The limits of accounting rates of return and the calibration trap in applying accounting-based models in modern business valuation practice

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Accounting-based terminal value models - such as the Value-Driver-Model - require accounting rates of return as an input for determining the model-relevant long-term growth rate. Accounting rates of return are calculated as a ratio of accounting earnings over an accounting-based capital measure. However, they equal economic rates of return only under very specific circumstances. In particular, the existence of a larger amount of (non-capitalized) intangibles regularly leads to non-negligible differences between the two kinds of rates of return. As valuation professionals usually approach terminal value models from an economic perspective, and as our modern business world is more and more driven by intangibles, there is big risk of miscalibration of accounting-based terminal value models in practice.

1. Introduction

International financial reporting systems such as US-GAAP and IFRS have been continuously refined over the last years. E.g., the International Accounting Standards Board (IASB, the body responsible for the development of IFRS) just recently finished its big, multi-year update cycle with new rules on revenue recognition, leasing, financial instruments and insurance contracts now in place. In future it is time for the standards board to tackle some of the more general reporting challenges: For the next months, the treatment of so-called non-GAAP measures (performance measures which companies see as decision useful but which do not follow GAAP) and the big topic of non-capitalizable, but economically relevant intangible assets.[1] This latter topic touches the problem that financial reporting systems cannot – for mostly good reasons – bring all economic assets, such as e.g. brands, network effects, customer relationships, know-how, research or high-quality data sets, etc. onto the balance sheet.

This intangibles problem is seen as one of the biggest challenges of modern reporting systems. In the literature this point is sometimes even seen as unsolvable and as a trigger for the death of financial reporting as we know it today.[2] The authors of this article do not want to go that far but they acknowledge the necessity for a sound solution to this problem.

The intangibles problem is not new at all, it has rather always been part of conservative accounting systems. But it gains a lot of additional relevance every day in our modern world which moves at an increasing speed towards a more and more intangibles- and services-driven one. The practical impact of this problem is not only restricted to the pure analytical context – i.e. the question whether the basic idea of IFRS, the decision usefulness, can still be maintained – but also highly relevant for the application within some of our well-known business valuation models.

In this article, we want to shed some fresh light on the nature of accounting rates of return and on how they feed into accounting based valuation models – in particular vis-à-vis the development of the modern business environment. As this is a highly practical issue, this contribution does not follow a pure theoretical approach but rather focuses in its core on decision-maker-relevant aspects. For reasons of simplicity and focus, we abstract from any debt financing and taxation issues in this paper. The findings can, however, easily extended to a setting which includes financing and tax effects.

The structure of the article is as follows: After a short overview of the development of the value relevance of accounting in general in recent years (section 2), we will show the consequences of this development for the derivation of accounting-based performance measures such as accounting rates of return in section 3. In section 4 we shed light on why it is quite problematic in today's business environment to apply valuation models that use accounting performance measures as an input, and why we see so many practitioners falling for the "calibration trap" when using these models.

[1] See the interview with Hans Hoogervorst, Chairman of the IASB on 20 June 2019: https://www.ifrs.org/news-and-events/2019/06/strengthening-the-relevance-of-financial-reporting/

[2] See e.g. Lev/Gu (2016), The End of Accounting, Hoboken.

And finally, in section 6 we provide some solutions on how to solve the problem associated with this calibration trap. The summary in section 7 rounds off this article.

2. Challenges of Financial Reporting in a Modern Business Environment

US-GAAP as well as IFRS are reporting systems that are based on the idea of accounting conservatism. Conservatism is not at all a new characteristic of reporting systems. It has already been applied in certain reporting systems in the medieval period[3], and a 1924 explanation of conservatism as "anticipate no profit, but anticipate all losses"[4] is still a good description for certain specifications of accounting conservatism today.

Today, we usually differentiate in two sub-forms of accounting conservatism:[5] a) conditional conservatism, which rather targets the timeliness of the recognition of positive vs. negative news in the income statement[6] and b) unconditional conservatism, which clearly focuses on the recognition and measurement of assets vs. liabilities in the way that net assets are systematically understated on the balance sheet.

It is this latter, unconditional specification of accounting conservatism – which by the way stands against the academic ideal of an "unbiased accounting system"[7] – that is of particular interest for this paper. The conceptual background idea for the application of unconditional conservatism is the clear wish of standard setters to prevent an overstatement of asset values, combined with the observation that the risk of asset value overstatement increases with increasing management discretion (if no rules would prevent it).[8] Therefore, unconditional conservatism and its consequences for practical application – i.e. rather low book values of assets as compared to economic values or even no recognition of some assets on the balance sheet at all – are particularly relevant in cases where the degree of management discretion for valuation is high, e.g. for certain intangible assets. While unconditional conservatism is perfectly tolerable from a practical reporting application point of view, it is also quite plausible that higher conservatism often comes along with lower (economic) value relevance of accounting figures[9] or at least with some additional analytical challenges for investors.

In terms of business trends, recent years (even decades) have seen a tendency towards a more and more intangibles-driven environment. Studies, such as from the European Central Bank[10], highlight the growing investments in intangible assets as percent of total investments. Additionally, the ratio of (research & development plus selling, general and administrative expenses) as a percentage of revenues has strongly increased over the last years.[11] As a consequence of this tendency, the degree of accounting conservatism has also increased over the years.

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[3] See Basu (1997). The conservatism principle and the asymmetric timeliness of earnings. Journal of Accounting and Economics 24, 3-37.

[4] Bliss (1924). Management through Accounts, New York.

[5] See Beaver/Ryan (2005). Conditional and Unconditional Conservatism: Concepts and Modeling. Review of Accounting Studies 10, 269-309.

[6] See also Basu (1997). The conservatism principle and the asymmetric timeliness of earnings. Journal of Accounting and Economics 24, 3-37, for this defintion.

[7] See Feltham/Ohlson (1995): Valuation and Clean Surplus Accounting for Operating and Financial Activities, Contemporary Accounting Research 11, 689-731; Feltham/Ohlson (1996): Uncertainty Resolution and the Theory of Depreciation Measurement, Journal of Accounting Research, 34, 209-234. An unbiased accounting system is one where market values on average equal book values.

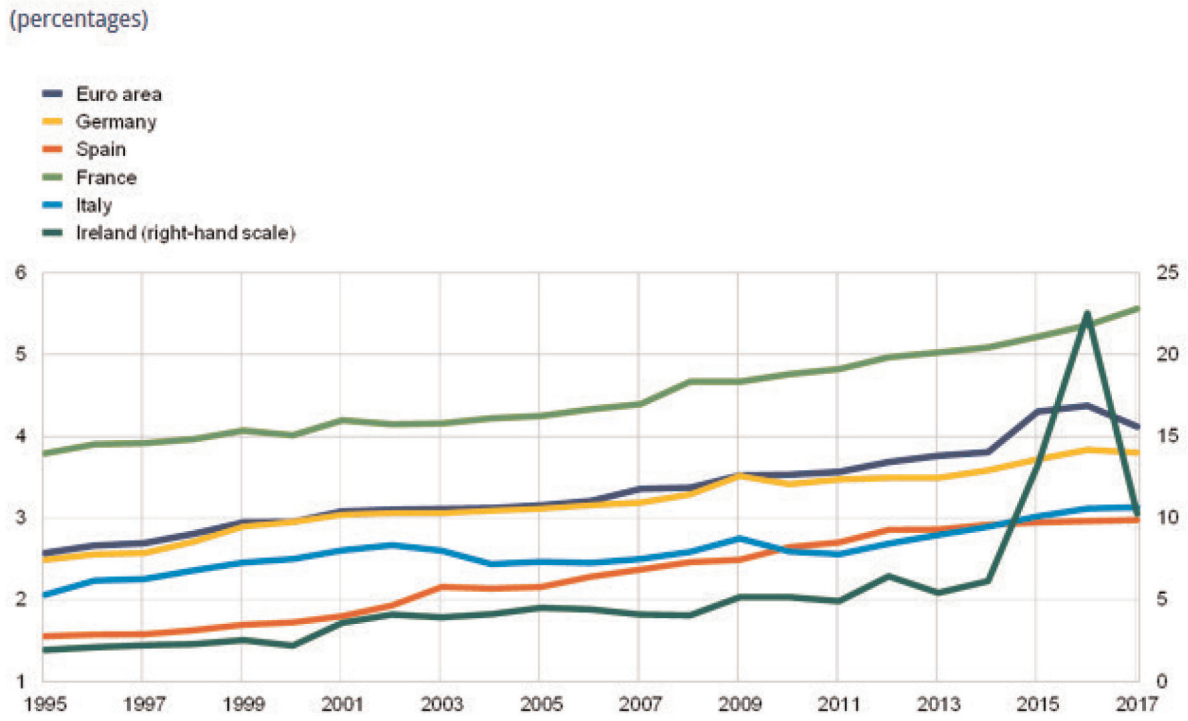
[8] See Watts (2003). Conservatism in Accounting part I: Explanations and Implications. Accounting Horizons 17, 207-221.

[9] This is also often supported by academic evidence, e.g. Lev/Zarowin (1999). The boundaries of financial reporting and how to extend them. Journal of Accounting Research 37, 353-385, found that more R&D on the balance sheet comes along with a decline in value relevance. Ciftci/Darrough/Mashruwala (2014), Value relevance of accounting information for intangible-intensive industries and the impact of scale: The US evidence. European Accounting Review 23 (2), 199-226, could also find a strong negative relationship between intangibles heaviness and value relevance of accounting numbers. This observation can also be made with regard to conditional conservatism, see Thijssen/Willem/Iatridis, 2016, Conditional conservatism and value relevance of financial reporting: A study in view of converging accounting standards, Journal of Multinational Financial Management, 37, 48-70. However, Balachandran/Mohanram, P. (2011). Is the decline in the value relevance of accounting driven by increased conservatism? Review of Accounting Studies 16 (2): 272-301, could not detect a clear relationship between conservatism and value relevance.

[10] See Figure 1, Source: ECB Economic Bulletin, Issue 7/2018.

[11] See Srivastava (2014) Why have Measures of Earnings Quality Changed over Time? Journal of Accounting and Economics, 57, 196-217, Lev/Gu (2016), The End of Accounting, Hoboken, 89. These are the positions in the income statement where spending for intangibles is usually hid due to accounting conservatism.

Figure 1: Intangible investment as a percentage of total investment



Sources: Eurostat and ECB calculations.
Notes: Here, "intangible investment" refers to intellectual property products included in the national accounts. Volatility in Irish and Dutch data, which is mainly due to intellectual property-related transactions conducted by large multinational companies, makes a significant contribution to fluctuations in euro area data.

It is this combination of both effects (lower value relevance of accounting figures vis-à-vis increasing accounting conservatism) that brings a lot of challenges to investors in these days. In fact, it gets more and more difficult to draw conclusions or get an understanding for the value of a business simply based on accounting numbers. The concrete forms of these challenges and problems can be very well observed in general in the determination of certain performance measures such as accounting rates of return and in particular in the application of well-known accounting based business valuation models. This will be analysed in the following sections.

3. Modern Firms and Accounting vs. Economic Rates of Return

3.1. Ideal Accounting System

One desirable aspect of real-world accounting systems is that it is possible to determine – based on information from this accounting system – rates of return that equal the economic rates of return (here economic rates of return are defined as the relative periodical change in economic value of a particular investment). In this context it can be shown that in particular two requirements of the reporting system are necessary in order to allow the proper application of such a performance measurement based on accounting figures by using simple ratios of the general form $\frac{earnings}{capital}$:[12]

– Initial recognition: all economic assets have to be initially recognised on the balance sheet at their original cost.

– Carrying valuation: the depreciation and amortization technique has to follow the so-called relative ben-

[12] See, Meitner (2013), Multi-Period Asset Lifetimes and Accounting-Based Equity Valuation: Take Care with Constant-Growth Terminal Value Models!, Abacus 49 (3), 340-366.

efit depreciation schedule[13] which ensures that periodical value changes in assets follow an economic path.

Below, we provide an example that highlights the identity of accounting rates of return and economic rates of return in a steady state setting. All numbers base on an annually repeating project with the following cash flow stream paid in arrears (Internal Rate of Return of the project is 10%):

Table 1: Standard Project

Time	t=0	t=1	t=2	t=3
Investment	-100			
Revenues minus periodical cash costs		39.47	40.26	41.06

Here the development of net cash flows in period 1 to 3 is set in a way that these cash flows are growing at a constant rate of g=2% which equals the inflation rate in our example. This also implies that the initial investment grows at the rate g=2% from one project to the next.

Table 2: Full Recognition of Assets

	-4	-3	-2	-1	0	1	2	3	4	5	6
Revenues ./. Cash Costs		39.47	80.51	123.19	125.65	128.16	130.73	133.34	136.01	138.73	141.50
Depreciation & Amortization		-33.33	-67.33	-102.01	-104.05	-106.13	-108.26	-110.42	-112.63	-114.88	-117.18
Net Income		6.13	13.18	21.17	21.60	22.03	22.47	22.92	23.38	23.84	24.32
g			*114.9%*	*60.6%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*
Capex	-100.00	-102.00	-104.04	-106.12	-108.24	-110.41	-112.62	-114.87	-117.17	-119.51	-121.90
Net Assets	100.00	168.67	205.37	209.48	213.67	217.94	222.30	226.75	231.28	235.91	240.63
ROE		**6.13%**	**7.81%**	**10.31%**	**10.31%**	**10.31%**	**10.31%**	**10.31%**	**10.31%**	**10.31%**	**10.31%**
ROE (relative benefit depreciation)		10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%

In Table 2 there is a ramp-up phase necessary until the steady-state is reached. Here, net assets are defined as gross assets minus cumulated depreciation & amortization. The useful life of assets equals the project length, i.e. 3 years. Furthermore RoE is calculated as follows $RoE = \frac{NI_t}{B_{t-1}}$ with B being the book value of net assets and NI the Net income. Be aware that the Depreciation in t=-2 is not equal to 66.67 because the second project already needs an initial investment of 102 and is depreciated with 34 per annum. Therefore the total depreciation in $t = 2$ is 33.33 for the first machine plus 34 being equal to 67.33, and so on.

Due to the bias in periodical value adjustments induced by the straight-line method of depreciation, ROE is at 10.31% slightly higher in the steady-state than the economic rate of return (here the internal rate of return of 10%). However, if we applied a depreciation & amortization schedule according to the relative benefit depreciation schedule, the calculated RoEs would exactly equal the economic rates of return.

3.2. Impact of non-capitalized Intangibles on Performance Measurement

In a variant of the above example we now assume that the company still goes for the same set of investment projects in cash flow terms but that the accounting system does not allow to recognise all economic assets on the balance sheet. It is highly important to note that nothing has changed in economic terms here, the projects are still the same and also the internal rate of return remains at 10%.

This new assumption is designed to show the effects of the already mentioned non-capitalization of certain intangibles. It makes our example more realistic as it brings it closer to the real-world proceeding in IFRS or US-GAAP (but also many national GAAP). Below, we assume that 50% of the initial investment will immediately be expensed through the profit & loss statement.

[13] See Reichelstein (1997): Investment Decisions and Managerial Performance Evaluation, in: Review of Accounting Studies, 2, 157–180. Due to its forward looking character the relative benefit depreciation schedule is usually not reasonably applicable in accounting practice.

Table 3: Partial Recognition of Assets

	-4	-3	-2	-1	0	1	2	3	4	5	6
Revenues ./. Cash Costs (original)		39.47	80.51	123.19	125.65	128.16	130.73	133.34	136.01	138.73	141.50
./. Immediately expensed investments into economic assets	-50.00	-51.00	-52.02	-53.06	-54.12	-55.20	-56.31	-57.43	-58.58	-59.75	-60.95
Depreciation & Amortization		-16.67	-33.67	-51.01	-52.03	-53.07	-54.13	-55.21	-56.32	-57.44	-58.59
Net Income	-50.00	-28.20	-5.17	19.12	19.50	19.89	20.29	20.69	21.11	21.53	21.96
g			*-81.7%*	*-469.6%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*	*2.0%*
Capex	-50.00	-51.00	-52.02	-53.06	-54.12	-55.20	-56.31	-57.43	-58.58	-59.75	-60.95
Net Assets	50.00	84.33	102.69	104.74	106.84	108.97	111.15	113.37	115.64	117.95	120.31
ROE		**-56.40%**	**-6.13%**	**18.62%**	**18.62%**	**18.62%**	**18.62%**	**18.62%**	**18.62%**	**18.62%**	**18.62%**
ROE (relative benefit depreciation)		10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%

In Table 3 one can see that e.g in period 1 the original capex from Table 2 (110.41) is now split into a capex part of 55.20 plus an immediately expensed part of also 55.20. Even though from an economic point of view the whole amount of 110.41 are assets, only 50% of this number generates assets from an accounting point of view.

In this steady state analysis of this not-full-capitalization example, we can now see that the accounting rates of return are at 18.62% much higher as compared to the original ideal accounting system example. The reason for this effect is that the performance measure (here: Net Income; the numerator in the ROE ratio) is only mildly affected by this change – e.g. in year 0 at 19.50 vs. 21.60 before – as immediate expenses are just substituted by (lagging) amortisation charges.[14] However, in contrast, the amount of capital recognised (here: book value of equity; the denominator in the ROE ratio) is much lower than in the previous example. Or putting it differently: From an accounting point of view, now only 50% of the assets are needed to generate an almost comparable income as in Table 2. An analytical translation from accounting rates of return in a full-capitalization setting to a partial-capitalization setting can be found in the appendix.

With this higher level of accounting rates of return obviously also the distance to the economic rates of return of still 10% increases. In fact, in the example case it is no longer possible to even roughly infer the economic rates of return from the accounting rates. Hence, without any information on the concrete amount of non-capitalized spending – which would allow a recalculation – no reasonable conclusion on the profitability of the company's projects is possible.

In this context, it is also worth noting that this positive deviation of accounting rates of return from economic rates of return is something that we can see on a regular basis in steady-state analyses of real world accounting systems. It is also something that we can observe in non-steady-state settings for companies that are somewhere in the middle of their life cycle or even mature (basically for the most part of publicly listed companies). However, for fast growing and young companies which are still in the phase of massively and increasingly building up non-capitalized intangibles we can sometimes observe that the negative numerator effect (earnings are lower because of the high amount of immediately recognised expenses) dominates the negative denominator effect which leads to accounting rates of return being lower than economic rates of return. This has been the case e.g. for Google in its earlier days.[15]

3.3. Unobservability of Performance Causes

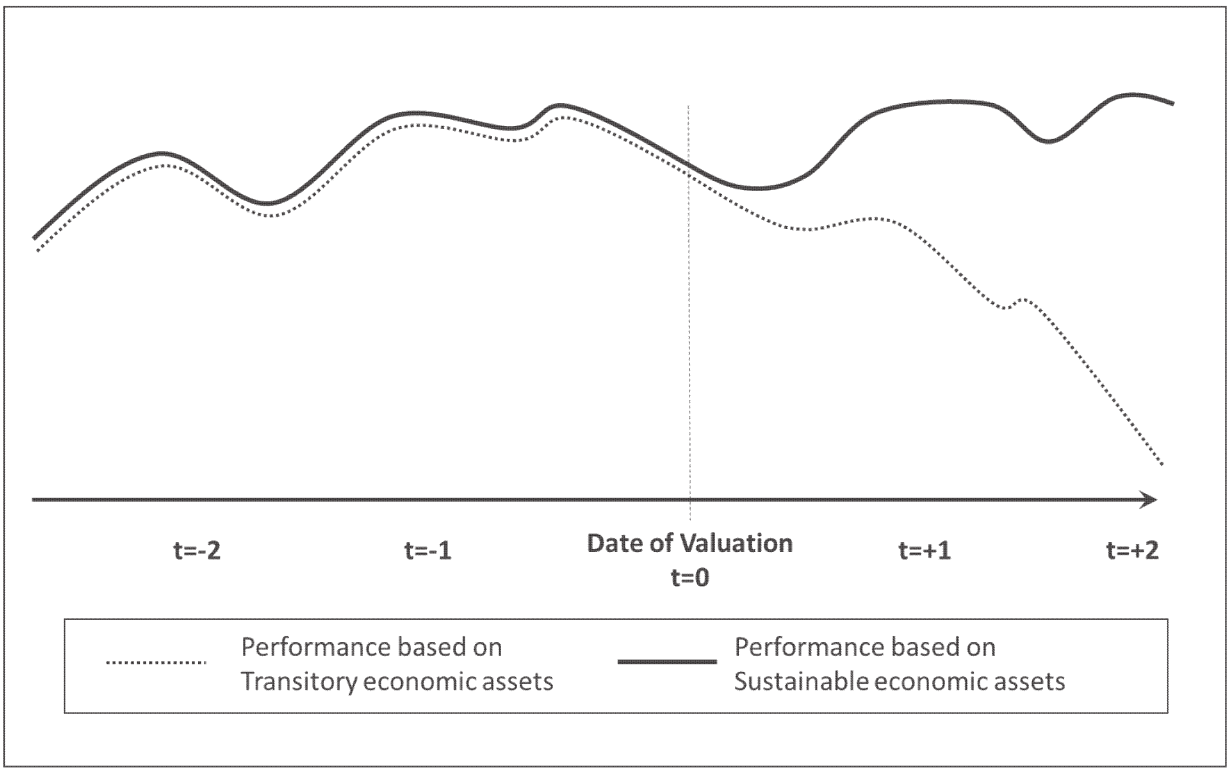
Looking at the not-full-capitalization example from the previous section again, there is an important conclusion to draw. In fact, for an analyst it is not possible to understand from the raw numbers whether the company a) really builds up economic assets on a sustainable basis – which it might support by future economic investments but which will remain assets also in the long-run – or b) is temporarily outperforming with no real sustainable assets that back its performance (and that might fade away over a shorter or longer competitive advantage period (CAP)).

[14] This lag in recognition in a growing business environments leads to amortization charges being slightly lower than the immediate expenses in the full-capitalization example.

[15] See Lev/Sarath/Sougiannis (2005), R&D Reporting Biases and their Consequences, Contemporary Accounting Research, 22, 977-1026.

I.e., a company that shows the accounting patterns depicted in Table 3 might do this a) because certain sustainable economic assets cannot be found on the balance sheet because of accounting restrictions or b) simply performs this way because of some temporary, transitory business assets. These temporary business assets can be first-mover advantages (or certain effects thereof), temporary market inefficiencies, etc.[16] They might disappear over time and will not provide any support for the future long-term cash flow generation and profitability.

Figure 2: The Unobservability Puzzle of Performance Reasons



This unobservability of performance causes might not look very material for analysis reasons at first glance. However, it is a massive problem for investors or other parties being interested in the valuation of companies. This is the cases because the question about the real nature of the company's performance determines the future development of cash flows and hence the value of the company. If these assets are only transitory, then future cash flows will be lower compared to a situation where the assets are sustainable in nature.

The unobservability puzzle can only be resolved by fundamental analysis which goes beyond the raw accounting numbers. This issue highlights the big (and increasing) limits of pure accounting numbers for making forecasts on future accounting numbers or cash flows.[17]

For clarification, it is also not observable without a deeper analysis whether the capitalized assets – both intangible and tangible – are sustainable in nature. But due to accounting rules (recognition only when they fulfil much stricter criteria), these assets are sustainable at much higher probability than the non-capitalized economic assets discussed above. While we are aware of this issue also potentially being relevant in practice, we abstract from it here in our analysis to allow full focus on the core problem of the article.

4. The Accounting Based Value Driver Model in a Modern Environment

4.1. Model Structure

The Accounting Based Value Driver Model (VDM)

[16] We assume here that any performance requires certain economic assets as a support, even if they are only very short-term in nature. There are other opinions on this issue amongst investors (e.g. that a temporary outperformance does not require any assets to support it) but the concrete reasons for transitory performance are not relevant for the central findings of this article.

[17] See Lev/Li/Sougiannis (2010), The Usefulness of Accounting Estimates for Predicting Cash Flows and Earnings, Review of Accounting Studies, 15, 779-807.

that goes back to the works of Gordon and Shapiro[18], also very prominently supported by consulting firm McKinsey, is quite simple in its structure, although it is often derived in quite complex terms in some publications. We shortly explain all that is necessary to understand this model below.

First it is assumed that the accounting system suffices the so-called clean surplus relation (CSR):

$$B_{t+1} - B_t = NI_{t+1} - D_{t+1}$$

which means that all changes in the book value of equity B are due to either net income from the profit & loss statements NI or transactions with shareholders (here for reasons of simplicity defined as dividends D).[19]

In a steady state[20] equity should earn a stable rate of return which demands that net income and the book value of equity have to grow at the same rate g[21], i.e.

$$\frac{B_{t+1}}{B_t} - 1 = g \text{ and } \frac{NI_{t+1}}{NI_t} - 1 = g.$$

Further assuming that the Dividend Discount Model applies and setting t=0, we can write for the terminal value TV:

$$TV_0 = \frac{D_1}{k-g} = \frac{D_1}{k - \frac{B_1 - B_0}{B_0}} = \frac{D_1}{k - \frac{NI_1 - D_1}{B_0}} = \frac{D_1}{k - \frac{NI_1}{B_0} \cdot \frac{NI_1 - D_1}{NI_1}} = \frac{NI_1 \cdot q}{k - RoE \cdot (1-q)}$$

Here k is the cost of equity, $q = \frac{D_1}{NI_1}$ is the constant pay-out ratio of net income (which also leads to $\frac{D_{t+1}}{D_t} - 1 = g$), and the return on equity $RoE = \frac{NI_1}{B_0}$ is an accounting rate of return.[22] Voilà the VDM.

4.2. Calibration Trap

From the derivation of the VDM above it becomes clear that the assumed growth rate is a function of the plow-back ratio $(1 - q)$ and the accounting (sic!) rate of return. Hence, for our original example (Table 2), the VDM applied for valuation in t=0 (setting the cost of equity equal to the economic rate of return of 10%) gets us to:

$$TV_0 = \frac{NI_1 \cdot q}{k - RoE \cdot (1-q)} = \frac{22.03 \cdot 80.60\%}{10\% - 10.31\% \cdot (1 - 80.60\%)} = 221.93$$

Here, the pay-out ratio q is determined for t=1 numbers by:

$$q = \frac{available\ cash\ flow\ for\ pay-out}{Net\ Income} = \frac{Revenues - Cash\ Costs - Capex}{Net\ Income} = \frac{128.16 - 110.41}{22.03} = 80.60\%$$

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[18] See Gordon/Shapiro (1956): Capital Equipment Analysis: The Required Rate of Profit. In: Management Science, 3, 102-110.

[19] In fact, real-world accounting systems do not follow the CSR in a strict way. E.g. in IFRS-accounting there are certain changes in book equity which take place outside the profit & loss statement and company-owner-transactions, such as changes in actuarial assumptions for pension liability accounting, certain currency effects, etc. They are accounted for in an equity subaccount called "Other Comprehensive Income" (OCI). But in valuation, these violations of the CSR are usually not meaningful as they rarely are considered in forecasted financials and hence usually do not impact our valuation models. Moreover, the VDM also works without the CSR under certain conditions which are not closer described here.

[20] Steady-state in economic and accounting terms. The requirements for an accounting steady state are quite strict, see Meitner (2013): Multi-Period Asset Lifetimes and Accounting-Based Equity Valuation: Take Care with Constant-Growth Terminal Value Models!, Abacus 49 (3), 340-366, and Knoll (2016): Continuing Value in Disunion: Steady State or Value Neutrality?, Corporate Finance, 7, S. 33-34. They are rarely fulfilled in practical valuations when it goes into the terminal value phase. But we do want to put too much stress on this here.

[21] See Chiang/Wainwright (2005): Fundamental Methods of Mathematical Economics, 4th Edition, 501.

[22] In a strict sense it is the return on retained earnings, sometimes also called return on new equity RoNE, that is needed here. But as our analysis is based on a collection of a repeated standard project, we do not have to make this distinction clear here. In a practical setting, however, this distinction is highly important – not only for decision values but also in appraisal settings such as e.g. the proceeding according to valuation recommendations for specific reasons of the IDW (Institut der Wirtschaftsprüfer in Deutschland; Institute of Public Auditors in Germany), see IDW Standard 1: Principles for the Performance of Business Valuations (IDW S 1) 2008, recital 37.

Take care to use the accounting rate of 10.31% here as an input for application of the VDM.

If we now move into the setting of Table 3 above – further assuming that the economic assets build-up outside of the balance sheet are sustainable in nature – and value the company at time 0, we get based on the VDM:

$$TV_0 = \frac{NI_1 \cdot q}{k - RoE \cdot (1-q)} = \frac{19.89 \cdot 89.26\%}{10\% - 18.62\% \cdot (1 - 89.26\%)} = 221.93$$

These calculations are also equal to a direct flow to equity (FTE) based valuation of the form $TV_0 = \frac{FTE_1}{k-g}$:[23]

$$TV_0 = \frac{FTE_1}{k-g} = \frac{128.16 - 110.41}{10\% - 2\%} = \frac{17.75}{8\%} = 221.93$$

The important point is here that it is the accounting rate of return that feeds into the VDM (i.e. 10.31% in the Table 2 setting and 18.62% in the Table 3 setting), not an economic rate of return. Hence, despite these optically high rates of return, in the valuations above we assume that operating projects do not generate an outperformance but rather perform exactly at the cost of equity in economic terms (remember: the economic rate of return equals the cost of equity [10%]) – they are net present value (NPV) neutral and create no outperformance. This finding is so important that we want to repeat it here: For assumption of NPV neutrality of investments from plowed-back earnings, it is necessary to include the accounting rate of return into the VDM. This rate might differ materially from the economic rate of return as we have already shown above without any value being created or destroyed.

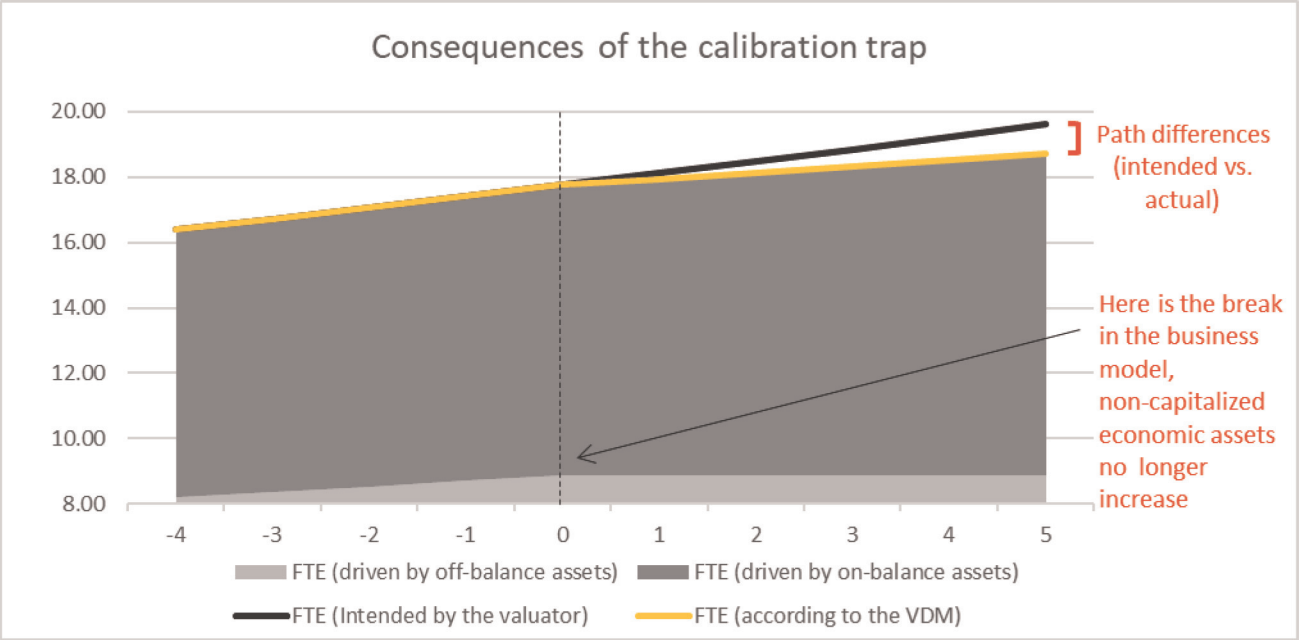
Despite the relatively clear structure of the VDM, in practical valuation settings we often observe a completely different calibration of this model. In real life, valuators who want to map NPV neutrality for retained earnings feel regularly forced to set the RoE equal to the cost of equity in pure quantitative terms (we admit that this tempting if one takes a superficial look at the formula for the VDM). I.e. they calibrate the VDM in the setting of e.g. Table 3 as follows:

$$TV_{0,false} = \frac{NI_1 \cdot q}{k - ERR \cdot (1-q)} = \frac{19.89 \cdot 89.26\%}{10\% - 10.00\% \cdot (1 - 89.26\%)} = 198.91$$

Here, ERR equals the economic rate of return, i.e. 10%. Obviously this false application of the ERR in the VDM leads to a much lower value. And it is quite interesting to see which implicit economic assumption the valuator makes if he calibrates the model this way. In fact, when putting the ERR instead of the accounting rate of return into the VDM, valuators implicitly assume that any spending that generated historical growth of the non-capitalized economic assets immediately stops at time of valuation. The company does not build up any further non-capitalized economic assets – but it still keeps its level of total spending. It basically totally changes its business model! This is shown in Figure 3 below.

[23] Here full pay-out of Flows-to-Equity is assumed, i.e. $FTE = D$.

Figure 3: The Calibration Trap



Obviously falling for this calibration trap can lead to massive mis-valuations[24] of the company if in fact these economic assets exist, are sustainable in nature if supported by future spending and are part of the core business model of the company – similar to the assets that we can see on the balance sheet.

Of course, it could also be that behind the setting of RoE equalling the cost of equity in pure quantitative terms stands the active assumption that the economic assets indeed stop being assets at the time of terminal value calculation. In this case, the calibration is absolutely ok (but then this massive break of the business model at the time of terminal value calibration should clearly be described in the comments relating to the valuation).

5. Possible Solutions to the Calibration Trap

5.1. Using transformed Accounting Rates of Return

From the explanations above, it clearly seems as if the easiest way for dealing with the problem of the VDM calibration trap is to apply the transformed accounting rates of return as a variable input into the model. It admittedly works, but comes along with several problems in valuation practice.

If a valuator wants to know e.g. what the transformed accounting rate is for implying a NPV neutral investment of retained earnings she has to drill out the whole accounting system in order to really understand what rate she has to apply for determining the growth rate of the VDM. In reality, this is not as easy as in our example cases in this article: How much of the spending is periodical expense and how much leads to economic assets? How sustainable are these assets? Etc. This is not an impossible task, but it requires deep fundamental analysis – far beyond a simple digestion of accounting numbers.

5.2. Setting margins back to immediate-expense levels

If a valuator wants to stick to the VDM and wishes to set RoE equalling the cost of equity in pure quantitative terms, and hence make the non-capitalized economic assets ceasing being assets at time of terminal value calculation, then she should adjust spending of the company to a level that only covers the periodical expenses. From an economic point of view it otherwise is extremely difficult to argue why the company has build-up assets over time by doing some sort of economic investing but now doesn't. If these assets are no assets anymore then there is no reason for investing money in their development – only a very stupid CFO would do this, and this is not a sound default assumption for the terminal value.

In our Table 3 setting we would e.g. have to cut expenses by 2.055 in year 1 (iteratively determined)

[24] To be clear: A mis-valuation is given when a valuator applies a model or assumptions within this model which contradict what the valuator wants to say in economic terms. It is, however, not a mis-valuation if assumptions are set and correctly mapped in the valuation model but turn out to be wrong in the future.

in order to cope with the assumed effect of no more economic assets being generated by any further spending. This leads to the following VDM valuation equation:

$$TV_0 = \frac{NI_1 \cdot q}{k - RoE \cdot (1 - q)} = \frac{17.75 + 2.055}{10\% - 10.00\% \cdot (1 - 89.26\%)} = 221.93$$

Obviously, here the impact can be neutralised. The curbing of spending exactly offsets the loss of asset characteristics. However, this is only the case here because all projects are assumed to generate an economic rate of return equalling the cost of capital. In a real-world setting we would observe a loss in value as compared to the original economic setting if we take out the growth investment component for non-capitalized economic assets if these non-capitalized economic assets generate an economic return higher than the cost of capital, and vice versa.

In a real-world setting the determination of the portion of spending that has to be curbed in order to change to a pure economic immediate-expense setting of future spending is quite difficult to determine. In fact, it requires a deep analytical process to understand the real nature of the spending.

5.3. Considering economic investments directly in the valuation model

An approach that does no longer make use of the VBM but rather changes the whole model setting, is to allow for a more direct economic determination of the growth rate. A model that relates more to economic value drivers is e.g. the so-called Bradley/Jarrell-Model: [25]

$$TV_0 = \frac{BCF_1 \cdot q_{BTF}}{k - i + (ERR - i) \cdot (1 - q_{BTF})}$$

Here, i is the inflation rate, BCF is the basis cash flow (the cash flow which just allows for real capital preservation of the company in economic terms) and q_{BTF} is the pay-out ratio based on BCF.

While we do not want to go deeper into the economics of this model here, we still want to highlight that the application of this model is not a silver-bullet, as it also requires deep fundamental analysis – in particular about the concrete amount of BCF where all economic spending for maintaining all economic assets is already included. However, this model follows typical analytical and economic ideas which clearly puts it into a better position than the VDM.

5.4. So what?

If a valuator understands that there is spending of the company which does not translate into accounting assets but does so into sustainable economic assets, there is no way out of putting the analytical helmet onto its valuation head. In a time where accounting rules are less and less able to map the spending of a company correctly in economic terms there is an increasingly forced necessity to look beyond the raw numbers from financial statements. We showed different ways how to deal with the accounting deficiencies in order to still derive a value that is sound in economic terms. None of them is easy in practical application but all require an in-depth fundamental analysis.

This, however, should not come as a surprise. If our core source of information (financial reporting) could not deliver the way we need it, we have to make up our mind ourselves. In addition, no matter which of the different ways we described a valuator thinks is best to follow, it always requires to build-up an economic understanding of the situation the target company is in.

6. Summary

There is an old saying in the investment community: "The standard setters are the last ones to admit that there is something wrong with accounting". This bon mot is based on the fact, that usually standard setters do not at all want to see their set of rules as inferior for decision making and only react if evidence is overwhelming. This creates on a regular basis room for forensic accounting analysts to make a difference in investment analysis, but it also forces normal investors to look deeper into accounting topics than just digesting the raw numbers.

After years of comments, complaints and head shaking of investors, the IASB now eventually has under-

[25] See, Bradley/Jarrell, (2008), Expected Inflation and the Constant-growth Valuation Model', Journal of Applied Corporate Finance, 20.

stood that the problem of non-capitalized intangibles is a massive one and has put this issue on its agenda.[26] Interestingly, this time they are not the last ones to react. We still see many appraisal cases in the real valuation world which deny the existence of this problem. These cases are falling for the VDM calibration trap described in this article – mostly due to the nice optical appearance of the model if accounting rates equal cost of capital in pure quantitative terms, but which is wrong in economic terms.

We have discussed this issue in different settings and audiences over the last years, but now eventually the evidence seems to be overwhelming. We do not see any excuses anymore to fall for the VDM calibration trap. The only good reason for the application of the RoE equalling the cost of equity in pure quantitative terms (or of similar application with some variable variations in an enterprise setting) is when valuators *actively* (and supported by documentation) assume that the non-capitalized assets cease to grow exactly at the time of terminal value calculation – i.e. a change of the business model. At the same time, they have to assume that the spending of the company still stays at the same level (despite no more economic assets are created). In our opinion, this is a thread of arguments and analytical conclusions which will be very difficult to argue for – especially if one takes into consideration the nature of our modern business world.

We admit that in real-world settings, there are more things to consider than we did in this article. In particular, the existence of corporate taxes (which are determined on tax accounting numbers) or debt financing were not considered in this article. But none of them is too problematic to be included into a sound application of a terminal value model, whatever shape it takes – as long as it follows the economic ideas and analytical assessments of the valuator.

The real finding of this article is that the application of a terminal value is not a quick-and-dirty or mechanical task. It is a highly fundamental exercise, forcing the investor/analyst/valuator into a rigorous analytical process into the company's fundamentals. Only based on such analytical depth a sound valuation of a company is possible. And the terminal value with its value weight in typical valuation cases (not rarely more than 60% even for mature companies and often much more for the valuation of growth companies) deserves this analytical treatment. This is good news for those who have always seen valuation as an analytical task, but bad news for those who want to stick to the status quo of a fast application of such models as the Accounting based Value Driver Model.

7. Appendix: Accounting Rates of Return for full vs. partial Recognition of Assets

In case of full recognition of all economic assets on the balance sheet, accounting rates of return are calculated in the steady state (straight-line depreciation) as:

$$ARR_{1,Full} = \frac{NI_{1,full}}{B_{0,full}} = \frac{Revenues - CashCosts_{periodical} - DA}{B_0}$$

In case that only the portion b (with 0<b<1) of all economic assets is recognised as accounting assets, accounting rates of return are calculated in the steady state (straight-line depreciation) as:

$$ARR_{1,partial} = \frac{NI_{1,partial}}{B_{0,partial}} = \frac{Revenues - CashCosts_{periodical} - (1-b)\cdot Spending_{EconomicAssets} - b\cdot DA}{b\cdot B_0}$$

Transforming these equations and substituting, leads to:

$$ARR_{1,partial} = ARR_{1,Full}\cdot\frac{Revenues - CashCosts_{periodical} - (1-b)\cdot Spending_{EconomicAssets} - b\cdot DA}{b\cdot\left(Revenues - CashCosts_{periodical} - DA\right)}$$

[26] At our experience it was also the very strong book Lev/Gu (2016), The End of Accounting, Hoboken, which ultimately pushed standard setters over the edge.

For the calculation of accounting rate of return according to the setting in Table 3 (50% recognition of economic assets) in period 1 based on the information from Table 2 (full recognition of economic assets), we get:

$$ARR_{50\%} = 10.31\% \cdot \frac{128.16 - (1 - 50\%) \cdot 110.41 - 50\% \cdot 106.13}{50\% \cdot (128.16 - 106.13)} = 18.62\%$$

We can also read this $ARR_{50\%}$ -value from the calculations in Table 3.