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Capital Structure Disclosure as a Useful Tool for Credit Risk Assessment?

- Specific Problems regarding Credit Risk Assessment arising from a Potential Full Fair Value-Approach of Accounting Measurement -

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Capital Structure Disclosure as a Useful Tool for Credit Risk Assessment?

- Specific Problems regarding Credit Risk Assessment arising from a potential Full Fair Value-Approach of Accounting Measurement -*

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Abstract

Within Europe the adoption of IAS/IFRS by the European Union implies changes of accounting rules that firms within EU-member states have to apply. Within this framework, the banking industry as an important user of accounting information is facing changes in the field of banking supervision, namely by the so called Basel-II-Accord.

One aspect of the application of IAS/IFRS is the outstanding importance of fair-value measurement. This paper analyses the impact of fair-value accounting on a firm's capital-structure disclosure. The focus is on the question whether a full fair value-based capital-structure disclosure provides a useful basis to properly asses a creditor's risk position. In other words, it is asked whether fair-value accounting facilitates credit decisions within the banking industry or not.

Based on the capital asset pricing model (CAPM), the consequences of fair-value measurement for financial-statement analysis regarding a firm's capital structure are discussed, and a possible way to resolve arising difficulties is derived. It is argued that equityholders' financial claims may be interpreted as call options on the firm, and that a bank's risk position is determined by these options being in the money or not at future dates. Since equityholders, or management representing them, can influence these options, the aspect of accounting for stewardship becomes important. In order to capture these aspects, information regarding the firm value as well as a comprehensive statement of changes in a firm's capital and liabilities is suggested as relevant for creditors' decision-making.

1. Introduction

While capital markets urge managers in corporations to create and increase shareholder value, standard setters in the field of accounting intend to support the functioning of capital markets by aiming to meet the informational needs of investors and creditors. So it is not by chance that the European Commission in 2003 decided to adopt most of the existing International Accounting Standards[1].

Within Europe, the adoption of IAS/IFRS by the European Union implies considerable changes of accounting rules that firms within EU-member states have to apply. One aspect of the application of IAS/IFRS for the preparation of financial statements is the outstanding importance of fair-value measurement. A prominent example that underlines the relevance of fair-value accounting is the revised IAS 39 that was issued in December 2003 and amended in March 04, according to which there was an option to measure any financial asset or financial liability at fair value. After amending IAS 39

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[1] See Commission Regulation (EC) No 1725/2003 of 29 September 2003.

again in June 2005, there now is a modified fair value option that restricts its use certain situations.

At the same time, the banking industry as an important user of accounting information is facing changes in the field of banking supervision, namely by the so called Basel-II-Accord, which leads to an increasing relevance of accounting data for credit rating-purposes. According to the Basel Committee's view, a borrower's capital structure plays an important role for determining a creditor's risk position, and therefore necessarily has to be taken into account within the rating process[2]. In contrast to the increasing relevance of fair-value measurement, external rating agencies prefer book values to fair (market) values[3]. So the question arises what kind of measurement regime provides better information.

This paper analyses the impact of fair-value accounting on the decision usefulness of a firm's capital-structure disclosure. The focus is on the question whether capital-structure information that is exclusively based on fair values of debt and equity can, compared to a measurement and disclosing regime that, perhaps as additional information, reveals book values, serve as a better basis to asses the financial risk creditors are facing. So the paper's potential contribution to the discussion about an appropriate measurement basis is strictly limited to the creditor's perspective as well as to the capital-structure issue. An overall assessment of the costs and benefits of fair-value measurement is not intended.

The paper is organised as follows: As a prerequisite for analysing the impact of a full fair-value approach of accounting measurement on a firm's capital-structure disclosure, the nature and relevance of fair-value accounting within IAS/IFRS is shown in section 2. Section 3 deals with creditors' informational needs and the concept of decision usefulness of financial reporting information from a creditor's point of view. It is then argued in section 4 that financial-statement analysis requires the application of techniques that reveal important sources of uncertainty and the way they develop in time. Based on these considerations, the consequences of fair-value measurement for financial-statement analysis in an intertemporal context are discussed. In addition to this, and

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[2] See Basel Committee on Banking Supervision (2001 a), par. 264 – 265: (d) Criteria on risk assessment of a borrower.

[3] See Ross, Westerfield & Jaffe (2002), pp. 386-387.

based on the options analogy of equity claims, potential problems arising from a full fair-value approach are shown and illustrated by a numerical example.

As a consequence, the revelation of disaggregated information, comprising the development of book values as well as market values of debt, the development of owner's equity, and firm value information (value reporting) is required. A desirable disclosure regime is derived in section 5. Section 6 finally contains a brief summary and an outlook on future research.

2. The nature of fair value based measurement and its impact on the presentation of a firm's capital structure on the balance sheet

A firm's capital structure is determined by the relationship between the amounts of debt and equity. So consequently aspects regarding measurement of debt and equity are of primary interest. Nevertheless, since measurement of assets determines the amount of equity recognised on the face of the balance sheet, this aspect necessarily is also part of the considerations in this paper.

Generally, fair value can be described as "the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction"[4]. Consequently, a fair value should be a market price that can be observed directly in the market. In those cases, however, where there is no active market for the asset or liability itself or a similar asset or liability, direct observation is impossible. Then theoretical valuation models like the Capital Asset Pricing Model (CAPM) or option pricing models have to be applied.

Both ways of determining fair values are not equivalent. The difference between them is not only a technical one, but has also an economic dimension: A market price implicitly presumes that an asset is to be purchased or sold or a liability settled. The result of e.g. the CAPM, on the other hand, represents a value in use. Only if markets are perfect the amount of any observable market price and the amount of the corresponding value in use are identical, because otherwise arbitrage profit opportunities would exist.

If all items on the face of the balance sheet, including goodwill, were measured at their fair values at initial measurement, and remeasured to their new fair values at every bal-

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[4] See IAS 39.9.

ance-sheet date subsequent to initial measurement, or, in other words, if a full fair-value approach was established, the balance sheet under the ideal condition of perfect markets would portray the equation required for calculating the market value of equity by applying the discounted-cash-flow model[5]:

$$\text{Market Value of Equity} = \text{Marktet Value of Assets} - \text{Market Value of Debt}$$

Within the IASB Framework, par. 67 states that "normally, the aggregate amount of equity only by coincidence corresponds with the aggregate market value of the shares of the enterprise". This is at least partly due to the current state of the existing mixed-accounting model underlying the IAS/IFRS, with the term "mixed-accounting model" describing the fact that the system of IAS/IFRS currently applies both fair-value measurement and measurement at cost (book values). Moving towards a measurement regime that exclusively uses fair-value measurement would, apparently, partly resolve this problem.

Although it is not maintained in this article that any standard setter actually aims at a final state in which accounting standards follow the idea that a balance sheet should imitate a business valuation by employing a full fair value approach, there are certain indicators showing a tendency towards a full fair value approach. For example Mujkanovic (2002) comes to the conclusion that the increasing relevance of fair value accounting goes hand in hand with a history oriented balance sheet being abandoned in favour of a balance sheet that reveals the present value of uncertain future cash flows[6]. Wagenhofer (2006) comes to a similar conclusion[7].

The current developments regarding the measurement of financial instruments may serve as an illustrative example supporting this point of view and giving evidence of an increasing relevance of fair values as an accounting measure. According to the revised

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[5] IAS 32.22 formulates: "Changes in the fair value of an equity instrument are not recognised in the financial statements." On the other hand it has to be realised that equity or changes in equity result from payments between equityholders and the corporation as well as changes in the fair values of assets and liabilities. So if a full fair-value approach was established then changes in the fair value of equityholders' residual claims would certainly be recognised on the balance sheet.

[6] See Mujkanovic (2002), p. 361.

[7] See Wagenhofer (2006), p. 33.

IAS 39 published in December 2003 any financial asset or financial liability could be measured at its fair value (so called fair-value option). So accounting for financial instruments on a full fair value basis was possible, but not mandatory[8]. Within an IASB press release of 17 December 2003 it is said that "many users support requiring all financial assets and liabilities to be measured at fair value, but this was judged to be too big a change to make at the present time"[9]. So apparently, until its February meeting in 2004, the IASB intended to step by step establish a full fair-value approach, at least as far as financial instruments are concerned.

Due to critical comments the IASB received especially from national standardsetters regarding the fair value option, and despite the fact that there are Board members who did not wish to alter the fair value option, the Board, however, decided to modify IAS 39 in June 2005: As a result, the comprehensive fair value option was withdrawn and substituted by a limited option, applicable only under specific circumstances[10]. Nevertheless, the long-term objective "to require that all financial instruments be measured at fair value with realised and unrealised gains and losses recognised in the period in which they occur" remains unchanged[11].

As far as non-financial assets are concerned, the mixed-accounting model remains[12]. Nevertheless it has to be asked whether a full fair-value approach, comprising non-financial and financial assets as well as liabilities, is able to facilitate credit decisions by providing useful capital-structure information.

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[8] See IAS 39 (2003), IN 16: "The Standard permits an entity to designate any financial asset or financial liability on initial recognition as one to be measured at fair value, with changes in fair value recognised in profit or loss."

[9] See attached note B: "Financial Instruments – An introduction to IAS 32 and IAS 39" to the IASB press release of 17 December 2003: International Accounting Standards Board issues revised standards on financial instruments.

[10] See Amendment to IAS 39: Financial Instruments: Recognition and Measurement – The Fair Value Option.

[11] See IASB: Project Update: Financial Instruments from 18 January 2006.

[12] For an overview regarding fair-value measurement of financial and non-financial assets see Wagenhofer (2006). p. 32.

Even if a full fair value approach was established there would remain certain inconsistencies regarding the imitation of a business valuation: The discounted-cash-flow model appraises uncertain future cash flows to the entity by calculating their present value, and then deducts the market value of issued debt. The balance sheet, on the other hand, by its formal structure presents the sum of the measures of recognised assets and the sum of the measures of recognised liabilities. Under realistic conditions, i.e. beyond the assumption of perfect markets, the difference between both amounts is not necessarily the same as the market value of equity. So as a result, a balance sheet based on a full fair-value approach of accounting measurement cannot reliably serve as an instrument that reveals the "real" market values of debt and equity. Whether it is, however, accepted as an approximation for the market values of debt and equity or not, depends on the attitude and belief of any individual user of accounting information.

Although it is clear that real markets do not meet the theoretical requirements of perfect markets, the following analysis is conducted under the (idealistic) assumption that managers within corporations practise value oriented management, and that the right hand side of a balance sheet contains a reasonable approximation of the market values of debt and equity if a full fair-value approach is established. It will be shown that even under these circumstances the exclusive disclosure of full fair-value based capital-structure information may be misleading from creditors' perspective.

3. Predictive power of capital-structure information and accounting for stewardship from a creditor's point of view as relevant issues

According to the IASB Framework "the objective of financial statements is to provide information about the financial position, performance and changes in financial position of an enterprise that is useful to a wide range of users in making economic decisions"[13]. It can be assumed that investors and creditors are primarily interested in assessing "the amounts, timing and uncertainty of future net cash flows into the entity, and eventually to them"[14].

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[13] IASB Framework, par. 12.

[14] Willis (1998), p. 855.

Therefore, from a creditor's point of view and due to the contractual nature of his claim it is crucial for him to be able to properly assess a (potential) borrower's default risk by conducting financial-statement analysis. In this context the New Basel Capital Accord requires that a bank should at least analyse each item listed in par. 264 - 265 for assessing a borrower's risk. One criterion in this context regarded to be important is the "capital structure and the likelihood that unforeseen circumstances could exhaust its [i.e. the borrower's] capital cushion and result in insolvency"[15]. However, the aspect of measurement of debt and equity is not addressed by the Basel Committee although this might be crucial for achieving reliable and robust results from financial-statement analysis.

Empirical studies support the hypothesis of the predictive power of capital-structure information. Ewert & Szczesny (2002) for example show that, based on an investigation of the files of 260 credit transactions by German banks, there is a significant relationship between the capital structure of a borrower and the rating result as well as the credit default risk[16].

According to the Basel Committee the impact of an enterprise's capital structure on its credit default risk is both plausible and intuitive[17]. In order to achieve plausibility and intuition, an underlying model that serves as a rationale for specific if-then statements is required[18]. One possible if-then statement would be the following: If the amount of debt or the debt-equity ratio increases in time, then an entity's risk to become insolvent increases. Financial statements in this context serve as a "database" for directly observing, or calculating the "if-component" in order to draw a conclusion regarding the economic consequences.

One theoretical model within corporate finance literature dealing with capital-structure decisions is the model developed by Kraus & Litzenberger (1973). This approach, based on a single period state-preference model, seeks to derive the optimal debt-equity mix which maximises the market value of an enterprise. It is shown that a firm's financing

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[15] Basel Committee on Banking Supervision (2001 a), par. 265.

[16] See Ewert & Szczesny (2002), p. 586. Since the data used for this study refer to medium sized German enterprises, it can be assumed that they are based on German accounting rules. This means that capital structure information is based on book values rather than fair values.

[17] Basel Committee on Banking Supervision (2001 a), par. 264.

[18] See Schneider (1989), p. 636.

mix determines the future states in which the firm becomes insolvent. Nevertheless this result depends on the crucial assumption that the set of possible future states of the world as well as the corresponding amounts of earnings before interest and taxes are exogenously given.

In addition to this, the model does not include potential conflicts and informational asymmetries between management, representing shareholders, and creditors. As far as these aspects are concerned, for example Jensen & Meckling (1976) as well as Jensen & Smith (1985) have shown that there are incentives to deteriorate creditors' wealth in order to enhance shareholder value, and they have analysed sources of agency costs of debt and their potential impact on the value of a firm and equityholders' as well as debtholders' wealth. So the aspect of accounting for stewardship and management's accountability for the resources entrusted to it by creditors is of high relevance[19], because especially in a multiperiod context management can make decisions that alter the financial structure of an enterprise, and these decisions have an impact on future cash flows to creditors as well as the market value of debt. Besides these agency-theory related articles Leland & Pyle (1977) for example address the problem of asymmetric information between an owner-manager and creditors. They derive conditions under which the enterprise's financial structure can serve as a reliable signal indicating the true quality of the enterprise (i.e. the value of the enterprise's investments).

It has to be asked whether theoretical models like those mentioned above can serve as an underlying rationale for conducting financial-statement analysis. Within capital-structure literature[20] theoretical models are often created and then used as technical instruments to analyse and explain the impact of financing decisions on shareholders' and/or creditors' wealth, given a certain situation determined by a given set of future cash flows and taking into account the existence of incentive problems and informational asymmetries.

Unfortunately, a creditor, trying to assess the risk resulting from a potential or existing credit transaction, has a quite different view on an enterprise that wishes to borrow money: He tries to assess uncertain future cash flows attributable to his (potential) fi-

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[19] IASB Framework, par. 14.

[20] For a comprehensive overview regarding issues related to capital-structure theory see Harris & Raviv (1991).

nancial claim. These cash flows are not exogenously given. Financial-statement analysis cannot rely on a given set of future cash flows but attempts to generate a probability distribution of future cash flows from accounting data. So theoretical models taken from the field of theory of finance show the relevance of an enterprise's financial structure regarding its value, as well as the potential reasons for this relevance, but they do not answer the question what kind of measurement on the face of a balance sheet better supports the assessment of future cash flows to creditors. So as a result from these considerations, the following section 4 analyses in how far a full fair value approach supports creditors in their effort to properly assess credit risk by conducting financial-statement analysis, and if full fair-value accounting provides useful capital-structure information to creditors regarding their informational needs to

- predict future cash flows, and to
- assess management's stewardship as far as their financial claims are concerned.

4. The relationship between fair value measurement and the revelation of credit risk

4.1 The options analogy of equity claims

This section is based on the following requirements of conducting financial-statement analysis for credit rating purposes:

- Conclusions derived from financial-statement analysis should be based on the existence of reliable and robust if-then rules (i.e. an appropriate underlying model);
- Conducting financial-statement analysis should provide a way to disaggregate creditor's risk so that sources of uncertainty can be identified;
- Financial-statement analysis should be able to cope with behavioural risks (i.e. unforeseeable financial decisions) and therefore reveal management's decisions concerning the firm's financial structure as a fundamental cause of changes of creditor's risk.

In order to meet these requirements, the interpretation of financial claims as options can be helpful, not primarily as an instrument for valuation purposes, but as a framework that enables creditors to identify certain sources of the risk they are bearing.

Within a single-period context, equityholders have a call option on the firm (i.e. the right to repurchase the firm), expiring at the end of the period. The exercise price is equal to the principal amount of issued debt (amount that has to be paid to creditors when all liabilities are due at the end of the period). Creditors, on the other hand, own the firm which is equivalent to a call option on the value of the firm with an exercise price that is equal to zero. At the same time creditors have written a call option on the firm with an exercise price that is equal to the principal amount of issued debt[21].

In a multi-period context, however, the situation becomes more complex. The management of an enterprise, representing its equityholders and acting in their interest, at the end of every period has to decide whether to repurchase the right to control the enterprise or not. Equityholders will meet their contractual obligation to pay off liabilities that mature at the end of a period, or, in other words, they exercise their call option on the firm value if the following condition holds:

$$\left\{\begin{array}{c}\text{firm value if}\\ \text{operations}\\ \text{continue}\end{array}\right. - \left.\begin{array}{c}\text{total amount of li-}\\ \text{abilities that mature}\\ \text{at subsequent periods,}\\ \text{measured at fair value}\end{array}\right\} > \begin{array}{c}\text{amount required for settlement}\\ \text{of liabilities that mature at the}\\ \text{end of the current period}\end{array}$$

Otherwise this option is not exercised and the firm becomes insolvent (equityholders default on debt payments).

In addition to this, equityholders still have another option: At the end of every period they (or management representing them) have to decide whether to continue operations or to abandon the firm's current operations in order to realise the resale values of the firm's assets on the second-hand market. This means that equityholders have a real option to abandon for salvage value, or, in other words, to switch from the "continuing mode" to the "liquidation mode". Operations continue, i.e. the switching option is not exercised, if:

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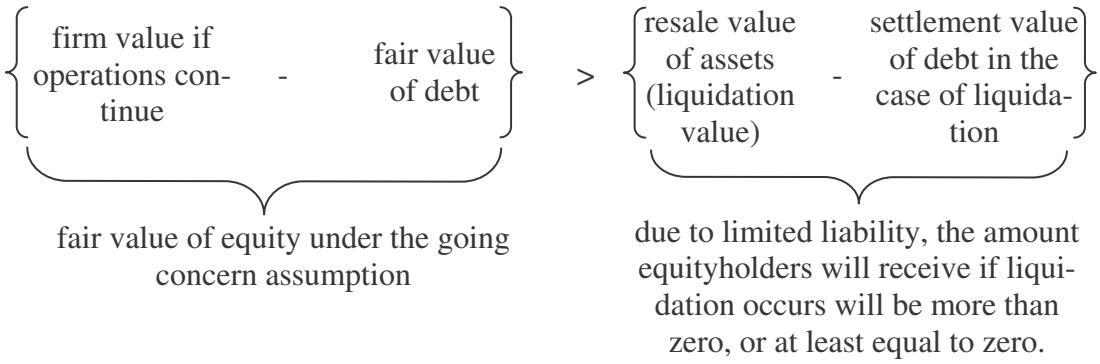
[21] For an intuitive illustration of this options analogy see for example Ross, Westerfield & Jaffe (2002), pp. 633-640.



In this context the term "settlement value" can be described as a creditor's exposure in the case of immediate liquidation of the borrowing entity (i.e. the amount required to repay debt obligations). The settlement value of a credit claim is equal to its book value (carrying amount) according to IAS 39, par. 9, which requires application of the effective interest method, since if liquidation occurs this is the amount the enterprise is obliged to pay to the creditor[22].

There are certain consequences from the options analogy of equity claims for assessing creditors' risk. In a multi-period context, credit risk is influenced

- by the probability that a firm's operations are abandoned due to insolvency or deliberate liquidation before debt matures, and
- by the relationship between the amount of uncertain cash inflows resulting from liquidation (i.e. the resale prices of the firm's assets) and the amount of claims to be repaid in the case of liquidation (settlement value of debt).

As will be shown later, there is no known general financial rule that facilitates a prediction of the probability distributions of the future payments to creditors, based on the knowledge of the present and earlier amounts of the variables that determine equityholders' options to be in the money or not, as well as the observation of management's decisions made in the past. Even if equityholders' options to switch from the "continuing mode" to the "liquidation mode" and to default on credit payments result in the

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[22] According to IAS 39, par. 9, the amortised cost of a financial liability is the amount at which the liability is measured at initial recognition minus principal repayments plus the cumulative amortisation using the effective interest method of any difference between the initial amount and the maturity amount in the case of debt issued at a discount.

firm's operations to continue now, it may occur that in the future the firm's operations are abandoned and the firm becomes insolvent. So apparently, looking at the variables that determine whether an option is currently in the money or out of the money and how it developed in the past only provides history-oriented information.

But, on the other hand, looking at what management has done in the past in order to influence the sharing of risk between creditors and equityholders is of importance because it might reveal that management has made investment and financing decisions in the past pursuing a strategy to deteriorate creditors' wealth in order to increase equityholders' wealth (shareholder value), and so to benefit from the option-like structure of equityholders' claims (options to default on debt payments and to deliberately abandon the firm's operations for salvage value in the future)[23].

Debtholders, as a reaction to this, might want to add restrictive covenants to credit contracts that impose certain restrictions on management's financial decisions in order to reduce or avoid debt induced agency problems. In this case, current as well as potential creditors are interested in monitoring management's compliance. Non-compliance then will lead to subsequent decisions made by creditors, e.g. withdrawal of credits. Additionally, if management's behaviour regarding its financing decisions is observable it determines its reputation in the credit market which, in turn, has an impact on management's ability to raise additional debt in the future. Therefore, observing management's behaviour in the past probably has an impact on its future behaviour. So the basic idea

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[23] See for example Jensen & Smith (1985), p. 111, for illustrations of possible strategies to maximise shareholder value at the cost of debtholders. See as well Jensen & Meckling (1976), p. 336, emphasizing the options analogy of equity in the context of owner-debtholder conflicts. Harris & Raviv (1991), p. 301, give an intuitive explanation for the possibility of shifting wealth from debtholders to equityholders: "Conflicts between debtholders and equityholders arise because the debt contract gives equityholders an incentive to invest suboptimally. More specifically the debt contract provides that if an investment yields large returns, well above the face value of debt, equityholders capture most of the gain. If, however, the investment fails, because of limited liability, debtholders bear the consequences. As a result, equityholders may benefit from 'going for broke', i.e. investing in very risky projects, even if they are value decreasing. Such investments result in a decrease in the value of the debt. The loss in value of the equity from the poor investment can be more than offset by the gain in equity value captured at the expense of debtholders." For an illustrating numerical example, referring to management's financing decisions and emphasizing the options character of equity and the value of equityholders' option to default on debt payments, see Trigeorgis (1997), pp. 168-169.

of modelling equity claims as options and observing current and earlier amounts of variables that determine whether an option is exercised or not, is in fact future oriented.

In this sense the "options model" provides a certain view on the risk structure of credit claims and therefore can be seen as a formal pattern of disaggregating creditors' risk in order to distinguish between the influence of

- the development of market parameters in time, e.g. market prices of assets and interest rates, or the market's expectations regarding the enterprise's future cash flows, and
- management's financial policy, i.e. management's decisions regarding changes of the financial structure of the firm (investment and financing decisions)

as relevant sources of credit risk in the sense of uncertainty of future cash flows to creditors.

The remainder of section 4 will illustrate these considerations, and in this context show that there are serious problems arising from exclusively reporting capital-structure information based on a full fair value approach of measurement. It will then serve as a basis for conclusions regarding measurement and disclosure rules that enhance and not reduce decision usefulness of financial reporting information.

4.2 Characterisation of the time-uncertainty setting for the analysis of capital-structure disclosure based on fair values

If a balance sheet is assumed to serve as an instrument for the approximate disclosure of the market values of debt and equity, then in a multi-period context time and uncertainty can be modelled by an event-tree (see Figure 1). As a consequence, the fair values of assets as well as liabilities can be calculated as present values, based on the CAPM, in a retrograde way.

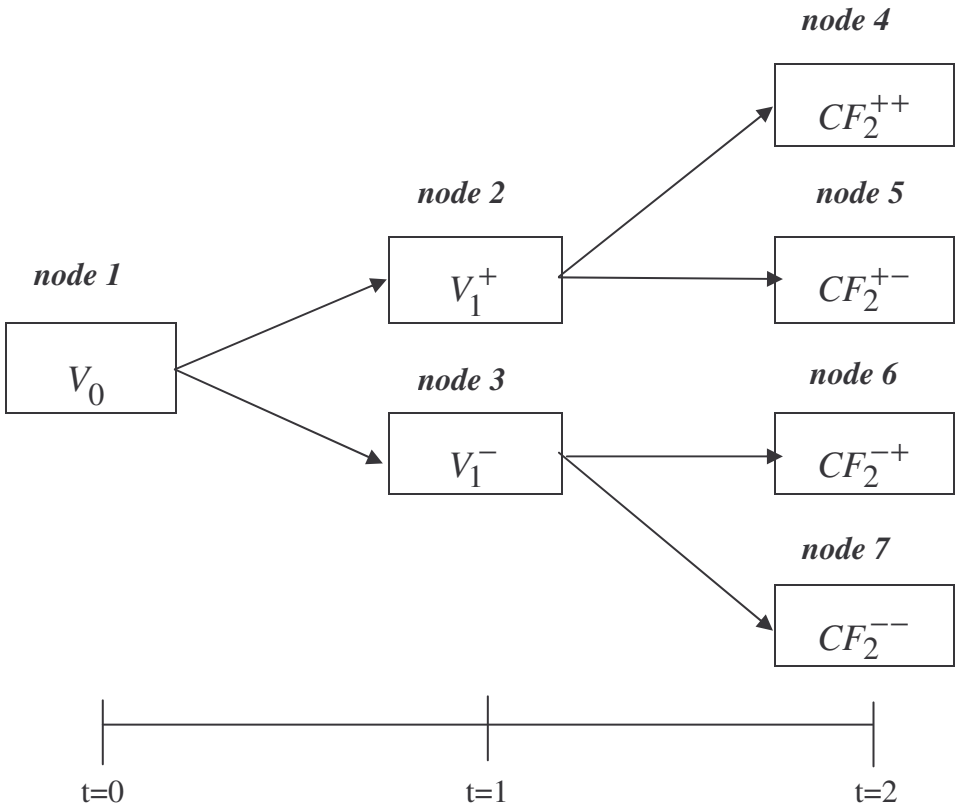

Figure 1: Event-tree showing the possible cash flows and values of the enterprise at each date in the two period case

This event-tree corresponds with a sequence of information partitions of the uncertain outcomes (states) at date t=2 in the two-period model[24]. As displayed in Figure 2, the information about the possible future states at date t=2 becomes progressively finer as time evolves. At date t=0, all the states 1, 2, 3, and 4 are possible states at date t=2. Moving from date t=0 to date t=1, and assuming for example that the upper branch of the event-tree has been chosen, additional information has been gained since now it is clear that only the states 1 and 2 are possible.

[24] For a formal definition of the concept of information partitions see Magill & Quinzii (1996), p. 215-216.

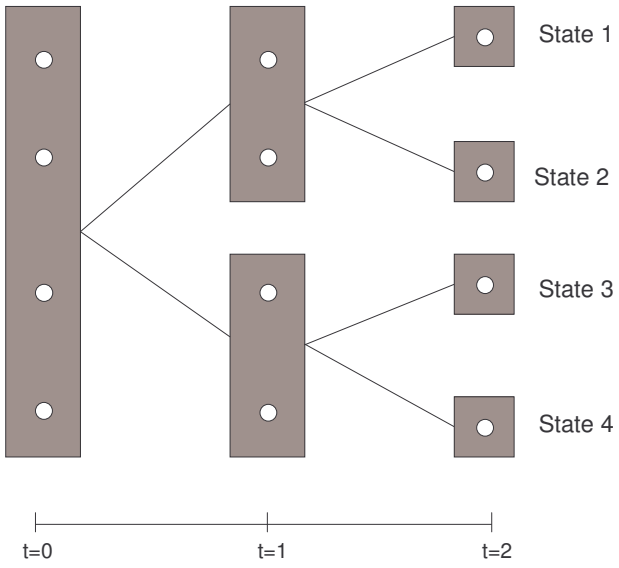

Figure 2: Sequence of information partitions

Using this way of modelling, and depending on the occurring state of nature at date t=1 (i.e. node 2 if good conditions occur or node 3 if bad conditions occur within the event-tree), a present value at date t=1 (V_1^+, V_1^-) can be calculated by discounting the relevant expected future cash flow (node 2: calculated from CF_2^{++}, CF_2^{+-}; node 3: calculated from CF_2^{-+}, CF_2^{--}), minus a risk premium, at the risk-free rate of return. Rolling back to date t=0 the value V_0 is calculated by discounting the expected value at date 1 (calculated from V_1^+, V_1^-) minus a risk premium at the risk-free rate of return.

4.3 Analysis of the relationship between credit risk, the fair (market) value of debt, and the debt-equity-ratio based on fair value measurement[25]

4.3.1 A changing fair value of debt as an indicator of changing credit risk under simplified conditions?

Credit risk is revealed by the probability distribution of future payments to the creditor. It is determined by the existence of future states within the event-tree in which the borrower becomes insolvent, by their respective probabilities, and by the amount that the creditor will be repaid in the case of insolvency[26]. So in this context the question arises whether changes in the fair value of debt can serve as a measure of changing credit risk or not.

According to the concept of value additivity the amounts of the fair values of the enterprise, and of debt and equity attributed to the respective nodes within the event-tree are calculated according to the following formula[27]:

$$V_t = \frac{E(\tilde{V}_{t+1}^{tot}) + E(\tilde{C}F_{t+1}^{tot})}{1+r_f} - \frac{\frac{\mu_M - r_f}{\sigma_M^2} * Cov(\tilde{V}_{t+1}^{tot} + \tilde{C}F_{t+1}^{tot}; \tilde{r}_M)}{1+r_f}$$

$$= \frac{E(\tilde{V}_{t+1}^{D}) + E(\tilde{C}F_{t+1}^{D})}{1+r_f} - \frac{\frac{\mu_M - r_f}{\sigma_M^2} * Cov(\tilde{V}_{t+1}^{D} + \tilde{C}F_{t+1}^{D}; \tilde{r}_M)}{1+r_f} \quad (1)$$

$$+ \frac{E(\tilde{V}_{t+1}^{E}) + E(\tilde{C}F_{t+1}^{E})}{1+r_f} - \frac{\frac{\mu_M - r_f}{\sigma_M^2} * Cov(\tilde{V}_{t+1}^{E} + \tilde{C}F_{t+1}^{E}; \tilde{r}_M)}{1+r_f}$$

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[25] The considerations in this paper concentrate on fair-value based capital structure information. For a detailed analysis concerning capital structure information based on book values see Schneider (1989).

[26] See Basel Committee on Banking Supervision (2001 b), par. 12.

[27] See for this formula as well as the underlying concept of value additivity Copeland & Weston (1988), p. 203.

where

CF_t^{tot}	=	a firm's cash flow at date t that is allocated to creditors and equityholders;
CF_t^D	=	cash flow received by creditors at date t;
CF_t^E	=	cash flow received by equityholders at date t;
V_t^{tot}	=	total value of the firm at date t;
V_t^D	=	value of debt at date t;
V_t^E	=	value of equity at date t;
$E(\tilde{V}_{t+1}^{tot})$	=	expected future value of the firm at the end of the period;
$E(\tilde{C}F_{t+1}^{tot})$	=	expected future cash flow of the firm at the end of the period;
r_f	=	risk-free rate of return;
$\tilde{r}_M$	=	the rate of return on the market portfolio;
$\mu_M = E(\tilde{r}_M)$	=	the required return on the market portfolio (expected rate of return);
$\lfloor E(\tilde{r}_M) - r_f \rfloor$	=	price of risk (slope of the security market line);
σ_M^2	=	the variance of the market portfolio's rate of return;
$Cov(\tilde{V}_{t+1}^{tot}; \tilde{r}_M)$	=	the covariance between the future value of the firm and the rate of return on the market portfolio;
$\frac{\mu_M - r_f}{\sigma_M^2}$	=	market price per unit of risk.

In order to identify possible rules that provide a general relationship between the fair value of debt and credit risk it is helpful look at a simplified scenario:

- An enterprise (the borrower) has issued zero-bond like debt (i.e. cash flows to the creditor only occur at the terminal nodes of the event tree at date t=N).
- The risk free rate of return (r_f) is equal to zero.
- Economic agents are risk neutral (i.e. there is no risk premium).

In this case, equation (1) can be reduced to the following expression:

(2) $V_t^{tot} = E(\tilde{C}F_N^{tot}) = E(\tilde{C}F_N^D) + E(\tilde{C}F_N^E)$

Then, under these assumptions, the market value of debt at every date is equal to the expected value of the future cash flow to the creditor.

Assuming additionally that for all future states at the final date within the event-tree in which the borrower becomes insolvent, the amount the creditor will be repaid is the same[28], leads to the following general if-then statement regarding the relationship between the development of the fair value of debt in time and the risk of default: If the fair value of debt increases then credit risk decreases since obviously the probability of default has decreased and vice versa.

If instead the assumption that for all future states in which the borrower becomes insolvent the amount the creditor will be repaid is the same, is dropped, then an increasing fair value of debt as time progresses does not necessarily go hand in hand with a decreasing probability of default and vice versa, because the effect of a changing probability of default may be outweighed by a higher or lower amount of money the creditor receives in the case of insolvency. So, since the market value of debt reflects the market's expectations regarding future payments to the creditor which are influenced by a mix of the probability of default and the respective amounts creditors are repaid if insolvency occurs, it is not possible to distinguish between these two sources of uncertainty based on observing a change in the market value of debt. There especially is no general rule that the probability of default increases as the volume of debt measured at fair value increases.

Figure 3 illustrates this: Although the amount of the expected future cash flow decreases if the upper subtree is chosen (increases if the lower subtree is chosen), the probability of insolvency remains unchanged no matter whether the lower or the upper subtree is chosen.

[28] For all future states at the final date in the event-tree in which the borrower will not become insolvent, the amount the creditor will be repaid is the same anyway since it is fixed by debt contract.

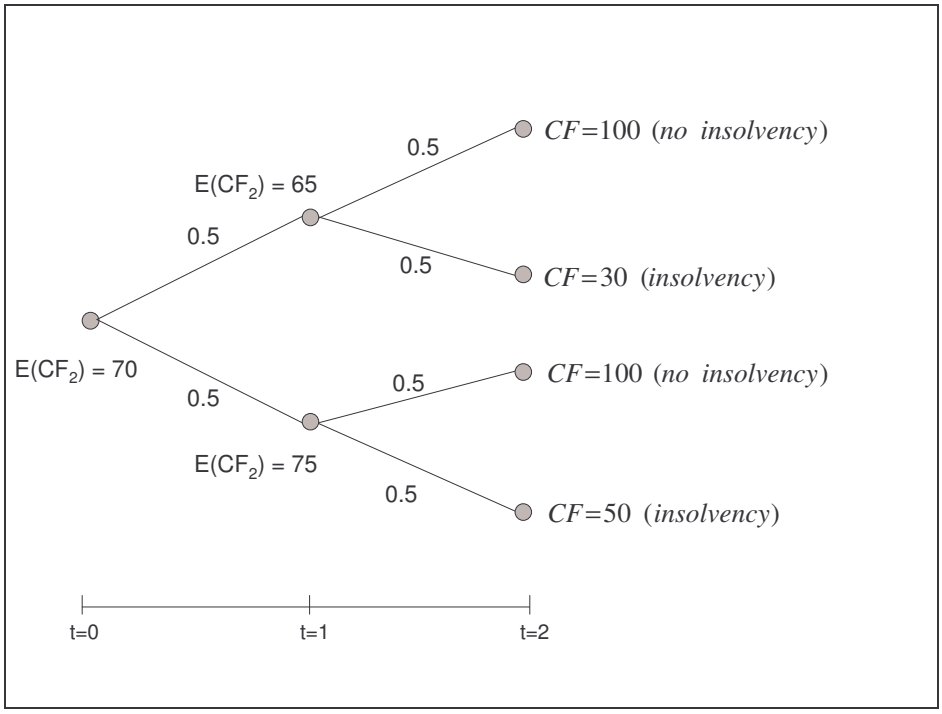

Figure 3: Interaction between creditors' expected cash flow at date t=2 and the probability of default

4.3.2 A changing debt-equity-ratio as an indicator of changing credit risk under simplified conditions?

In this section it is shown that there is no general relationship between the development of a firm's debt-equity-ratio and credit risk. The analysis is carried out within a two-period framework which is shown in Figure 4. The firm's cash flows at the respective states of nature (s) at the final date t=2 ($CF_{2,s}^{tot}$) are allocated to creditors ($CF_{2,s}^{D}$) and equityholders ($CF_{2,s}^{E}$). The same simplifying assumptions that were made in section 4.3.1[29] apply in this section.

[29] I.e. zero-bond like debt, a risk free rate of return (r_f) that is equal to zero, and risk neutrality.

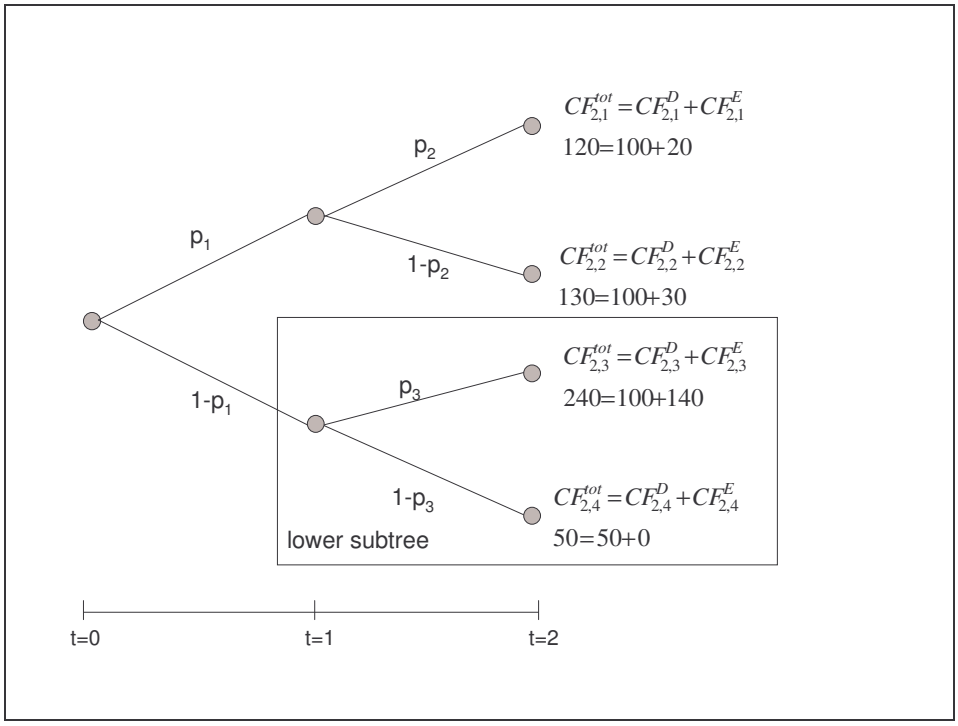

Figure 4: Future cash flows within the two-period time-uncertainty setting

The formal definition of the debt-equity-ratio (D/E-Ratio) and the relationship between the D/E-Ratio and the debt ratio[30] under the above made assumptions are shown in Equation (3):

$$D/E-Ratio = \frac{E(\tilde{C}F_N^D)}{E(\tilde{C}F_N^E)} = \frac{E(\tilde{C}F_N^D)}{E(\tilde{C}F_N^{tot}) - E(\tilde{C}F_N^D)} = \frac{E(\tilde{C}F_N^D) \Big/ E(\tilde{C}F_N^{tot})}{1 - E(\tilde{C}F_N^D) \Big/ E(\tilde{C}F_N^{tot})} \quad (3)$$

The debt ratio (D-Ratio) itself at date t=0 within the two-period scenario can be calculated according to equation (4):

[30] The debt ratio under a fair value measurement regime is equal to the ratio of the fair value of liabilities to the fair value of the firm. An increasing debt ratio leads to an increasing debt-equity-ratio and vice versa.

$$(4) \quad D-Ratio=\frac{p_1*p_2*CF_{2,1}^{D}+p_1*(1-p_2)*CF_{2,2}^{D}+(1-p_1)*p_3*CF_{2,3}^{D}+(1-p_1)*(1-p_3)*CF_{2,4}^{D}}{p_1*p_2*CF_{2,1}^{tot}+p_1*(1-p_2)*CF_{2,2}^{tot}+(1-p_1)*p_3*CF_{2,3}^{tot}+(1-p_1)*(1-p_3)*CF_{2,4}^{tot}}$$

If, for example, at date t=1 the lower subtree in Figure 4 is chosen then, since $p+(1-p)=1$, moving from date t=0 to date t=1 leads to equation (5) (the frames emphasise the relevant differences between the two equations):

$$(5) \quad D-Ratio=\frac{p_1*p_3*CF_{2,3}^{D}+p_1*(1-p_3)*CF_{2,4}^{D}+(1-p_1)*p_3*CF_{2,3}^{D}+(1-p_1)*(1-p_3)*CF_{2,4}^{D}}{p_1*p_3*CF_{2,3}^{tot}+p_1*(1-p_3)*CF_{2,4}^{tot}+(1-p_1)*p_3*CF_{N,3}^{tot}+(1-p_1)*(1-p_3)*CF_{2,4}^{tot}}$$

Under the additional assumption that $p_1 = p_2 = p_3 = 0.5$, all probability weights within the above terms amount to 0.25 and, as a consequence, the impact of differing probability measures of up- and downward movements within the event-tree for the calculation of expected values is eliminated. In this case the debt ratio as well as the debt-equity-ratio are only determined by the relationship between the sum of the debt related cash flows attributed to the respective states at date t=2, and the sum of the firm's total cash flows attributed to the respective states at date t=2. As a consequence, due to the asymmetric pattern of debt related cash flows[31], the sum of cash flows attributed to the enterprise may rise while the sum of debt related cash flows decreases, which leads to a decreasing debt ratio as well as a decreasing debt-equity-ratio, and therefore provides that there is a contradiction between the traditional capital structure hypothesis, stating that there is a negative correlation between the debt-equity-ratio and credit risk, and the result of the model. The calculation of the respective debt ratios at date t=0 and t=1, based on the numbers given in Figure 4, illustrates this, assuming that 100 is the amount of money that has to be repaid to creditors at date t=2:

t=0: $$\frac{0.25*(100+100+100+50)}{0.25*(120+130+240+50}=0.65$$

t=1: $$\frac{0.25*(100+50+100+50)}{0.25*(240+50+240+50}=0.52$$

[31] Due to the nature of debt a creditor at maturity is paid the amount of money that is fixed by the debt contract if no insolvency occurs. In this case, only equityholders benefit from cash flows that exceed the amount repayable to creditors. If, instead, a borrower becomes insolvent, then due to limited liability debtholders to a high degree bear the consequences.

Moving from date t=0 to date t=1, the debt ratio and, as a consequence, the debt-equity ratio decreases (0.52 < 0.65) while the probability of default increases (0.5 > 0.25), and the amount of creditors' expected future cash flow decreases (75 < 87.5). So credit risk increases.

On the other hand, an increasing credit risk may as well go hand in hand with an increasing debt-equity-ratio. This can easily be shown by modifying the scenario displayed in Figure 4:

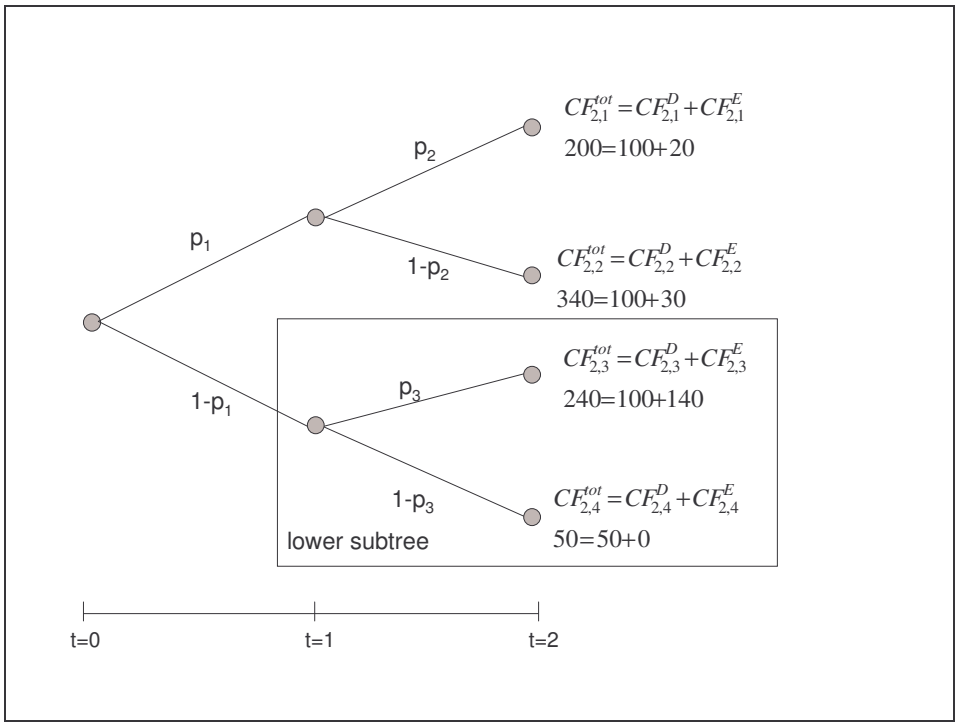

Figure 5: Future cash flows within a modified setting

Now, moving from date t=0 to date t=1, the debt ratio and, as a consequence, the debt-equity ratio increases (0.52 > 0.42) while the probability of default increases (0.5 > 0.25), and the amount of creditors' expected future cash flow decreases (75 < 87.5). So credit risk increases:

t=0: $$\frac{0.25*(100+100+100+50)}{0.25*(200+340+240+50} = 0.42$$

t=1: $$\frac{0.25*(100+50+100+50)}{0.25*(240+50+240+50} = 0.52$$

So even in this extremely simplified setting it is impossible to generate reliable what-if-statements regarding the impact of an observable change in a firm's debt-equity ratio on

the components of credit risk. Introducing the influence of different probabilities of upward and downward movements to the event-tree does not alter this result.

4.3.3 Consequences for a more general setting regarding the contractual structure of debt

In a more general setting compared to section 4.3.1 and 4.3.2, there is no formal relationship between a firm's capital structure, measured as its debt-equity-ratio on a fair value basis, and credit risk. If an enterprise has issued debt with contractual cash flows attributed to more than just the terminal date, and if the risk free rate of return (r_f) is greater than zero, and if eventually economic agents are risk averse (i.e. there is a positive risk premium), then there is not only an impact of the informational progress as time evolves on the market value of debt and the firm value[32], but also an impact of a positive interest rate and the timing of contractual cash flows attributed to individual debt contracts (and therefore the intertemporal allocation of risk) as well as the amount of risk premiums attributed to debt. More than this, the development of market parameters in time and payments to and from debtholders and equityholders, changing the amounts of issued debt and equity, influence the fair values of debt and equity which are presented on the face o a balance sheet under a fair-value measurement regime.

The formal structure of the present-value calculation according to equation (1) illustrates that the amount calculated refers to the present moment in time. To say that only fair values, in contrast to book values, are future-oriented[33], neglects that once the present value is calculated and disclosed, it is impossible for the user of this information to reassess the amounts, timing and uncertainty of future cash flows without access to the original underlying data required for the calculation. Capital structure disclosure exclusively based on fair values therefore represents the highest possible level of aggregation of information. This level of aggregation and the fact that fair values not only embody an assessment of the mere quantity of risk, but also a monetary valuation of risk, rather hinders than supports banks in their effort to make an appropriate assessment of credit

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[32] This informational progress was shown by the sequence of information partitions in Figure 2.

[33] See for example Shim & Larkin (1998), p. 40.

risk as a combination of the probability of default of a borrower and the amount of money a creditor would be repaid in the case of a borrower's default.

So using capital-structure information exclusively based on fair values for credit rating purposes may be misleading since banks as users of capital-structure information neither can identify the reasons for a reported change of the firm's capital structure nor are they able to draw reasonable conclusions regarding a borrower's credit risk.

4.4 Strategies to expropriate debtholders and the relevance of accounting for stewardship[34]

As there is no general formal rule that provides a link between a reported capital-structure change and the intertemporal development of debtholders' risk, what remains as a basis for deriving if-then statements and potential capital-structure management rules results from the options analogy of equity and the fact that management can pursue financial strategies that make it possible to expropriate debtholders in order to increase shareholders' wealth[35]. So it is important to find if-then statements that help debtholders to build prospective covenants (or internal capital management requirements), and, as a consequence, are helpful in preventing management from employing strategies that lead to debtholder expropriation. Prospective covenants as well as internal capital-management requirements only make sense if debtholders are able to monitor management's compliance with these rules. This leads to accounting for stewardship as a major function of financial reporting.

Fundamental and well known strategies of debtholder expropriation are:

- the strategy of risk shifting (asset substitution), and
- the strategy of paying dividends to equityholders financed by incurring additional debt or partly selling the firm's assets.

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[34] At this point the ideal world of perfect capital markets is left behind. Nevertheless, as it is usual in the field of corporate finance, the formal instruments for calculating present values of uncertain future cash flows are still used although they are designed for the environment of perfect capital markets.

[35] See section 4.1 regarding these aspects.

Both are convenient ways to raise the current value of equityholders' option to default at a future date or to reduce the financial input of equityholders which leaves a greater portion of risk with the debtholders.

Pursuing a strategy of risk shifting allows management to transfer risk from equityholders to debtholders by choosing high risk projects. Finding protective covenants against this strategy, however, most likely is not practicable since the degree of risk of an investment project is not easy to measure, and since it is impossible to tell whether an investment project is chosen just in order to shift risk to debtholders or as a result of investors' risk attitude.

As far as debtholder expropriation strategies by paying dividends to equityholders are concerned, finding protective covenants is possible. If management incurs additional debt, or partly liquidates the firm's assets, and uses this additional cash amount to finance a dividend payment to equityholders then, according to the value-additivity principle ($V_t^{tot} = V_t^E + V_t^D \Rightarrow \Delta V^{tot} = \Delta V^E + \Delta V^D$), the result is a redistribution of wealth from those debtholders who already held claims before management's action to equityholders. This is because the market value of equity goes down by less than the amount of the dividend payment[36].

As a consequence, potential debtholders could impose two restrictions to a borrower's capital structure management:

1. Additional debt, incurred by management, must lead to an increase of the firm value by the same amount and therefore has to be spent as an investment outlay in order to prevent management from using this additional debt for a dividend distribution payment. The rationale behind this restriction that limits debt expansion to an increase of the firm value is as follows: Violating this restriction means reducing the (present) discrepancy between the firm value and the market value of debt that matures in the future. The firm value here serves as a "cushion" that keeps equityholders' option to default out of the money[37]. At the same time, violating this restriction means to raise the exercise price of equityholders' option to continue operations (to repurchase the right to further control the enterprise).

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[36] See the illustrating examples at Franke & Hax (2004), p.431 – 435.

[37] See section 4.1 for the options analogy of equity claims.

2. It is necessary to add a restriction to prevent management from pursuing a dividend induced expropriation strategy where the dividend payment is financed by abandoning certain investment projects for their resale value. So the amount of a dividend payment at the end of a period should be limited to the amount of a previous increase of the total firm value resulting from the firm's investments.

Of course there can be no guarantee that management's compliance with the above restrictions will keep equityholders' default option out of the money. Furthermore, the risk debtholders are facing can of course change in time due to the risk characteristics embodied in the event-tree. Despite these limitations both restrictions may serve as a first step to formulate financial covenants that protect creditors by reducing the chances for management to intentionally expropriate debtholders by altering the firm's financial structure[38].

The numerical example in the following section 4.5 illustrates the considerations within the previous sections 4.1 to 4.4, before suggestions regarding a set of information that meet the requirements resulting from the idea of ex post monitoring management's behaviour are then made in section 5.

4.5 A numerical example[39]

Initial scenario: Underlying assumption of the following considerations is that there is an arbitrary enterprise that is founded at date t=0, with a useful life of two periods (until t=2). Management, representing the enterprise's owners, acts in the owners' interest and therefore aims at the maximisation of shareholder value.

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[38] The suggestions made here in principle are in line with the ideas of the High Level Group to replace the system of legal capital in order to protect creditors by a solvency test: Creditors can be better protected if an adequate solvency test is developed. According to a solvency test, a company can only make distributions to shareholders if the company remains solvent after the distribution." See High Level Group (2002), p. 78. But the required balance sheet test or net assets test which requires assets to fully cover or exceed liabilities after a dividend distribution does not cover the risk of expropriation creditors are bearing.

[39] The example is based on Drukarczyk (1993), p. 283. All calculations required for this numerical example are shown in the appendix.

Under the additional assumption that investment and financing decisions only are made at date t=0, and that there are no intermediate payments until t=2, the enterprise can be described by its cash flows (CF) and the probabilities (p) attributed to the nodes within the event tree in Figure 6.

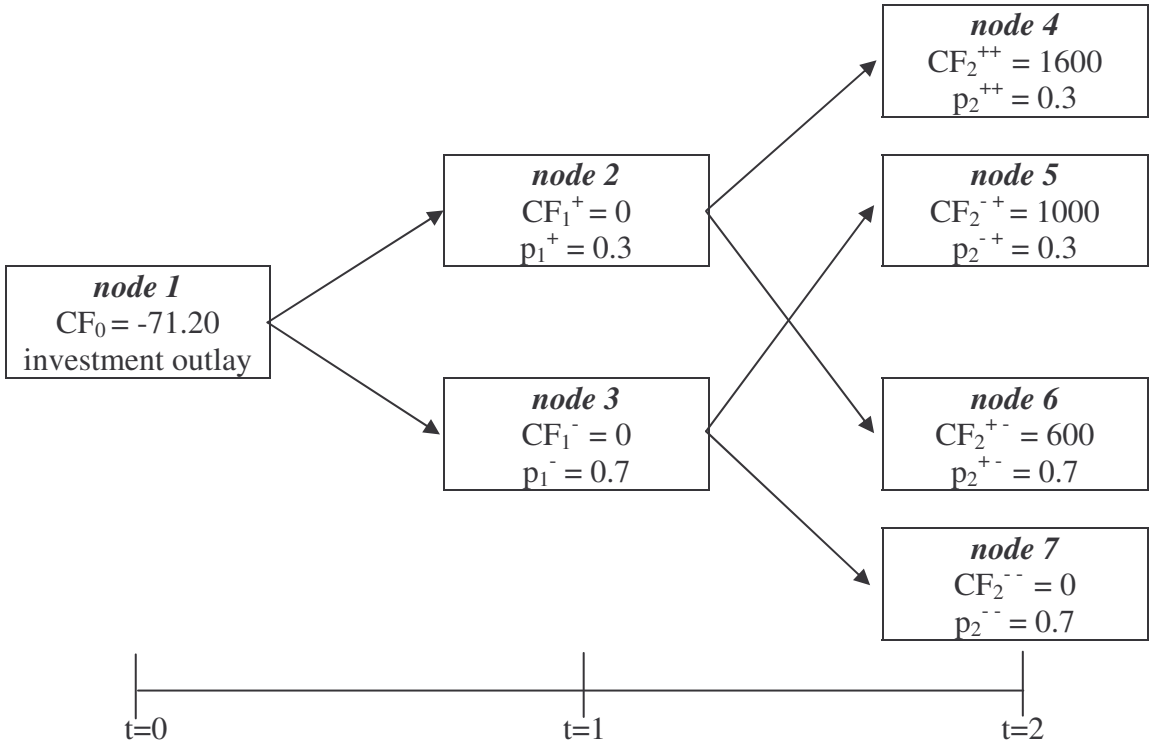

Figure 6: Cash flows of the enterprise and the probabilities attributed to the future states of the world

The investment is financed by issuing common stocks and raising a bank loan. Having homogenous expectations regarding the future cash flows resulting from the investment, equityholders and bank A each make a contribution to the investment outlay that amounts to the fair value of their respective claim at date t=0, as shown in Figure 7. So the bank's contribution to the investment outlay at date t=0 amounts to 47.73, assuming that its contractual claim at date t=2 is a payment of 550.

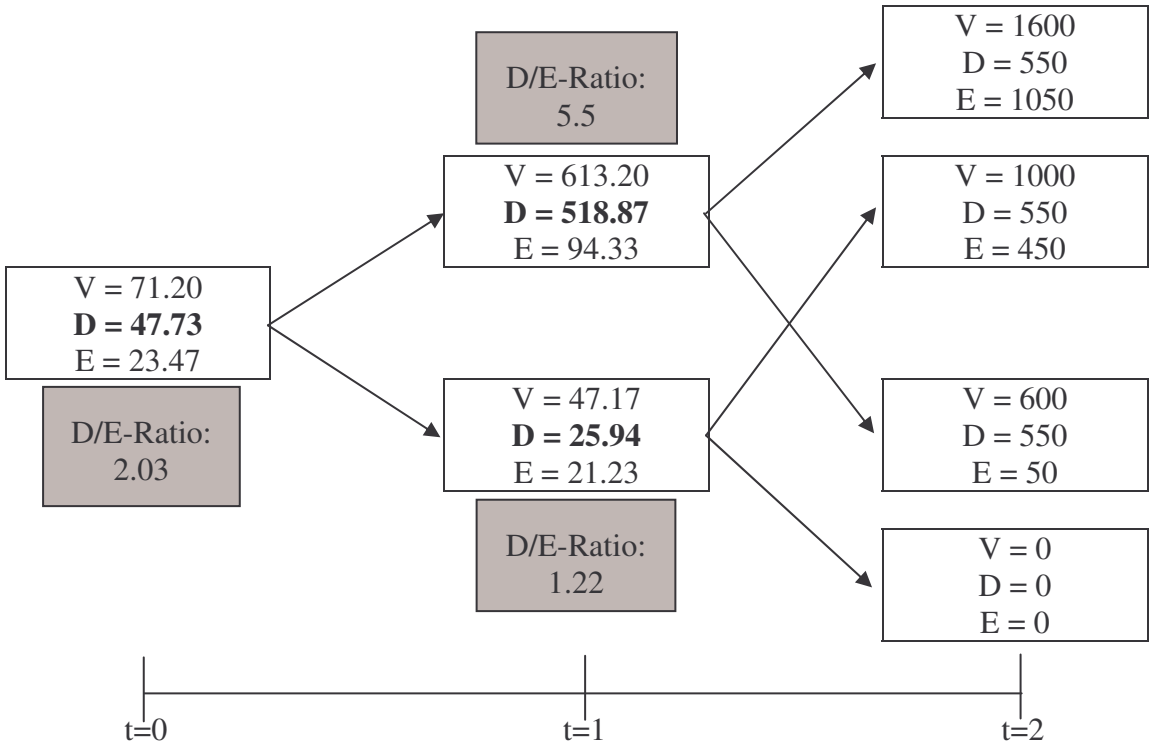

Figure 7: Fair values of the firm, fair values of debt and equity, and the resulting debt-equity ratios (D/E-Ratio)

At date t=1 bank A wants to identify whether its risk has changed or not. It is provided the financial statements of the enterprise for the first period. The balance sheet is prepared by applying the full fair value approach of measurement. The bank is familiar with the traditional capital-structure hypothesis stating that an increasing debt-equity ratio (D/E-Ratio) indicates a deterioration of the enterprise's financial position and therefore an increasing credit risk and vice versa.

Figure 7 shows that in contrast to the traditional capital-structure hypothesis, reassessing the enterprise's risk of default, based on its fair value measured capital structure, would be misleading: If management reports an "improved" capital structure (i.e. the debt-equity ratio drops to 1.22), the bank's risk, measured by the probability that insolvency occurs at date t=2, increases[40]. If, instead, the debt-equity ratio increases (5.5) the risk decreases (in this particular situation there is no risk at all).

[40] For a similar argumentation referring to the interaction between the amount of debt (instead of the debt-equity ratio) and the enterprise's credit standing, see for example Starbatty (2001), p. 549.

On the other hand the bank, being reported the value of the enterprise, the settlement value of the loan in the case of early settlement (162.20[41]), and the assumed salvage value of the firm's assets (60) at date t=1 will conclude that management while not exercising the option to switch from the "continuing mode" to the "liquidation mode" if node 3 occurs clearly acts against the bank's interest[42]. Therefore, reducing capital-structure information to a fair value based debt-equity ratio furthermore helps management to conceal that it acted against the bank's interest by not liquidating the enterprise at date t=1. Only if the bank has detailed information, corresponding with the options nature of equity, it might demand to renegotiate the terms of credit or even withdraw the money if the credit contract comprises appropriate covenants.

It might be argued that the options analogy is not needed because the change of the sheer amount of debt, measured at its fair value and so indicating a gain or a loss of the bank's wealth, is an appropriate indicator of the bank's risk position. For the given situation this is true since the bank's risk, again measured by the probability that insolvency occurs at date t=2, increases as the fair value of debt decreases and vice versa. But this cannot be generalised as is shown by the following modification.

First modification: It is now assumed that management immediately after date t=0 raises another (risk free) loan from a different bank B (so that bank A has no information about this additional transaction), maturing immediately after date t=1[43]. This additional loan is used to finance an additional one-period investment. The resulting distribution of cash flows immediately after date t=1 to the enterprise (1300 if node 2 occurs,

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[41] According to the "zero-bond-like" time structure of payments this amount can be calculated as follows: $\sqrt{\frac{550}{47.73}} - 1 = 2.3945$. So the contractual rate of return amounts to 239.45 %, and the amortised amount at date t=1 is equal to 162.20.

[42] Liquidation in this situation clearly would make sense since the liquidation value (60) exceeds the value of the enterprise if operations continue (47.17). Only due to the options nature of equity, management, acting in the shareholders' interest, decides to continue operations. Nevertheless in this particular situation managements decision does not deteriorate bank A's position since management's behaviour was anticipated by bank A at date t=0.

[43] The amount to be paid to bank B after date t=1 being 300, and the riskless rate of return being 6 %, this additional credit amounts to 283.02 (= 300/1.06) since there is no default risk.

300 otherwise), and to the second bank B (300) as well as dividend distribution payments to equityholders (1000 if node 2 occurs, 0 otherwise) are shown in Figure 8.

As a consequence of this modification the fair value based debt-equity ratios at date t=1 immensely differ from those in the initial scenario, although the risk situation from bank A's perspective has not changed at all. Looking at the total amount of debt, measured at its fair value at date t=1 if node 3 occurs, it is almost seven times as high as at date t=0, which one would expect to indicate an improved credit standing. However, the risk in fact has increased.

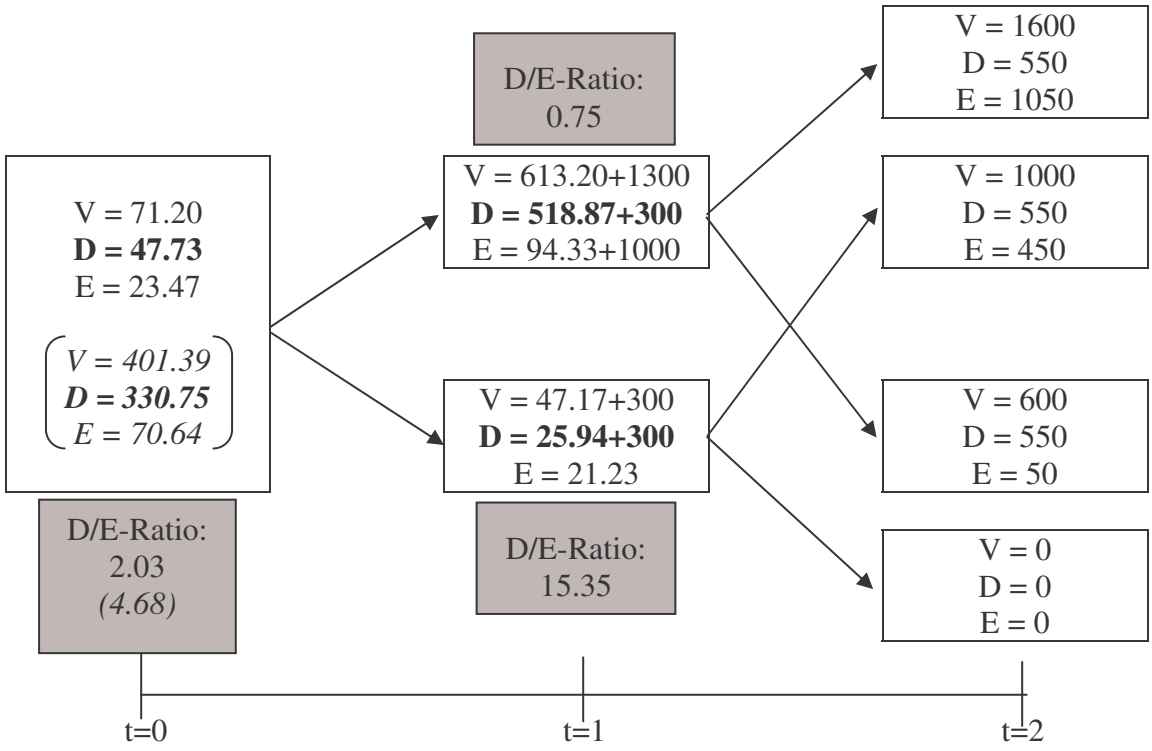

Figure 8: Modified amounts under the assumption of intermediate payments (The figures in parenthesis and italics at date t=0 represent the amounts taking into account the decisions made by management immediately after date t=0.)

Second modification: Based on the situation described within the initial scenario, management now intentionally at date t=1 alters the firm's capital structure if node 2 occurs in order to maximise shareholder value. The firm receives an additional amount of debt from bank B, promising a contractual payment of 450 at date t=2 (which is equal to 45% of the total amount of debt outstanding at date t=2).

Both credits are of the same priority, i.e. none of the loans is classified as preferred debt in the case of insolvency. Therefore, bank B receives an amount of 270 in the case of insolvency (45% of the total payments to creditors, i.e. 0.45*600 = 270). So the fair value (present value of the future payments relating to Bank B's loan) of this additional

loan at date t=1 amounts to 263.21 (0.45*584.90). The additional loan is not used for any investment but for a dividend payment to equityholders shortly after the balance-sheet date t=1. The fair value of bank A's loan amounts to 321.70 at date t=1 (0.55*584.90).

This is displayed in Figure 9. The amounts related to date t=0 do not include management's flexibility option to act the way described, and management's action was unforeseeable for bank A (otherwise bank A would not have given the loan, or at least it would have done so on different terms).

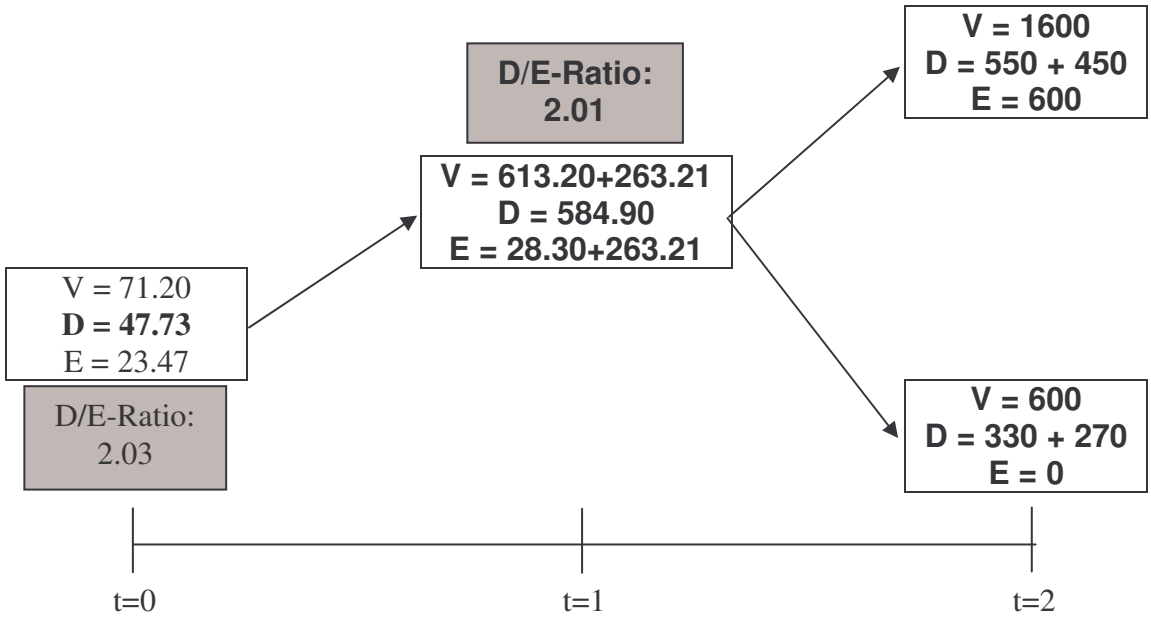

Figure 9: Modified amounts at dates t=1 and t=2 under the assumption that management incurs additional debt if node 2 at date t=1 occurs, and before dividend distribution to equityholders

Management's action cannot directly be observed by bank A, but the consequence regarding the fair value-based capital structure is reported on the face of the balance sheet. The debt-equity ratio compared to date t=0 has remained almost unchanged, so that according to the traditional capital-structure hypothesis the credit risk from bank A's perspective has not changed as well. In addition to this, the debt-equity ratio compared to the initial scenario is much lower (2.01 compared to 5.5) which might lead to the conclusion that there is lower risk. This assessment is definitely wrong.

Revealing the firm's new capital structure measured at fair values cannot be accepted as an appropriate signal indicating the significant change of bank A's risk position. While within the initial scenario the debt-equity ratio increases although the risk bank A is facing is equal to zero, now the debt-equity ratio remains at the level of about two al-

though bank A is now facing a considerable risk that the enterprise will default on providing the amount obliged to pay at date t=2 (550). Also the increasing fair value of all issued debt (47.73 at date t=0; 584.90 at date t=1) is in contrast to bank A's risk position[44].

Furthermore, management under these circumstances is able to enhance shareholders' wealth at the cost of bank A: Bank A suffers a loss that amounts to 197.17 (= 518.87 – 321.70), while there is an increase of equityholders' wealth by exactly the same amount (197.17 = 263.21 + 28.30 – 94.34). So again (as within the initial scenario), pure fair value accounting helps management to conceal that it acted against bank A's interest by its financing decision.

If, instead, bank A can at date t=1 observe the firm value, the fact that new debt has been issued (settlement value of both loans: 425.41 = 162.20 + 263.21), and the (proposed) dividend to equityholders to be paid shortly after the balance-sheet date t=1, it will be able to identify management's strategy to transfer wealth from bank A to the equityholders.

The example demonstrates that changes in a firm's capital structure, or changes in the sheer amount of debt measured at fair value do not reliably reflect changes in the probability distribution of uncertain future cash flows to creditors.

5. Consequences for financial reporting

According to the considerations within the previous sections, accounting information, or more generally financial reporting information, should primarily reveal the impact of past management decisions on the variables that are relevant for equityholders options and the financial restrictions discussed above. Capital structure issues have to be defined in a broader way, and are not limited to the amounts and the relationship of debt and equity, but include the total firm value as a relevant parameter as well. Only if creditors are provided comprehensive information regarding the firm's investment pro-

[44] It is assumed that accounting information does not provide information that makes it possible for (potential) creditors to separate the total fair value of debt into the individual fair values of existing debt contracts.

jects as well as debt and equity, they can draw conclusions about what management has done in the past, and what this might mean for the future.

Therefore, disaggregated information has to be provided that enables (potential) creditors to consider possible ways to reduce credit risk when making credit decisions (e.g. to formulate protective restrictions to management's financial policy) or decisions subsequent to an initial decision to grant a loan (e.g. to withdraw the money early in the case of violation of such restrictions). Then capital-structure information in this broader sense would facilitate the analysis of changes in creditors' risk position. The term "disaggregated" as used here means that capital structure information should comprise the following components:

1. Information regarding the total firm value and the firm's assets

Information regarding the market value of the firm, according to the value additivity principle representing the sum of creditors' and equityholders' claims, is essential because it, given a certain amount of debt issued, largely determines whether equityholders' option to continue operations is in the money or not. According to IAS/IFRS, including IFRS 7[45], any disclosure regarding the development of the firm value is not mandatory, although many firms voluntarily reveal firm value information (value reporting).

If, however, firm value information is provided in accordance with the traditional discounted-cash-flow model[46] there has to be taken into account that there are certain restrictions to the model: The value of management's flexibility options to alter the firm's investment and financing policy in the future are not captured by the model[47]. So the

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[45] The IASB in August 2005 published as a new International Financial Reporting Standard IFRS 7: Financial Instruments: Disclosures, with the intention to streamline existing disclosures in IAS 30 and IAS 32 and remove unnecessarily onerous or duplicative disclosures. By applying the rules of IFRS 7, IAS 32, par. 51-95 (disclosure) are superseded.

[46] The expected future cash flows to the entity are discounted by the entity's weighted average cost of capital (WACC) (T_C being the corporate tax rate, and r_d (r_E) the cost of debt (equity)): $WACC = r_D(1-T_C)\frac{D}{V} + r_E\frac{E}{V}$. See Brealey & Myers (2003), p. 525.

[47] For employing the WACC formula in a multiperiod context, the firm's capital structure has to remain unchanged. See Brealey & Myers (2003), p. 535.

discounted-cash-flow model implicitly assumes that management is committed to a given investment and financing strategy without the possibility of adapting financial strategies to unexpected market developments[48]. Furthermore, equityholders' options to abandon the firm's operations permanently in the future are not captured: Since calculating the present value of the firm's future cash flows by discounting them at the firm's WACC requires a given number of periods in which the firm operates, the owner's flexibility to shut down operations is not included. In order to avoid misleading interpretations the assumptions underlying the concrete calculation of the discounted cash flow have to be revealed.

Since reporting the firm value and its changes in time describes highly aggregated information, supplementary information regarding transaction driven changes in the carrying amounts of assets, and an analysis of the firm's assets measured at their resale prices is necessary. Such information might be presented in the form of a reconciliation of the respective amounts at the beginning and the end of the period, showing the reasons for changes in those amounts as it is for example required by IAS 16, par. 73 (e) for property, plant, and equipment.

2. Development of creditors' claims (liabilities)

Detailed information related to the firm's development of debt is necessary in order to separate transaction driven changes in debt (i.e. issuing additional debt or repayment of debt) from changes that are the result of the (market) valuation process. According to the options analogy of equityholders' claims both the settlement (book) value and the market (fair) value of outstanding debt at the balance sheet date are important since they have an impact on equityholders' options.

Following the structure suggested in Table 1, both the impact of management's financing decisions and of the market-valuation process on the amounts and the structure of debt have to be revealed.

[48] See Trigeorgis (1997), p. 1.

Liabilities							
(classified by date of maturity)[49]	Settlement value at January 1[50]	Fair value at January 1	Increase by issuing additional debt instruments	Increase due to contractual interest (amortised cost using the effective interest method)	Decrease due to repayment of debt and interest payment	Settlement value at December 31	Fair value at December 31
. . .							

Table 1: Development of creditors' claims (liabilities)

Having access to this kind of information ad a detailed quantification of changes in the fair value by cause[51], (potential) creditors under ideal circumstances are able to separate changes in a liability's fair value as a result of changes in market parameters from changes which result from changes in expectations regarding the future cash flows from the liability, and from changes caused by cash receipts and payments[52].

A special aspect regarding measurement of debt refers to convertible debt. In the case of convertible debt so called split accounting which follows the idea of fair value measurement, and which according to IAS 32.29 is mandatory for accounting purposes must not be applied for the purpose of the statement of changes in a firm's equity and liabilities. This is because as long as the option to convert is not exercised, the amount required for early settlement in the case of liquidation is not the fair value of the separated debt component but the amount received at the date of issuing the convertible instrument.

Referring to the numerical example in section 4.5, a creditor (or potential creditor) could learn from the above described disclosures what has happened to the firm's finan-

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[49] A maturity analysis for financial liabilities is required by IFRS 7, par. 39.

[50] The settlement value is equal to the book value, applying the effective interest rate method.

[51] See IASB (2006): Staff Request for Information about Financial Analysis of Companies that report some or all Financial Instruments at Fair Value.

[52] According to IFRS 7, par. 10, an entity has to disclose the amount of change in the fair value of the liability that is attributable to changes in the credit risk of that liability.

cial structure, and if it is the result of management's decision making or a change of market appraisal. He, being provided this disaggregated information for the first period, would be able to conclude whether management acted in contrast to the original creditor's (bank A) interests by exploiting its wealth position or not.

3. Development of owners' equity

Reporting changes in equity according to IAS 1, par. 96 – 101, additionally showing planned or proposed dividend payments to shareholders, facilitates distinguishing between capital transactions between the firm and its owners on the one hand and gains and losses on the other hand.

4. Internally imposed targets regarding the development of the firm's financial structure

With the amended IAS 1, par. 124A-124C, the IASB for the first time requires special disclosures regarding an entity's capital. These disclosures comprise information about management's "objectives, policies and processes for managing capital". The illustrating example in the supplementary Guidance on Implementing IAS 1(IG 5 - 6) demonstrates what the IASB obviously had in mind when it formulated these capital disclosure requirements: the management of capital, based on a debt-to-adjusted capital ratio.

This may be a useful strategy in order to maintain a certain credit rating, assuming that rating agencies or banks rely on this ratio as a means of measuring financial stability. But the issue of measurement of assets (since this determines the amount of equity presented on the balance sheet) and liabilities remains unmentioned. The considerations in section 4, however, show that the debt-to-equity ratio (or a debt ratio) in the case of fair value accounting is not a reliable measure for a firm's ability to repay creditors. So without explicitly taking into account the aspect of measurement of debt and equity on the face of the balance sheet, such a capital-structure target must be a doubtful tool.

Instead of imposing a capital target that relies on a debt-to-equity ratio, restrictions that have the power to prevent management from realising certain financial strategies that shift wealth from creditors to equityholders should be preferred. As shown in section 4.4, such restrictions should refer to a dividend and debt policy that management intends to implement, and which creates a link between dividend payments and debt transactions on the one hand, and changes in the value of the firm on the other hand. This, in turn, would enable creditors to monitor dividend payments and to separate

"regular" dividend payments from "irregular" dividend payments, which possibly lead to creditor expropriation.

6. Summary and outlook on future research

In an environment that strongly requires and supports value-oriented management concepts, and that, as a consequence, develops capital-market oriented accounting concepts, the fair value method of measuring assets and liabilities seems to be the more appropriate option compared to using "old fashioned" book values. Therefore, fair values play a more and more important role within the international standard setting process.

In this context recent accounting literature often argues that only fair values can be relevant for users of accounting information since they incorporate and reflect all relevant information about an enterprise's future cash flows, in contrast to book values which are assumed to be history oriented.

This article examines the possible impact of a full fair value approach of measurement on capital-structure information used for credit decisions and, therefore, for banking supervision. It is shown that besides the problems concerning the practical determination of fair values as well as the existence of the so called mixed-accounting model, there are more fundamental aspects that make an intended full fair value approach a questionable issue. The core arguments against the exclusive disclosure of a fair value based capital structure are the following:

1. Traditional patterns of financial-statement analysis like the capital structure hypothesis, maintaining an increasing default risk as the debt-equity ratio increases and vice versa, lead to wrong conclusions under a full fair value measurement regime.

2. The formal analysis in this paper was conducted under the assumption of perfect markets which made it possible to employ the Capital Asset Pricing Model as an instrument of deriving fair values. If even under these ideal and simplified conditions capital structure information based on fair values of debt and equity only is not appropriate to assess creditors' risk since there are no general formal patterns that make it possible to conclude from a fair value based capital structure observation how credit risk develops in time.

3. Measuring and disclosing the amounts of debt and equity only at their respective fair values provides highly aggregated information which helps management to conceal the sources of uncertainty a creditor is facing, and it hinders financial reporting information to reveal management's behaviour under the aspect of management's stewardship and accountability.

4. The options analogy of financial claims provides a framework for capital-structure analysis that disaggregates information in a way so that it is possible to appropriately consider the aspect of management's stewardship and to identify and separately analyse sources of uncertainty a creditor is facing which relate to the future behaviour of management and equityholders.

5. Statements in literature that suggest that only fair values contain future oriented information and therefore have to be preferred oversimplify the problem of conducting financial-statement analysis. The qualitative characteristics of the information needed by financial analysts depend on the field of financial-statement analysis: So for the special field of capital-structure analysis, providing only fair values of debt and equity and using them for calculating financial ratios like the debt-equity ratio might be a dangerous practice.

6. Due to the options like character of equity, capital-structure information to be relevant for credit decision making comprises value information relating to the enterprise as a whole as well as to debt and equity, and it is a mix of fair values and book values.

7. Furthermore, book values (= settlement values) of debt are of high importance since they are under management's control, and they are essential for monitoring management's compliance with financial covenants (or, alternatively, with internally imposed targets regarding the development of the firm's financial structure). Therefore, disclosing book values might as well influence management's future behaviour regarding financial decisions since reputation in the credit market is a factor not to be neglected.

It is not maintained in this paper that an overall assessment of benefits and costs of a full fair value approach necessarily leads to the conclusion that full fair value accounting finally is disadvantageous. So it is not a call for returning to "old fashioned" book values. Rules regarding measurement on the face of the balance sheet cannot be judged taking only into account the aspect of presenting capital structure information. Due to

the technique of double entry accounting the balance sheet as well as the profit and loss account reveals an enterprise's income. Therefore, measurement rules have to be developed that take into account the prevailing fundamental concept of income underlying the preparation of financial statements as well as the prevailing concept of presenting risk-management strategies on the face of the balance sheet and the income statement. If, for reasons that result from given concepts of income and presentation of risk management, a full fair value approach is required, capital-structure information to be independent of these aspects should be presented by a separate and comprehensive statement of changes in a firm's equity and liabilities, supplemented by firm value information.

Additional research should deal with the following aspects:

- providing reliable firm value information and fair values of debt;
- a more detailed analysis under what circumstances changes in market value of debt in time indicate changes in credit risk;
- the possible impact of terms and conditions of loan agreements or bond indentures (e.g. collateral, and degree of priority of debt) on equityholders' options and therefore on the assessment of creditor's exposure in the case of default;
- the possible impact of risk management strategies (hedging) on capital structure issues;
- the issue of adequately defining equity and so distinguishing between debt and equity, and finally
- the consequences of adding provisions and contingent liabilities to the analysis.

Appendix: Calculations required for the numerical example used in the text

The amounts of the value of the enterprise, and of debt and equity attributed to the respective nodes of the event tree are calculated according to the following formula[53]:

$$V_t = \frac{E(\tilde{V}_{t+1}) + E(\tilde{C}F_{t+1}) - \frac{\mu_M - r_f}{\sigma_M^2} * Cov(\tilde{V}_{t+1} + \tilde{C}F_{t+1}; \tilde{r}_M)}{1 + r_f}$$

where

V_t = value of the firm at date t;

$E(\tilde{V}_{t+1})$ = the expected future value of the firm at the end of the period;

$E(\tilde{C}F_{t+1})$ = the expected future cash Flow of the firm at the end of the period;

r_f = risk-free rate of return, assumed to be 6 % in both periods;

$\tilde{r}_M$ = the rate of return on the market portfolio, in both periods assumed to be 25 % if the market moves up, and 5 % if the market moves down;

$\mu_M = E(\tilde{r}_M)$ = the required return on the market portfolio (expected rate of return), assumed to be 11 % in both periods;

$\lfloor E(\tilde{r}_M) - r_f \rfloor$ = price of risk, slope of the security market line;

σ_M^2 = the variance of the market portfolio's rate of return, assumed to be 0.0084 in both periods;

$Cov(\tilde{V}_{t+1}; \tilde{r}_M)$ = the covariance between the future value of the firm and the rate of return on the market portfolio.

$\frac{\mu_M - r_f}{\sigma_M^2}$ = market price per unit of risk, assumed to be 5.95238 in both periods.

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[53] See Copeland & Weston (1988), p. 203.

As a result, the amounts displayed in tables 2 – 4 are calculated for the time-uncertainty setting shown in Fig. 1 and for the three scenarios distinguished in the text in section 4.3.

Initial scenario:

Fair values at node 2:			
	Enterprise	Debt	Equity
Cash flow at node 4	1600.00	550.00	1050.00
Cash flow at node 6	600.00	550.00	50.00
Expected Cash Flow	900.00	550.00	350.00
$Cov(\tilde{C}\tilde{F}_2;\tilde{r}_M)$	42	0	42
Present value (= fair value) at node 2	613.20	518.87	94.33
Fair values at node 3:			
	Enterprise	Debt	Equity
Cash flow at node 5	1000.00	550.00	450.00
Cash flow at node 7	0.00	0.00	0.00
Expected Cash Flow	300.00	165.00	135.00
$Cov(\tilde{C}\tilde{F}_2;\tilde{r}_M)$	42	23.1	18.9
Present value (= fair value) at node 3	47.17	25.94	21.23
Fair values at node 1:			
	Enterprise	Debt	Equity
Fair value at node 2	613.20	518.87	94.33
Fair value at node 3	47.17	25.94	21.23
Expected Fair value	216.98	173.82	43.16
$Cov(\tilde{V}_1;\tilde{r}_M)$	23.774	20.703	3.071
Present value (= fair value) at node 1	71.20	47.73	23.47

Table 2: Calculation of market values of the firm as a whole and of debt and equity at the initial scenario

First modification:

Fair values at node 2:			
	Enterprise	Debt	Equity
Cash flow at node 2	1300.00	300.00	1000.00
Cash flow at node 4	1600.00	550.00	1050.00
Cash flow at node 6	600.00	550.00	50.00
Expected Cash Flow	900.00	550.00	350.00
$Cov(\tilde{CF}_2;\tilde{r}_M)$	42	0	42
Present value (= fair value) at node 2	613.20 + 1300.00 = 1913.20	518.87 + 300.00 = 818.87	94.33 + 1000.00 = 1094.33
Fair values at node 3:			
	Enterprise	Debt	Equity
Cash flow at node 3	300.00	300.00	-
Cash flow at node 5	1000.00	550.00	450.00
Cash flow at node 7	0.00	0.00	0.00
Expected Cash Flow	300.00	165.00	135.00
$Cov(\tilde{CF}_2;\tilde{r}_M)$	42	23.1	18.9
Present value (= fair value) at node 3	47.17 + 300.00 = 347.17	25.94 + 300.00 = 325.94	21.23
Fair values at node 1:			
	Enterprise	Debt	Equity
Fair value at node 2	1913.20	818.87	1094.33
Fair value at node 3	347.17	325.94	21.23
Expected Fair value	816.98	473.82	343.16
$Cov(\tilde{V}_1+\tilde{CF}_1;\tilde{r}_M)$	65.774	20.703	45.071
Present value (= fair value) at node 1	401.39	330.74	70.64

Table 3: Calculation of market values of the firm as a whole and of debt and equity at the first modification

Second modification:

Fair values at node 2:			
	Enterprise	Debt	Equity
Cash flow at node 2	263.21	-	263.21
Cash flow at node 4	1600.00	1000.00	600.00
Cash flow at node 6	600.00	600.00	0.00
Expected Cash Flow	900.00	720.00	180.00
$Cov(\tilde{CF}_2; \tilde{r}_M)$	42	16.8	25.2
Present value (= fair value) at node 2	613.20 + 263.21 = 876.41	584.90	28.30 + 263.21 = 291.51

Table 4: Calculation of market values of the firm as a whole and of debt and equity at the second modification

Due to the assumption that none of the loans is subordinated, bank A's share of the amount of total debt is equal to 321.70 (0.55 * 584.91), while bank B's share amounts to 263.21 (0.45 * 584.91).

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