Kumulative Dissertation zum Themengebiet:

ESSAYS ON ACCOUNTING INFORMATION AND EQUITY VALUATION

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CONTENTS

I. INTRODUCTION AND SYNOPSIS

An accurate and thus reliable equity valuation is crucial for capital market participants (e.g., analysts and investors) as value and price reveal decision-relevant information. For example, investors may decide to invest or divest in a firm based on estimated values considering observable prices. Further, managers may decide whether to acquire a firm based on valuation, among other factors (Holthausen and Zmijewski 2019). These examples are just a few events where the valuation of a company is necessary and the accurate valuation is crucial for future wealth.

Regarding the accuracy of equity valuation, it is important to distinguish between the concepts of price and value. The price for listed companies is observable via their stock prices, and thus conceptually incorporates all publicly available information (see e.g., Dimson and Mussavian 1998; Fama 1970). In contrast, the true fundamental value, the intrinsic value, of a company or stock is unobservable. In practice and research, different valuation models are used to estimate this intrinsic value. The accuracy of equity valuation models is one of the most discussed topics in practice and research. Over decades, different models were developed to value companies. Some models are based on the usage of market information or comparable transactions (e.g., multiples), while other models are based on the usage of accounting information (e.g., discounted cash flow models or the residual income model). Standard setters around the world support accurate valuation, and they design accounting standards to provide users with decision-useful information. Put differently, standard setters provide capital market participants with information to enable accurate equity valuation among others. Barth et al. (2001) state that equity investment is a primary focus of financial statements.

With respect to valuation, this thesis is motivated by the ongoing discussion of the usefulness of accounting information (e. g., Francis and Schipper 1999; Shao et al. 2021; Sloan 2019). In this context, Curtis (2012) shows that equity prices are detached from fundamental values, estimated by valuation models based on the residual income model (RIM). The author highlights that the identified detachment between price and value is reasoned in investors' (irrational) trading behaviors (e.g., speculation), suggesting that while the valuation model yields reliable intrinsic value estimates, investors trade irrationally in some periods. Contributing to the discussion of the usefulness of accounting information, in Study A) and Study B) we analyze the usage of accounting information for risk measurement in equity valuation; Study C) takes a broader

perspective to the information setting used by analysts to estimate the intrinsic value of a company. This study analyzes an informational shock to accounting information (restatement of GAAP earnings) and the spillover effect to another component of the analysts' information setting non-GAAP earnings, being precise if learning about low GAAP reporting quality changes investors' perception of aggressive non-GAAP reporting choices.

Study A) and Study B) use the well-known RIM to estimate the intrinsic value of a company. The RIM is based on the Dividend-Discount-Model (DDM), which represents the present value of the expected future dividends as a stock's intrinsic value (Campbell and Shiller 1988; Samuelson 1965; Williams 1938):

$$V_t^* \equiv \sum_{\tau=1}^{\infty} \frac{E_t(D_{t+\tau})}{(1+r_e)^{\tau}}, \tag{1}$$

where V_t^*= the intrinsic value of a stock at time t, $D_{t+\tau}$= future dividend for period $t+\tau$, r_e= discount rate, and $E(.)$= expectations conditional on information available at time t. Lee et al. (1999) state that the DDM is the standard view to express the value of a stock among financial economists.

Using the clean-surplus-relation[1], the present value of future dividends can be expressed using accounting numbers, such as in the residual income model (e.g., Ohlson 1995; Preinreich 1938):

$$V_t^* = B_t + \sum_{\tau=1}^{\infty} \frac{E_t(\tilde{x}^a_{t+\tau})}{(1+r_e)^{\tau}}, \tag{2}$$

Where B_t= book value of equity at time t, $\tilde{x}^a_{t+\tau}$= future residual income or abnormal earnings for period $t+\tau$. The residual income $\tilde{x}^a_{t+\tau}$= is measured as $x_{t+\tau} - r_e B_{t+\tau-1}$, where $x_{t+\tau}$ = earnings for period $t+\tau$, r_e = cost of equity capital, and $B_{t+\tau-1}$ = book value at time $t+\tau-1$. Equation (1) and equation (2) show the two main estimation challenges of every valuation model based on the present value concept: a) estimation of future payoffs and b) estimation of the appropriate discount rate (the cost of capital).

Investigating the usefulness of accounting information for valuation Study A) and Study B) of this thesis focus on the estimation of the cost of capital, put differently, the incorporation of risk in

[1] The clean surplus relation states that all gains and losses that affect the book value are also included in the earnings. Put differently, change in book value from period t-1 to period t is equal to earnings in t minus net dividends in t: $B_t = B_{t-1} + x_t - d_t$.

the estimation of the intrinsic value of a company. These investigations are motivated by the important role of risk measurement in the field of equity valuation. Nekrasov and Shroff (2009, p. 1983) state that it "[...] is perhaps the single most difficult task in valuing a security". As mentioned above, in practice and research different valuation models exist. This thesis focuses on the RIM for two main reasons: i) previous literature finds that the empirical application of the RIM leads to lower valuation errors in comparison to other models (e.g., the DCF-model) (e.g. Francis et al. 2000; Heinrichs et al. 2013; Penman and Sougiannis 1998); and ii) Nekrasov and Shroff (2009) show how to incorporate accounting-based risk measurement directly in the RIM valuation formula. Typically, the estimation of cost of capital is based on factor models, such as the Capital Asset Pricing Model (CAPM) as a famous one-factor model (Lintner 1965; Sharpe 1964) or the Fama-French three-factor model (Fama and French 1993). However, these models are also criticized in the literature. Therefore, factor models are an active field of research in the literature (see e.g., Fama and French 2015, 2018; Feng et al. 2020; Harvey et al. 2016; Hou et al. 2020). It is important to note that the objective of this thesis is the investigation of the usefulness of accounting information for valuation and not the development of a new factor model that yields lower valuation errors. Study A) and Study B) apply and compare existing factor models based on a different set of information in the context of equity valuation, more specifically, the co-movement of price and value.

To be precise, **Study A) by Mehring, Olsson, Sievers, and Sofilkanitsch (2022)** analyzes the co-movement of price and value. Focusing on the incorporation of risk in equity valuation models, this study compares two methods of risk estimation: a) market- and b) accounting-based. The co-movement of price and value is investigated by two prominent studies (Curtis 2012; Lee et al. 1999). Lee et al. (1999) provide evidence for a co-movement of price and value in the period 1963 to 1996 for the DOW 30 stocks. On a broader index, Curtis (2012) also finds co-movement of price and value in a period from 1979 to 1993. For a more recent period from 1994 to 2008, however, Curtis (2012) documents a lack of co-movement, suggesting that the detachment is driven by investors' speculation. For our motivation of Study A), it is important to note that Curtis (2012) rules out risk explanations regarding the lack of co-movement and concludes that speculation has increased in this later period. Challenging the non-risk argument, Study A) investigates the co-movement of price and value using different measurements of risk (e.g., market- vs. accounting-based risk measurements). Using the accounting-based risk measurement model by Nekrasov and

Shroff (2009), our results show that price and value co-move in the historical and more importantly, also co-move in current periods, for which Curtis (2012) finds a lack of co-movement. Using the market-based risk measurement models, our results align with the findings by Curtis (2012). Overall, we document the usefulness of accounting information for risk estimation in equity valuation models over a long period. In addition, our results contribute to the discussion of whether the price formation process on the market is based on rationality (Shiller 2014). The explanation of the lack of co-movement in a more recent period by Curtis (2012) is speculation. Our findings, using the accounting-based risk measurement model, support the argument that the price formation is based on rationality, specifically if capital market participants process accounting information to estimate risk in a well-defined valuation model.

Further, given that this thesis focuses on the investigation of accounting information in the context of valuation, a specific characteristic of an accounting system is analyzed: accounting conservatism. Accounting conservatism is a vital field in academic research. Regardless of existing criticism in research, conservatism in accounting has not only survived but has increased (see Watts 2003a, 2003b). Much, but not all, of prior empirical and analytical research has documented the beneficial aspect of conservatism, especially in contracting situations to solve agency problems and reduce information asymmetry.[2] Turning to the association between conservatism and the relation of price and value (i.e., the co-movement), different aspects of the prior literature are important, especially the association of conservatism and price formation in markets and the separate components of a valuation model (market price, analysts' earnings forecasts, and cost of

[2] E.g., using an agency-model Kwon et al. (2001) show that the principal always designs a conservative accounting system in a limited liability setting. Gigler and Hemmer (2001) analyze the value of additional information next to an accounting system. More conservative accounting leads to a lower value of the additional information; therefore, the market price is more timely in reflecting the news of firms with less conservative accounting. Chen and Zhang (2007) show that conservative accounting contradicts the earnings manipulation by managers. Dai and Ngo (2020) analyze increasing information asymmetry based on political uncertainty and find that accounting conservatism is also increasing to resolve the information asymmetry. Put differently, conservatism leads to a reduction in information asymmetry, and therefore, the demand for conservatism increases in times of political uncertainty. On the equity market side, Kim et al. (2013) find that the abnormal returns around SEO announcements are less negative for more conservative firms. This smaller price decline is due to the alleviation of information asymmetry due to conservatism. In an international sample (including the US), Brown et al. (2006) document results that are consistent with conditional conservatism, serving as an efficient contracting role to reduce managers' opportunistic behavior in the use of accruals. These benefits are lost in countries with lower accrual intensity.

capital). Kim et al. (2019) show that analysts adjust their earnings forecasts to conservatism but do not include this adjustment in their stock recommendations. They suggest that analysts may not appreciate the valuation implications of conservative accounting, which could inhibit price discovery. In line with Easton and Pae (2004), they also find that on average market prices adjust the effect of conservatism. Mensah et al. (2004) show that analysts' earnings forecast errors and analyst dispersion is associated with conservatism. In line with these findings, Jung et al. (2017) find that analysts produce lower earnings forecast errors with stronger market reactions to this forecast when they better match the asymmetric timeliness of their forecasts with the asymmetric timeliness of the firm's earnings. On the other hand, García Lara et al. (2014) find that conservatism is useful for equity holders because of the decrease of information asymmetry between insiders and outsiders of a company. In addition, García Lara et al. (2011) document a negative relation between conditional conservatism and excess average stock returns, inferring that conservatism is associated with lower implied cost of capital. Barth et al. (2019) find that asymmetric timeliness delays price discovery at earnings announcements. They also find a positive relationship between asymmetric timeliness and stock returns during the earnings announcement period after the initial price reaction to the announcement, which is consistent with a slower resolution of valuation uncertainty. Conservative earnings are more complex for investors to assess because investors must determine whether the firm's earnings relate to good or bad news. Earnings persistence is a further aspect that helps financial statement users (Penman 2013). Chen et al. (2013) find that the firms with more conservative accounting generate less persistent earnings. In addition, they show that pricing multiples are lower for more conservative firms. These findings are in line with Ohlson (1995), who documents that pricing multiples on earnings increases with earnings persistence. These findings lead to the conclusion that investors incorporate earnings persistence into pricing decisions. Overall, Penman and Zhang (2002) state that, based on the previous arguments, accounting conservatism can be useful (e.g., decreasing information asymmetry) but also introduces complexity into valuation and therefore leads to pricing errors. Also, Francis et al. (2004) argue that conservatism leads to a bias in information. Penman and Zhang (2020) argue in an analytical paper that conservatism is applied when there is a significant degree of uncertainty in future cash flows, causing a lack of reliable information to measure the business activity.

Based on prior findings, a clear prediction of the effect of conservatism on co-movement of price and value remains an empirical question. Given that conservatism reflects the timing and

projections of future earnings components, accounting conservatism can affect equity valuation, depending on how investors price conservatism. To briefly describe our results, we document that the probability of finding a co-movement between price and value is associated negatively with conservatism, suggesting that conservatism is harmful for cointegration; however, if cointegration is observed, conservatism is associated positively with the probability that the price reacts to changes in fundamentals and restores to the equilibrium process. In sum, Study A) contributes to the literature in two ways: First, it contributes to the stream of accounting research regarding the usefulness of accounting information for risk measurement and the role of accounting conservatism, and second, it provides important insights for financial economics research that investigates the price formation process in equity markets.

Motivated by the findings of Nekrasov and Shroff (2009) and Study A) for the US market, **Study B) by** Mehring (2022) investigates the accounting-based risk measurement on the German market. This study contributes to the literature because country-specific studies can provide additional insights, but are rare, except for the US market (Griffin 2002). Furthermore, it is not clear that findings for the US market hold in different international markets. Turning to the estimation of cost of capital, Dirkx and Peter (2020) show that in contrast to the US market, profitability, a factor of the Fama French five-factor model, is not a relevant factor on the German market in explaining stock returns. In combination with the findings of Study A), this is important for the motivation of Study B) because the accounting-based risk measurement model is based on a profitability measure, the ROE. Therefore, it is not clear if the results on the US market can be confirmed on the German market. Thus, Study B) investigates if accounting information is helpful to estimate risk in the case of equity valuation on the German market. As in Study A), the "classical" criteria valuation accuracy and the ability to explain cross-sectional variation in securities prices are compared between different valuation models, which are all based on the RIM but use a different set of information to estimate the cost of equity capital. In addition to Study A), the correlation of the estimated risk of the different models with the ICC is analyzed.

The empirical analysis shows that the value estimates grounded on the accounting-based risk measurement approach produce a significantly smaller valuation inaccuracy relative to the market-based approach for the CDAX constituents. Also, the explanatory power of the variation in securities prices is larger for the intrinsic value estimates based on the accounting approach, and in contrast to the cost of equity produced by the Capital Asset Pricing Model (CAPM), a positive

significant correlation with the implied cost of capital can be observed. Finally, the value-to-price ratio of the value estimate using the accounting-based risk measurement fluctuates around one and therefore shows a more stable history in comparison to the ratio of the estimate using market-based risk measurement. As in Study A), Study B) concludes that accounting information is useful for equity valuation, in this case, especially for estimating risk.

Turning to a broader perspective, **Study C) by Mehring, Müller, Sievers, and Sofilkanitsch (2021)** analyzes if an informational shock to GAAP reporting (e.g., material financial restatement) and therefore heightened investor scrutiny of GAAP reporting quality has a spillover effect on investors' perceptions of aggressive non-GAAP reporting. Thus, in the context of the usefulness of accounting information for valuation, Study C) takes a different perspective on this topic. Next, to accounting information based on GAAP reporting, capital market participants like analysts and investors use much different information to value companies (e.g., non-GAAP earnings). Based on the analytical findings by Hirshleifer and Teoh (2003), we use material restatements as an informational shock and the exclusion of recurring expenses as a proxy for inappropriate non-GAAP adjustments. In our setting, a material restatement is an event, which triggers higher investor scrutiny. Here, we analyze the responsiveness of investors to aggressively reported non-GAAP earnings before and after this attention-grabbing event. Assuming that market revisions are revealing prior mispricing, we condition our sample to market reactions to material restatements on ex-ante non-GAAP reporting in the next analysis.

We find that after investors learn about low GAAP reporting quality, they react differently to non-GAAP reporting choices. In detail, investors reward the exclusion of recurring expenses (aggressive non-GAAP reporting choices) before material restatements (in the pre-restatement period) but penalize the same reporting choices after material restatements (in the post-restatement period). This result suggests that investors update their expectations to non-GAAP reporting quality after material restatements. More specifically, the more aggressive the exclusion of recurring expenses is, the less informative are the non-GAAP earnings ex-post. Furthermore, this finding provides evidence that scrutiny is a determinant of how investors process aggressive non-GAAP reporting choices.

Next, our research design allows us to condition market reactions to material restatements on pre-restatement non-GAAP reporting. Analyzing short-term market reactions, we find that on

average the cumulative abnormal return is five percentage points more negative for firms with aggressive ex-ante non-GAAP reporting relative to non-aggressive counterfactuals. We find more negative short- and long-term market reactions for firms reporting non-GAAP earnings aggressively before the material restatements relative to non-aggressive firms. This result suggests that aggressively reported non-GAAP earnings before material restatements mislead investors. Moreover, we document a long-lived earnings response coefficient (ERC) decline for firms with aggressive pre-restatement non-GAAP reporting and no ERC decline for non-aggressive firms, suggesting that investors overestimate the quality of aggressive firms before material restatements.

In sum, the findings in Study C) provide evidence that firm-specific changes in perceived financial reporting quality affect investors' responsiveness to aggressive non-GAAP reporting choices and that aggressive non-GAAP reporting choices mislead investors before material restatements. Since our findings hold for the pre- and post-Reg G periods, we note to regulatory bodies that mispricing likely has not yet been resolved. To investors, we suggest being vigilant when pricing aggressively reported non-GAAP earnings because our findings suggest that recurring expense exclusions might still be opportunistically exploited.

Taken together, this thesis investigates the role of accounting information in the specific context of equity valuation. While Study A) and Study B) investigate the role of accounting-based risk measurement, Study C) takes a broader perspective and analyzes the market reactions, put differently, the market valuation of companies after an informational shock about low GAAP reporting quality conditioned on aggressive non-GAAP reporting choices.

Study A) contributes to the literature by documenting that the lack of co-movement in prior research can be explained by the applied valuation model, rather than investors' trading behavior (e.g., speculation). This result provides strong empirical evidence that accounting information is useful for equity investors. Finally, we document that on an index level, conservative reporting harms the co-movement of price and value; however, conditioning on a co-movement of price and value, more conservatism helps move prices back to fundamentals. Study B) is based on these findings and shows that value estimates using an accounting-based risk measurement approach produce a smaller valuation inaccuracy relative to the market-based approach for the German market. Focusing on the price formation on markets, Study C) provides evidence that heightened investor scrutiny of GAAP reporting quality affects investors' treatment of aggressive non-GAAP

reporting choices. These findings are consistent with the idea that aggressive non-GAAP reporting choices mislead investors before material restatement announcements.

II. STUDIES OF THE DISSERTATION

Co-movement of Price and Intrinsic Value - Does Accounting Information Matter?*

Oliver Mehring[a] Per Olsson[b] Soenke Sievers[c] Christian Sofilkanitsch[d]

Abstract We investigate the co-movement of stock prices and intrinsic value estimates focusing on the estimation of risk. We apply risk measurements based on a) market and b) accounting data. We find that price and value co-move from 1983 to 2014 on an index-level using accounting-based risk measurement in contrast to the market-based risk measurement. Our findings have two vital implications. First, the lack of co-movement documented in prior research can be explained by the applied valuation model (market vs. accounting), rather than investors trading behavior (e.g., speculation). Second, this result provides strong empirical evidence that accounting information is useful for equity investors. Finally, we analyze the role of accounting conservatism regarding co-movement. We document that on an index level conservative reporting harms the co-movement of price and value. However, conditioning on a co-movement of price and value, more conservatism is helpful for moving prices back to fundamentals.

JEL Classification: C32; G12; G14; M41
Keywords: fundamental analysis; co-movement; risk measurement; accounting beta; accounting conservatism.
Data Availability: Data used in this study are available from public sources identified in the paper.

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Accounting-Based Risk Measurement - Evidence for the German Market[*]

Oliver Mehring[a]

Abstract I implement the accounting-based risk measurement approach in equity valuation proposed by Nekrasov and Shroff (2009) for the German market using monthly data from 2002 to 2019. The empirical analysis shows that value estimates based on this risk measurement approach produce a significantly smaller valuation inaccuracy relative to the market-based approach for the CDAX constituents. In addition, the explanatory power of the variation in securities prices is larger for the intrinsic value estimate based on the accounting approach. Also, the estimated risk can be transformed to obtain accounting-based cost of equity. In contrast to the cost of equity produced by the CAPM, a positive significant correlation with the implied cost of capital can be observed. I conclude and highlight that accounting information is useful for equity investors.

JEL Classification: G12; G14; M41
Keywords: fundamental analysis; risk measurement; accounting beta; German stock market.
Data Availability: Data used in this study are available from public sources identified in the paper.

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Does learning about low GAAP reporting quality change investors' perceptions of aggressive non-GAAP reporting choices?*

Oliver Mehring[a] Jens Müller[b] Soenke Sievers[c] Christian Sofilkanitsch[d]

Abstract Material financial restatements reveal GAAP-based misreporting and thus are a strong signal of low GAAP reporting quality. We explore these reporting shocks and investigate whether heightened investor scrutiny of GAAP reporting quality after material restatements has a spillover effect on investors' perceptions of aggressive non-GAAP reporting choices. We find that investors reward aggressive non-GAAP reporting choices before material restatements (e. g., ERC premium) but penalize the same reporting choices after material restatements (e. g., ERC discount). Furthermore, we document that short- and long-term market reactions to material restatements are more negative for firms that aggressively reported non-GAAP earnings before the announcement of material restatements. We provide evidence that heightened investor scrutiny of GAAP reporting quality affects investors' perceptions of aggressive non-GAAP reporting choices. Finally, our findings are consistent with the idea that aggressive non-GAAP reporting choices misled investors before material restatement announcements.

JEL Classification: G1; K4; M4
Keywords: Non-GAAP reporting, investor scrutiny, financial restatements, information content of earnings, mispricing.

Data Availability: Data used in this study are available from public sources identified in the paper.

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