EAR and CF are found in Table 7 in the Appendix.

Table 2 then reports descriptive statistics on all key variables. In particular, the table reports coefficients of correlation for standardized earnings EAR and standardized cash flows CF with total shareholder return (TSR): In line with Hypothesis 1, the coefficient of correlation for standardized accounting earnings EAR is positive and highly significant. Moreover, it is higher than the coefficient of correlation for standardized cash flows CF, although it is interesting to observe that the coefficient for CF is also highly significant, which is in line with the naïve view.

Table 2. Descriptive statistics

| Variable | Mean | Median | Correlation with TSR | | Observations |
|---|---|---|---|---|---|
| **TSR** | 0,14 | 0,01 | --- | | 4 648 |
| **EAR** | 0,02 | 0,06 | 0,28 | *** | 5 191 |
| **CF** | 0,05 | 0,07 | 0,25 | *** | 5 237 |
| **ACCRUALS** | -0,03 | -0,02 | 0,14 | *** | 5 160 |
| **BETA** | 0,67 | 0,60 | 0,09 | *** | 3 306 |
| **SIZE** | 5,05 | 4,77 | 0,02 | | 5 299 |
| **MTB** | 2,59 | 1,59 | 0,11 | *** | 4 933 |
| **ETP** | -0,22 | 0,08 | 0,03 | ** | 4 861 |
| **LEV** | 0,24 | 0,16 | 0,01 | | 5 293 |
| **DOMINATED** | 0,61 | 1,00 | -0,02 | | 3 297 |

Note: The table reports descriptive statistics for the variables used in the regression analysis. All variables are explained in detail in Table 6 in the Appendix. The second and third columns report mean and media values, respectively. The fourth column reports individual correlations with total shareholder return (TSR). Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively. The last column reports individually the number of observations within the sample of relevant firms.

While this result is a first indication in favor of Hypotheses 1, the figures reported in Table 2 are obviously only univariate, pooled cross-sectional coefficients. Therefore, I conduct a more detailed econometric analysis in the following section.

## 3. Empirical results

This section presents results of the empirical analysis. I use two-way fixed effects regression methods, i.e. regression models with fixed firm and fixed period effects to account for unobservable firm-specific and period-specific heterogeneity. To circumvent endogeneity concerns I lag most of my controls in my regression specifications.

Section 3.1. examines Hypothesis 1. Therefore, I estimate variants of my value-relevance specifications (2) and (3) on the set of all firms in my sample. These are my base-case regressions. Section 3.2 splits the sample using three dummy variables proxying firm size and complexity. I estimate variants of my extended value-relevance specification (3) on each of the six subsamples and compare coefficients and significance levels for each pair of subsamples. Section 3.3 splits the sample using the ownership dummy variable to proxy external monitoring. Again, I estimate variants of my extended value-relevance specification (3) on each of the subsamples, and compare coefficients and significance levels. Finally, Section 3.4 reports results from various robustness tests.

**3.1. Base-case regression.** To examine Hypothesis 1, I estimate variants of my value-relevance specifications (2) and (3) on the set of all firms in my sample. The results are reported in Table 3, where results of the simple (extended) value-relevance specifications are reported in Panel A (Panel B).

Panel A reports results from three specifications. In the first (second) specification standardized accounting earnings EAR (standardized cash flows CF) are significantly positively correlated with the endogenous variable TSR. These results are supported by specification three, where both variables (EAR and CF) are significantly positively correlated with the endogenous variable TSR. Moreover, note that adjusted $R^2$ improves only marginally when adding one variable to an existing specification.

Panel B also reports results from three specifications. The results of these three extended value-relevance specifications are qualitatively similar to the ones of the simple value-relevance specifications reported in Panel A. Overall, these results do not support Hypothesis 1 claiming that accounting figures will outperform pure cash flow figures in explaining a firm's stock market performance.

Table 3. Base-case regressions

| **Panel A: Simple two-way fixed-effects value-relevance regressions** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Dep. Variable:** | | **TSR** | | | **TSR** | | | **TSR** | |
| **Constant** | 0,01 | (0.76) | | -0,04 | (-4.86) | *** | -0,02 | (-2.20) | ** |
| **EAR** | 0,98 | (13.6) | *** | | | | 0,65 | (6.05) | *** |
| **CF** | | | | 1,22 | (12.4) | *** | 0,60 | (3.95) | *** |
| **Period effects** | | yes | | | yes | | | yes | |
| **Firm effects** | | yes | | | yes | | | yes | |
| **No of observ.** | | 4 594 | | | 4 628 | | | 4 565 | |
| **Adj. R^2** | | 0,331 | | | 0,330 | | | 0,336 | |
| **Panel B: Two-way fixed effects panel regressions with additional controls** | | | | | | | | | |
| **Dep. Variable:** | | **TSR** | | | **TSR** | | | **TSR** | |
| **Constant** | 1,46 | (6.78) | *** | 1,42 | (6.56) | *** | 1,40 | (6.44) | *** |
| **EAR** | 0,76 | (5.78) | *** | | | | 0,51 | (3.04) | *** |
| **CF** | | | | 0,98 | (5.29) | *** | 0,51 | (2.15) | ** |
| **BETA(-1)** | 0,03 | (0.91) | | 0,03 | (0.85) | | 0,03 | (0.90) | |
| **SIZE(-1)** | -0,26 | (-7.15) | *** | -0,26 | (-7.22) | *** | -0,26 | (-7.02) | *** |
| **MTB(-1)** | 0,00 | (0.67) | | 0,00 | (0.57) | | 0,00 | (0.59) | |
| **ETP(-1)** | -0,06 | (-2.68) | *** | -0,07 | (-2.99) | *** | -0,06 | (-2.85) | *** |
| **LEV(-1)** | 0,37 | (2.65) | *** | 0,44 | (3.12) | *** | 0,40 | (2.84) | *** |
| **DOMINATED** | 0,08 | (2.44) | ** | 0,09 | (2.60) | *** | 0,09 | (2.59) | *** |
| **Period effects** | | yes | | | yes | | | yes | |
| **Firm effects** | | yes | | | yes | | | yes | |
| **No of observ.** | | 2 363 | | | 2 357 | | | 2 350 | |
| **Adj. R^2** | | 0,357 | | | 0,355 | | | 0,358 | |

Note: The table reports coefficients and t-values of the base-case regressions explaining firms' total shareholder return. Panel A reports results of three simple two-way fixed effects value-relevance specifications. Panel B extends these specifications for various lagged controls and the ownership dummy variable DOMINATED. Variables are explained in detail in Table 6 in the Appendix. All specifications include period- and firm-fixed effects. t-values (reported in parentheses) are White-robust. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

**3.2. Regression on subsamples proxying firm complexity.** To examine the Hypotheses 2a and b I define various dummy variables, split my sample along each of the dummy variables and estimate the extended value-relevance specification (3) using two-way fixed effects models on each pair of subsamples.

In this section I use three dummy variables which proxy firm size and complexity. The first variable, MCAP, measures whether a firm's market capitalization is below or above median in a particular year. The second variable, RND, measures whether a firm has positive RND expenditures in a particular year. Finally, the third variable, INTANG, measures whether a firm has an asset structure with below or above median fraction of intangible assets. The results of these six regressions analyses are reported in Table 4: Panel A (B, C) report results from the regression analysis splitting the sample along MCAP (RND, INTANG).

The results are remarkably similar over all three pairs of subsamples: While standardized accounting earnings EAR are significantly positively correlated with the endogenous variable TSR in the low information

asymmetry setting, standardized cash flows CF are not. A completely opposite picture emerges in the high information asymmetry setting: Here standardized cash flows CF are significantly positively correlated with the endogenous variable TSR, but standardized accounting earnings EAR are not[1].

These results corroborate Hypothesis 2b, claiming that with increasing information asymmetries, accounting figures become less relevant in explaining a firm's stock market return compared to pure cash flow figures[2].

Table 4. Regressions on complexity subsamples

**Panel A: Two-way fixed effects panel regressions on size-subsamples**

| Subsample | Small firms | | | Large firms | | |
|---|---|---|---|---|---|---|
| Dep. Variable: | TSR | | | TSR | | |
| EAR | 0,84 | (3.19) | *** | 0,19 | (0.80) | |
| CF | 0,38 | (0.97) | | 0,90 | (2.77) | *** |
| Other controls | yes | | | yes | | |
| Period effects | yes | | | yes | | |
| Firm effects | yes | | | yes | | |
| No of observ. | 836 | | | 1 514 | | |
| Adj. R^2 | 0,290 | | | 0,412 | | |

**Panel B: Two-way fixed effects panel regressions on RnD-subsamples**

| Subsample | Firms without RnD | | | Firms with RnD | | |
|---|---|---|---|---|---|---|
| Dep. Variable: | TSR | | | TSR | | |
| EAR | 0,67 | (2.80) | *** | 0,12 | (0.45) | |
| CF | 0,27 | (0.77) | | 0,79 | (2.04) | ** |
| Other controls | yes | | | yes | | |
| Period effects | yes | | | yes | | |
| Firm effects | yes | | | yes | | |
| No of observ. | 1 277 | | | 1 073 | | |
| Adj. R^2 | 0,275 | | | 0,443 | | |

**Panel C: Two-way fixed effects panel regressions on asset-structure subsamples**

| Subsample | Firms with below median intangibles | | | Firms with above median intangibles | | |
|---|---|---|---|---|---|---|
| Dep. Variable: | TSR | | | TSR | | |
| EAR | 0,61 | (2.63) | *** | 0,28 | (0.89) | |
| CF | 0,38 | (1.07) | | 0,70 | (1.69) | * |
| Other controls | yes | | | yes | | |
| Period effects | yes | | | yes | | |
| Firm effects | yes | | | yes | | |
| No of observ. | 1 266 | | | 1 080 | | |
| Adj. R^2 | 0,331 | | | 0,408 | | |

Note: The table reports coefficients and t-values of regressions explaining firms' total shareholder return on various complexity subsamples. Panel A splits the sample along firm size (measured in terms of market cap). Panel B distinguishes between firms with positive and zero research and development expenses. Panel C splits the sample in firms with below and above median intangible assets (deflated by average total assets). Variables are explained in detail in Table 6 in the Appendix. All specifications include controls used in the extended base-case regressions, period- and firm-fixed effects. t-values (reported in parentheses) are White-robust. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

[1] Note that in the high information asymmetry setting adj. $R^2$ is substantially higher. Additional analyses reveal that this does not affect the results discussed above.
[2] The internal resource hypothesis of Kumar and Krishnan (2008) provides an alternative perspective on these results.

**3.3. Regression in subsamples proxying monitoring of shareholders.** To gain further insights I also use the ownership dummy variable DOMINATED to split the sample into two subsamples. DOMINATED is presumed to proxy for monitoring abilities of shareholders (e.g., Grossmann and Hart, 1980; Shleifer and Vishney, 1986 and Holderness, 2003 for a survey). The results of the regressions analyses are reported in Table 5.

The result is remarkably similar to the above findings: While standardized accounting earnings EAR are significantly positively correlated with the endogenous variable TSR in the low information asymmetry setting, standardized cash flows CF are not. In contrast, in the high information asymmetry setting standardized cash flows CF are significantly positively correlated with the endogenous variable TSR but standardized accounting earnings EAR are not[1].

Table 5. Regressions on free float subsamples

| Subsample | Widely-held firms | | | Dominated firms | | |
|---|---|---|---|---|---|---|
| Dep. Variable: | TSR | | | TSR | | |
| EAR | 0,34 | (1.35) | | 0,51 | (1.97) | ** |
| CF | 1,07 | (2.80) | *** | 0,31 | (0.89) | |
| Period effects | yes | | | yes | | |
| Firm effects | yes | | | yes | | |
| No of observ. | 997 | | | 1 353 | | |
| Adj. R^2 | 0,427 | | | 0,323 | | |

Notes: The table reports coefficients and t-values of regressions explaining firms' total shareholder return on two subsamples, distinguishing between widely held and dominated firms. Firms are defined to be dominated when free float is smaller than 50%. Otherwise, firms are defined to be widely held. Other variables are explained in detail in Table 6 in the Appendix. All specifications include controls used in the extended base-case regressions, period- and firm-fixed effects. t-values (reported in parentheses) are White-robust. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Again, these results corroborate Hypothesis 2b claiming that with increasing information asymmetries accounting figures become less relevant in explaining a firm's stock market return compared to pure cash flow figures.

**3.4. Robustness of results.** I challenge the above results in several ways. First, to deal with the problem of heteroskedasticity I use White-robust t-values. Second, I check variance inflation factors (VIFs) for all my specifications in order to check for multicolinearity (all VIFs are below 3.5). Third, while I only report results for the extended value-relevance specification in Table 4 and Table 5, I re-estimate all regressions using the simple value-relevance specification. My results are qualitatively robust against these variations. Fourth, I control for the fact that during the sample period firms tend to increasingly adopt international accounting standards. I also re-estimate all my specifications after adding a dummy variable ACC_LOC taking the value of 1 if the firm follows the local (domestic) accounting standard. All my results are robust against this variation. For reference, results for the extended base-case regressions are reported in Panel A in Table 8 in the Appendix.

Finally, I use three alternative measures of stock market returns as an endogenous variable: First, I use a second total shareholder return measure which is calculated over a 12-month period starting 5 month after the beginning of the corresponding fiscal year. Second, I use two excess return measures calculated as total shareholder return minus return of a buy-and-hold strategy investing in the CDAX. Results for the extended base-case regressions are reported in Panel B of Table 8 in the Appendix. Again, my results are robust against these variations.

## Summary and conclusion

Rappaport's shareholder value approach claims that managerial decisions are to be judged against their effect on shareholder wealth, i.e. their impact on the firm's stock market performance. Adopting this view the relevant performance measure for managerial accounting purposes is total shareholder return to be earned by investments in the firm's stocks. However, from the perspective of optimal incentive design using total shareholder return (TSR) as a performance measure has a serious drawback, since it is well-known that a substantial part of the variation in TSR is due to exogenous events beyond control of the management. Thus, although Rappaport's shareholder

[1] Again, note that in the high information asymmetry setting adjusted $R^2$ is substantially higher. Additional analyses reveal that this does not affect the results discussed above.

value approach seems widely accepted today, there is an ongoing debate about appropriate internal performance measures to evaluate managerial decisions and to be used in managerial accounting.

While some of the modern performance measures used in managerial accounting rely on cash flow based figures, others try to take advantage of the information content of accounting figures. However, whether the additional information content in the accrual components of earnings improves the internal performance measurement is an open empirical question. To shed light on this question, I examine the correlation of operating cash flows and earnings with firm's total shareholder returns. Using fixed firm effects regression methods for a large sample of German listed firms covering some 5,000 firm years, the analysis shows that generally operating cash flow and earnings are both positively correlated with total shareholder return. However, with increasing information asymmetry earnings become less correlated with the firm's stock market performance, and operating cash flow dominates earnings in explaining total shareholder return (and vice versa). These results suggest that, the information content of accounting figures is only relevant in settings characterized by low information asymmetries and, thus, there is no one-size-fits-all performance measure for managerial accounting purposes.

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## Appendix

Table 6. Description of variables

| Variable | Description | Source |
|---|---|---|
| ACC_LOCAL | Accountingstandard (dummy variable equal 1 if accounting standard followed is German HGB) | TD |
| ACCRUALS | Accruals calculated as EBIT minus OCF | TD, own calc |
| BETA | Regression coefficient of a simple market model using monthly market returns (proxied by CDAX returns) | TD, own calc |
| CF | CFO deflated by average total assets | TD, own calc |
| CFO | Total funds from operations representing the sum of net income and all non-cash charges or credits | TD |
| DOMINATED | Ownership structure proxy (dummy variable equal 1 if free float is smaller than 50%) | TD, own calc |
| EAR | EBIT deflated by average total assets | TD, own calc |
| EBIT | Earnings before interest and taxes (EBIT) | TD |
| ETP | Earnings before taxes (EBT) deflated by market capitalization | TD, own calc |
| LEV | Leverage proxy (total debt deflated by total assets) | TD, own calc |
| MTB | Market-to-book ratio of equity | TD, own calc |
| SIZE | Firm size proxy (ln of 1+total assets) | TD, own calc |
| TSR | Total shareholder retun (measured from month 4 of the corresponding fiscal year to month 16) | TD, own calc |
| TSR_EX | Total shareholder retun (measured from month 4 of the corresponding fiscal year to month 16) exceeding the corresponding market return (proxied by CDAX return) | TD, own calc |

Note: The table reports detailed descriptions and data sources of the variables. TD refers to Thomson database.

Table 7. Descriptive statistics of main variables

| YEAR | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EBIT | 61,994 | 64,149 | 92,241 | 42,563 | 31,469 | 54,371 | 80,520 | 88,899 | 99,233 | 120,771 | 93,621 | 829,832 |
| EBIT | 9.000 | 5.667 | 6.723 | 3.264 | 1.598 | 2.289 | 5.155 | 4.770 | 7.581 | 8.780 | 7.017 | 5.517 |
| EAR (median) | 8.2% | 6.0% | 5.9% | 3.6% | 2.2% | 3.3% | 6.0% | 6.4% | 7.2% | 7.4% | 5.8% | 5.7% |
| CFO | 90,209 | 89,770 | 109,529 | 103,063 | 115,404 | 108,465 | 116,621 | 119,059 | 135,437 | 151,900 | 136,313 | 1,275,769 |
| CFO | 10.252 | 7.304 | 7.305 | 5.814 | 4.252 | 4.510 | 6.192 | 6.447 | 8.615 | 8.923 | 9.301 | 7.069 |
| CF (median) | 10.4% | 8.2% | 6.9% | 5.7% | 4.2% | 5.8% | 7.4% | 8.0% | 8.3% | 8.7% | 7.6% | 7.5% |
| Accruals | -28,273 | -25,591 | -17,224 | -60,500 | -83,959 | -54,029 | -36,081 | -30,153 | -36,199 | -31,122 | -42,548 | -445,680 |
| Accruals | -0.683 | -1.102 | -1.697 | -3.091 | -2.631 | -1.940 | -0.946 | -0.456 | -0.519 | -0.490 | -1.161 | -1.284 |
| ACC (median) | -1.6% | -2.0% | -2.4% | -3.1% | -3.2% | -2.8% | -1.8% | -1.0% | -0.9% | -0.7% | -1.2% | -1.9% |
| TSR (median) | -11.3% | -2.7% | -21.1% | -30.2% | -30.0% | 49.7% | 6.8% | 35.3% | 7.1% | -18.8% | -35.9% | -5.5% |

Note: The table reports descriptive statistics of the main variables EAR, CFO, ACC and TSR. Accruals are calculated as the difference between operating cash flows (CFO) and earnings before interest and taxes (EBIT). ACC represent standardized accruals, i.e. accruals deflated by average total assets of the firm in the corresponding firm year. All other variables are explained in detail in Table 6 in this Appendix.

Table 8. Robustness of base-case regression

**Panel A: Two-way fixed effects panel regressions controlling for local accounting standard**

| Dep. Variable: | TSR | | TSR | | TSR | | TSR | |
|---|---|---|---|---|---|---|---|---|
| Constant | -0.02 | (-2.20) ** | -0.01 | (-0.95) | 1.40 | (6.44) *** | 1.39 | (6.28) *** |
| EAR | 0.65 | (6.05) *** | 0.69 | (6.25) *** | 0.51 | (3.04) *** | 0.51 | (2.99) *** |
| CF | 0.60 | (3.95) *** | 0.54 | (3.42) *** | 0.51 | (2.15) ** | 0.51 | (2.15) ** |
| BETA(-1) | | | | | 0.03 | (0.90) | 0.03 | (0.97) |
| SIZE(-1) | | | | | -0.26 | (-7.02) *** | -0.26 | (-6.91) *** |
| MTB(-1) | | | | | 0.00 | (0.59) | 0.00 | (0.60) |
| LEV(-1) | | | | | 0.40 | (2.84) *** | 0.40 | (2.80) *** |
| DOMINATED | | | | | 0.09 | (2.59) *** | 0.09 | (2.56) ** |
| ACC_LOCAL | | | 0.01 | (0.52) | | | -0.02 | (-0.43) |
| Period Effects | yes | | yes | | yes | | yes | |
| Firm Effects | yes | | yes | | yes | | yes | |
| No of observ. | 4,565 | | 4,283 | | 2,350 | | 2,344 | |
| Adj. R^2 | 0.336 | | 0.340 | | 0.358 | | 0.359 | |

**Panel B: Two-way fixed effects panel regressions explaining alternative return specifications**

| Dep. Variable: | TSR_44 | | TSR_44_EX | | TSR_55 | | TSR_55_EX | |
|---|---|---|---|---|---|---|---|---|
| Constant | 1.40 | (6.44) *** | 1.26 | (5.92) *** | 1.30 | (6.34) *** | 1.43 | (6.67) *** |
| EAR | 0.51 | (3.04) *** | 0.56 | (3.30) *** | 0.43 | (2.54) ** | 0.39 | (2.24) ** |
| CF | 0.51 | (2.15) ** | 0.52 | (2.18) ** | 0.45 | (1.98) ** | 0.49 | (2.06) ** |
| BETA(-1) | 0.03 | (0.90) | 0.02 | (0.81) | -0.01 | (-0.54) | -0.02 | (-0.58) |
| MTB(-1) | 0.00 | (0.59) | 0.00 | (0.66) | 0.00 | (1.15) | 0.00 | (1.35) |
| ETP(-1) | -0.06 | (-2.85) *** | -0.06 | (-2.81) *** | -0.05 | (-2.60) *** | -0.06 | (-2.51) ** |
| LEV(-1) | 0.40 | (2.84) *** | 0.40 | (2.83) *** | 0.41 | (3.12) *** | 0.43 | (3.18) *** |
| DOMINATED | 0.09 | (2.59) *** | 0.08 | (2.40) ** | 0.06 | (2.00) ** | 0.07 | (2.07) ** |
| Period Effects | yes | | yes | | yes | | yes | |
| Firm Effects | yes | | yes | | yes | | yes | |
| No of observ. | 2,350 | | 2,350 | | 2,350 | | 2,350 | |
| Adj. R^2 | 0.358 | | 0.530 | | 0.333 | | 0.433 | |

Note: The table reports coefficients and t-values of the robustness tests of my base-case regressions. Panel A extends my base-case regressions for an accounting standard dummy variable that takes the value of 1 if the firm follows a local accounting standard. Panel B re-estimates the extended base-case regressions using alternative specifications for the endogenous variable. I use two standard total shareholder return measures and two excess return measures. Excess return is calculated as total shareholder return minus return of a buy-and-hold strategy investing in the CDAX. TSR_44 and TSR_55 are standard total shareholder return measures over a 12-month period starting 4 months (5 months) after the beginning of the corresponding fiscal year. TSR_44_EX and TSR_55_EX are the corresponding excess return measures. All other variables are explained in detail in Table 6 in the Appendix. All specifications include period- and firm-fixed effects. t-values (reported in parentheses) are White-robust. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.