CORPORATE EVALUATION IN BANKS – DEVELOPMENT OF A NEW EVALUATION MODEL WITH THE SPECIAL FOCUS ON THE SEPARATION OF THE VALUE OF MATURITY TRANSFORMATION

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Abstract: Banks have to be handled differently in the theory of corporate evaluation. After a critical discussion of existing approaches of corporate evaluation, the following results can be stated: As banks generate value by an efficient liability side, gross methods do not lead to reliable results concerning a bank's value. Further, the effects of maturity transformation have to be separated as they do not increase the value of banks.

The model developed by the author takes these aspects into consideration. By an integrated usage of the market interest rate method and the usage of secure cash flows, the CAPM approach could be avoided. The model separates the treasury effects and quantifies the value of a bank in a more realistic way. The first empirical test shows that the model works in practice.

Keywords: Corporate Evaluation, Banks, Maturity transformation, Market yield method

JEL Classification: G21, G32

1 Introduction

Current press releases offer many examples, where a corporate evaluation of a bank takes place. The merger of Commerzbank and Dresdner Bank, the activities of Deutsche Bank to take over the Postbank and the results of the financial crisis that lead to the insolvency of Lehman Brothers require a reliable model to evaluate the corporate value of a bank. Because of many specialities, the banking sector is different from other sections and more difficult because of the fact that value can be generated by the liability side of the balance sheet. Further, the central aspect of maturity transformation has to be considered. Does it generate value or not?

With respect to the banking sector, literature offers rather theoretical methods to quantify the value of a bank. However, nearly no practical solutions are available. Further, not all aspects of typical banking operations are integrated into the published models. A current and reliable model proven by empirical data is not known to exist.

This article describes the development of a new model to quantify the value of a bank. Therefore, the structure is as follows. The status quo of corporate evaluation with respect to the specialities in the banking sector is discussed in section 2. Section 3 develops the new model, describes its structure and discusses it critically in the context of existing approaches. Section 4 sums up the main results and gives a summary.

2 Existing Approaches with Respect to the Banking Sector

2.1 Existing Methods of General Corporate Evaluation

Without going too much into detail regarding the motivations for a corporate evaluation (Reuse 2007, p. 5), the main focus of this section shall be laid onto the structure of existing approaches of corporate evaluation. Several models to define the value of a company can be found in literature. They differ in the time they were evaluated as well as in the assumptions they make. The higher the number of the approaches, the higher is the number of special cases and various ways to structure the methods of corporate evaluation.
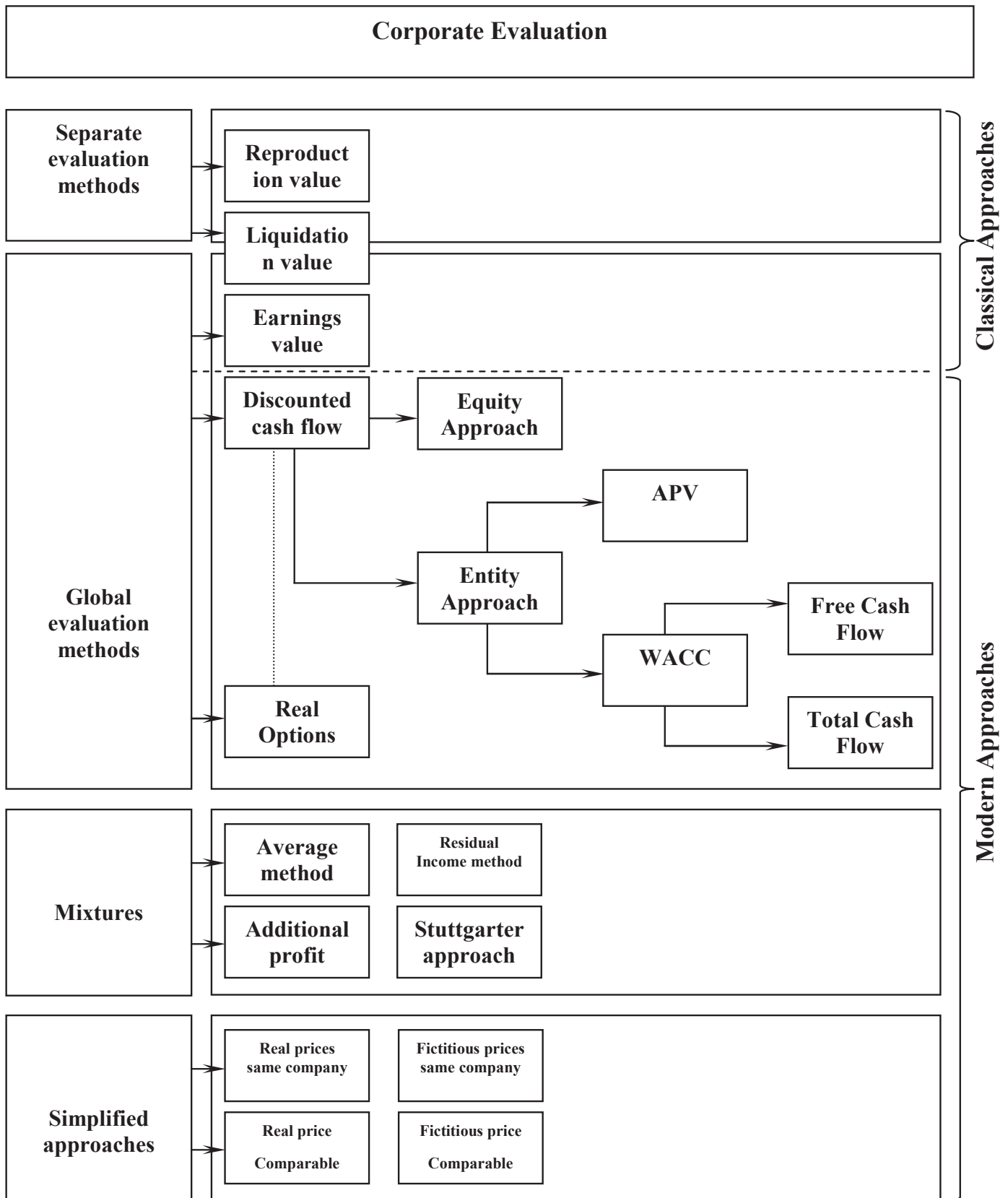
Drukarczyk offers one chapter of corporate evaluation in which he differentiates the earnings value method from discounted cash flow methods and structures those into entity, equity and APV (Adjusted Present Value) approach. Reproduction or liquidation methods, multiplier methods or real option approach are not presented (Drukarczyk 1996, pp. 87–267).

Ballwieser offers a holistic structure of corporate evaluation methods. Separate evaluation methods, global evaluation methods, mixtures of both and multiplier approaches are mentioned. The DCF (Discounted Cash Flow) are structured into APV, FCF (Free Cash Flow), TCF (Total Cash Flow) and FTE (Flow to Equity). Chapter 5 on the other hand offers a more structured overview according to the DCF methods (Ballwieser 2004, p. 111).

Kuhner and Maltry do not structure all approaches consequently in the content table, but they give the main structure in section 2 similar to Ballwieser (Kuhner and Maltry 2006, p. VIII–X, 52). Nevertheless, they differ in some aspects. Their structure of the DCF approaches leads to a difference compared with Drukarczyk and Ballwieser – the APV is a sub-section of the entity approach (Kuhner and Maltry 2006, p. 200). Further, TCF and FCF approaches exist beneath the APV approach. All three put the existing entity approaches beneath the equity approach.

As the Ballwieser's main structure is common in literature (Mandl and Rabel 1997, p. 30; Drukarczyk 2003, p. 131 and Ballwieser 2004, p. 11), the structure used in this text is based on his main assumptions and implemented aspects of Drukarczyk, Kuhner and Maltry. However, some extensions are done. Due to the fact that some authors do not discuss classical and modern approaches together in one chapter, this is chosen to be an additional criterion to distinguish between the approaches. Further, the market value based on the share price analysis and the real option approach are inserted into the figure. In contrast to Schierenbeck, the mixture methods are treated as modern approaches (Schierenbeck 1998, p. 388) as they combine modern and classical aspects with focus on the modern aspects. Figure 1 sums up all these aspects (Reuse 2007, p. 10, especially referring to Ballwieser 2004, p. 8, p. 111, p. 184, p. 190 and Schierenbeck 1998, p. 388).

Fig. 1 Main structure of corporate evaluation approaches

Corporate Evaluation

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┌──────────────┐     ┌──────────────┐                    ┐
│ Separate     │ ──▶ │ Reproduct    │                    │
│ evaluation   │     │ ion value    │                    │  Classical
│ methods      │     ├──────────────┤                    │  Approaches
│              │ ──▶ │ Liquidatio   │                    │
└──────────────┘     │ n value      │                    │
                     ├──────────────┤                    │
                     │ Earnings     │                    │
                     │ value        │                    ┘
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
┌──────────────┐     ┌──────────────┐   ┌──────────────┐
│              │ ──▶ │ Discounted   │──▶│ Equity       │
│              │     │ cash flow    │   │ Approach     │
│              │     └──────────────┘
│              │                          ┌──────┐
│ Global       │            ┌──────────┐  │ APV  │
│ evaluation   │            │ Entity   │──│      │
│ methods      │            │ Approach │──────────────
│              │            └──────────┘  │ WACC │──▶│ Free Cash Flow │
│              │ ──▶ ┌──────────────┐                │ Total Cash Flow│
│              │     │ Real         │
│              │     │ Options      │
└──────────────┘     └──────────────┘
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Entity Approach → APV, WACC; WACC → Free Cash Flow, Total Cash Flow. (Modern Approaches)

Mixtures	Average method	Residual Income method
	Additional profit	Stuttgarter approach

Simplified approaches	Real prices same company	Fictitious prices same company
	Real price Comparable	Fictitious price Comparable

Source: Reuse 2007, p. 10.

Separate evaluation methods quantify the value of the company by adding the value of the company's parts while global evaluation methods seek to evaluate the company as a

whole (Moxter 1977, p. 254) by considering future incomes and efforts. Mixtures combine these two basic criteria. Simplified approaches seek to get a price for the company by comparing it to the market or to other companies (Ballwieser 2004, p. 8 and Kuhner and Maltry 2006, p. 52).

Figure 1 is more detailed than the illustrations in existing literature. As a consequence, the real option approach is inserted into the DCF-sector, the simplified approaches are distinguished into four aspects and the DCF entity/equity structuring approach combines Ballwieser and Kuhner/Maltry.

Even though this structure represents the status quo of modern literature, some aspects are still under discussion. Personal taxes are not always considered in literature (Ballwieser 2004, p. 8) and the substantial value is often set similar to the liquidation value (OLG Düsseldorf 2003, p. 691 and OLG Düsseldorf 2004, p. 327). This is wrong as the main assumption of the liquidation approach is the winding up of the company (Kuhner and Maltry 2006, p. 42). A typical example for another structure is given by Schultze. He defines several other global evaluation models. He offers a structure with the main sectors being DDM (Dividend Discount Model), DCF, earnings value and RIM (Residual Income Method). Differentiating between dividends to discount and earnings to discount (Schultze 2003a, p. 75) shows no real difference – defining the dividends as earnings solves this classification problem (Ballwieser 2004, p. 11). The RIM is based on the book value of the equity and compares expected earnings with the equity yield (Schultze 2003a, p. 111). It can be defined as a mixture approach, a specialisation of an additional profit approach (Argued in Ewert and Wagenhofer 2000, p. 10). It is not an original global evaluation model (Ballwieser 2004, p. 11).

As this article does not focus onto the description of the existing methods, the following section discusses the arguments why these approaches cannot be used for banks.

2.2 Reasons for a Bank Individual Approach

All approaches of corporate evaluation imply that the value of a classical industrial company has to be defined (Sonntag 2001, p. 1). But the procedure for banks differs, as the banking sector shows several special aspects which have to be considered (Koch 2004, p. 119). This can be discussed as follows.

2.2.1 Generating Value with the Liability Side

In contrast to other companies that take credits in order to receive money to invest, banks generate earnings with the liability side (Sonntag 2001, p. 2 and Adamus and Koch 2006, p. 153). The market yield method is the basic idea for this (Rolfes 1999, pp. 12–18, p. 270 and Schierenbeck 2001a, p. 43, p. 70). On the asset side customers pay more than they would pay on the capital market. On the contrary, they receive fewer interest payments for savings or deposits than they would receive at the market. Only due to the effect that the liability side shows lower interest rates than market rates, banks are able to generate value. This effect is not concerned correctly in the classical approaches described above. All entity methods require the market value for the liabilities. However, this value is difficult

to quantify as savings and deposits cannot be traded (Koch 2000, p. 45 and Adamus and Koch 2006, p. 153). Using the nominal value would be a wrong way as well (Strutz 1993, p. 87; Behm 1994, p. 59; Vettiger 1996, pp. 125–126 and Copeland and Koller and Murrin 1998, p. 488). Therefore, the approaches that deal with a fictitious equity finance situation as WACC and APV would not lead to the "right" corporate evaluation. Even small mistakes in the assumptions concerning the debt side would lead to a high variance of the corporate value.

2.2.2 Maturity Transformation

Further, in contrast to industrial companies, banks do maturity transformation (Sonntag 2001, p. 1 and Koch 2004, p. 119). This means that the assets have another maturity than the liabilities. Short term liabilities are normally transformed into long term assets. In case of a normal yield structure, this leads to additional earnings, which depend on the current market interest rates. Maturity transformation is a part of the market interest rate method. This method is able to divide the interest earnings of a bank into those generated by customer deals and those generated by maturity transformation (Rolfes 1999, p. 12. Adamus and Koch 2006, p. 148). The central question remaining is whether and how this has to be implemented into the corporate value of a bank. This will be discussed critically later on.

2.2.3 Structure of the Balance Sheet

In addition, the measurable assets of a bank are typically low, as the balance sheet nearly consists of credits and savings only (Kirsten 2000, p. 134 and Zessin 1982, p. 28). As a consequence, the expenditures of the profit and loss account show a very high part of interest payments and depend on the current interest rates (Sonntag 2001, p. 2). Market values do not exist for customer deals and the nominal values would lead to wrong results (Adamus and Koch 2006, p. 153).

2.2.4 Risk Transformation

Last, banks do risk transformation (Koch 2004, p. 119). Liabilities in form of customer savings are transformed into loans. While the liability side does not have an inherent risk, the assets side does. This leads to the most important value and risk driver for banks: the provisions for lost loans which have been the largest problem in the recent past (Adamus and Koch 2006, p. 143). Traditional approaches of corporate evaluation do not consider the fact that the credits a bank grants may be lost because of customers' bankruptcy (Sonntag 2001, p. 2 and Koch 2004, p. 119). The expected losses of the credit portfolio have to be considered accordingly (Done in Sonntag 2001, p. 202).

2.3 Structuring the Status Quo in Current Literature

All these aspects led to the requirement for bank-individual approaches in the past. Literature offers several bank evaluation approaches (Sonntag 2001, p. 6 and Reuse 2007, p. 40). This is shown in figure 2.

Fig. 2 Status quo of existing bank-individual evaluation approaches

	Zessin	Adolf/Cramer/ Ollmann	Strutz	Behm	Kümmel	Miller	Vettiger	Börner/Lowis	Copeland/Koller/ Murrin	Höhmann	Hörter	Sonntag	Koch, Adamus/Koch
Year	1982	1989	1993	1994	1995	1995	1996	1997	1998	1998	1998	2001	2004
Kind of return													
to shareholders	X	X	X	X	X	X	X	X	X	X	X	X	X
also to investors													
Used interest rates													
Equity interest rate	X	X	X	X	X	X	X	X	X	X	X	X	X
WACC													
Valuation granularity													
Direct evaluation of the whole value.	X		X	X	X	X	X	X	X	X	X	X	X
Indirect evaluation: • Sum of strategic business units.		X	X						X				
Indirect evaluation: • Private customers • corporate customers • Treasury								X	X				

	Zessin	Adolf/Cramer/Ollmann	Strutz	Behm	Kümmel	Miller	Vettiger	Börner/Lowis	Copeland/Koller/Murrin	Höhmann	Hörter	Sonntag	Koch, Adamus/Koch
Indirect evaluation: • Asset side • Liability side • Treasury				X			X					X	
Using multiples to receive the bank value.													X

Source: Sonntag 2001, p. 6 and Reuse 2007, p. 40

Zessin was the first one who discussed the evaluation of banks in his work. He worked out that banks do not produce real products, but deal with monetary assets. He prefers an equity approach combined with an equity yield to discount the cash flows with. The result is the enterprise value. But a more detailed analysis, from which part of the bank the value comes, was not done (Zessin 1982, p. 28, 57, p. 61, pp. 161–165).

Adolf/Cramer/Ollmann argue by using the earnings value approach. They add the value of strategic business units to the bank value. They are the first ones who demand a differentiated quantification of return and risk, depending on the strategic business unit. A direct prognosis of the bank's expected returns is not useful, as the value drivers (nominal value and net interest margin of the customer deals) can only be estimated in subunits. Adolf/Cramer/Ollmann discuss the CAPM (Capital Asset Pricing Model) approach as well. The final conclusion regarding its practicability is very critical. The equity yield defined by CAPM does not represent the threshold value an investor would pay for a bank. Adolf/Cramer/Ollmann demand an external and an internal yield evaluation. The yield of an opportunity investment the investor has should be quantified in an external evaluation. This yield is based on the risk free ratio and a risk premium. In an internal evaluation, Adolf/Cramer/Ollmann demand the yield of banking obligations that are traded at the stock exchange (Adolf and Cramer and Ollmann 1989a, pp. 485–492 and Adolf and Cramer and Ollmann 1989b, pp. 546–554).

Strutz, on the other hand, keeps the classical CAPM approach. But he follows Adolf/Cramer/Ollmann in the differentiated quantification of the single values of the strategic business units (Strutz 1993, pp. 87–97).

Behm defines so-called value centers, the asset side, the liability side and the treasury, for the purpose of a value based management or shareholder value management. Adding the market value of these centers leads to the bank value. He is the first to structure a bank like this. The free cash flows of all three value centers are discounted at the end. The main advantage of this procedure is that the above explained market yield method can be used

by Behm (Sonntag 2001, p. 9). With respect to the equity yield, Behm did an empirical analysis. He estimated the equity yields in July 1993 for the following years. He uses three approaches including the CAPM to define the equity yield and compares them to each other. The CAPM is used, but it is only one of several solutions (Behm 1994, p. 59, pp. 83–85, p. 118).

Kümmel evaluates the bank's value by using an equity approach and discounting the cash flows with an equity yield. He criticises the CAPM as well. In his opinion, beta factors are instable and their historical values are not representative. Further, the main assumption of the CAPM is the tradability. If a CAPM should be used, the equity should be differentiated according to a fictitious or real maturity (Kümmel 1993, pp. 34, 35; Kümmel 1995, p. 104–107).

Miller offers no new results. He uses the equity approach combined with an equity yield as well (Miller 1995, pp. 196–199).

Vettiger follows Behm in the definition of the value centers and the usage of the market yield method. He is the second one who uses the market yield method. Value based management or shareholder value is the main factor for corporate evaluations (Vettiger 1996, pp. 126–135).

Börner and Lowis follow the main arguments of the equity approach and the resulting equity discounting yield. Further, they offer a detailed cash flow evaluation approach and implement a three-phase model for the evaluation of the cash flows. The cash flows are structured into those coming out of operating activities, investments and business structure – for example maturity transformation. The usage of the market yield method was mentioned, too. They discuss the CAPM critically and offer the more general APT (Arbitrage Pricing Theory) model as an alternative approach (Börner and Lowis 1997, pp. 87–133).

Copeland/Koller/Murrin follow Behm when doing a corporate evaluation. In contrast to Behm they define private and corporate customers as the parts to evaluate. As well as in Behm's work, the value of treasury is isolated in the end. Its value varies in the case of market yield change. The strategic business units, private and corporate clients, remain constant in this case. Copeland/Koller/Murrin demand transfer prices for the cash flows between the three units. The disadvantage is that they do not use the market yield method. An exact interest rate risk free situation does not exist, even though they offer a consistent example, in which both approaches lead to the same result. Copeland/Koller/Murrin follow the main-stream to use the equity approach for a bank evaluation, even though they recommend an entity approach for all other corporate evaluations (Copeland and Koller and Murrin 1998, p. 489, p. 493, pp. 514–524, Copeland and Koller and Murrin 2002, pp. 501–524).

Höhmann and Hörter offer no new ideas either. Höhmann's model of external evaluation (Höhmann 1998, pp. 37–39, pp. 168–171) and Hörter's argumentations (Hörter 1998, p. 56) come to the same conclusion as the authors before: equity approach with equity costs as a discounting factor.

Sonntag defines the three value centers as well and adds them to the value of the bank. He uses the market yield method and distinguishes the customer deals into existing deals and possible new deals. This differentiation and the analysis of the treasury value are the main

new add-ons Sonntag presents. According to his argumentation the value of treasury is zero. Sonntag's work is the most detailed and structured one up to this moment (Sonntag 2001, p. 241).

Last, Koch and Adamus/Koch offered some new ideas. Again, they use the equity approach with equity costs. Further, the market interest rate method is discussed but not used. The reason is that external investors do not know the part of the net interest revenues that belong to maturity transformation. Further, they offer a detailed approach to evaluating the cash flow statement of a bank. Even though a detailed cash flows analysis would be better, an evaluation by using the income statement is the most practical way because the investor does not have the necessary detailed information. According to the equity yield, some further arguments are added. They accept the CAPM as a possible approach and prove that the equity yield is independent from the leverage (Contrary discussed in Kirsten 2000, p. 163). Choosing the right comparables for evaluating the beta is more important. Adamus/Koch offer the last new point. They are the first to recommend a multiplier approach, at least as a plausibility check. The preferred multiples are Market/Book, Price/Earnings and Price/Assets under Management. A balance sheet sum and a net interest revenue multiple are missing (Koch 2004, pp. 119–136 and Adamus and Koch 2006, pp. 131–162).

Even though all presented approaches differ in evaluating the cash flows, the central assumption of the equity approach is the same: all of them discount the net cash flows with the equity interest rate. No one uses an entity approach. In combination with the argumentation above, the entity approaches seem to be not useful in the banking sector.

2.4 Debatable Problem: The Value of Maturity Transformation

The central question to discuss in the context of corporate evaluation in banks is the maturity transformation. Does it generate value or not?

It is empirically proven that a 1Y liability side and a 10Y asset side lead to an optimal return. This strategy was the most efficient in the past. Often, it is used as a benchmark in the German banking sector (Goebel and Schumacher and Sievi 1998, p. 340; Hillmer 2002, pp. 495–500 and Wimmer 2006, p. 324). So the first conclusion is that such a strategy leads to additional earnings for a bank.

But will an investor have to pay additional sums for the generation of maturity transformation, if he buys a bank? All authors before 2001 did not consider this aspect. But after 2001 this question has been discussed in literature very often. On the one hand, Sonntag proved in 2001 that the value of treasury is zero, as everyone can duplicate a maturity transformation portfolio (Sonntag 2001, p. 79). On the other hand, Bartetzky/Oesterhelweg argued in 2002 that a high maturity transformation leads to a higher corporate value (Bartetzky and Oesterhelweg 2002, p. 508). Entrop/Scholz/Wilkens contradicted a few months later. According to their argumentation, treasury has a value of zero as well. The investor has two possibilities: Treating treasury as zero and discounting the value with a small yield or implementing the additional earnings but discounting them with a higher yield because transformation results are earnings under risk (Entrop and Scholz and Wilkens 2002, pp. 360–364).

To the opinion of the author, Sonntag and Entrop/Scholz/Wilkens are right. No additional sums have to be paid for these strategies, as they could be duplicated with several derivatives as swaps or caps. Nearly everyone can duplicate a bank's strategy, when they have access to the capital market. Sonntag calls this a "homemade interest rate risk (Sonntag 2001, p. 41)". The only margin a normal customer cannot generate is the above described contribution margin. This is why treasury and maturity differences have no influence on a bank's value.

The only component that might lead to an additional value for the bank is the knowledge of the treasurers. As they might have an information advantage and more experience, they would probably build up more efficient structures than anybody else. However, this has to be eyed very critically. In the long run, nearly no one can beat the market, so the strategies as mentioned above (10Y refinanced by 1Y etc.) are the most efficient ones and are treated as benchmarks for the treasury department.

It is correct that the share prices of a bank include the value of an inherent interest rate risk. But investors can hedge it, if they have an access to the capital market. Hence, it is proven that in the case of a perfect market, the value of the treasury center is zero. In case of an intrans-parent market, only the small bid/ask spread generates value for the bank – but this value is almost zero if the market is working right (Sonntag 2001, pp. 41, 82, 90).

3 Development of a New Corporate Evaluation Approach for Banks

3.1 The Main Idea of the Presented Approach

An approach that will be accepted by banks has to be simple. A big advantage would be if at least parts of the model were used in practice, perhaps for another purpose. The main idea of this individualized approach of a bank evaluation is relatively simple: Why not take existing parts of methods or models that are used for bank controlling? Combining and adjusting them would lead to a new model of corporate evaluation. Therefore, the evaluation of a new model has to be done as follows: First, the existing models or methods that could be used have to be defined. In the second step, they have to be modified and arranged. Last, all additional parts that are really new have to be defined and put together into a new model.
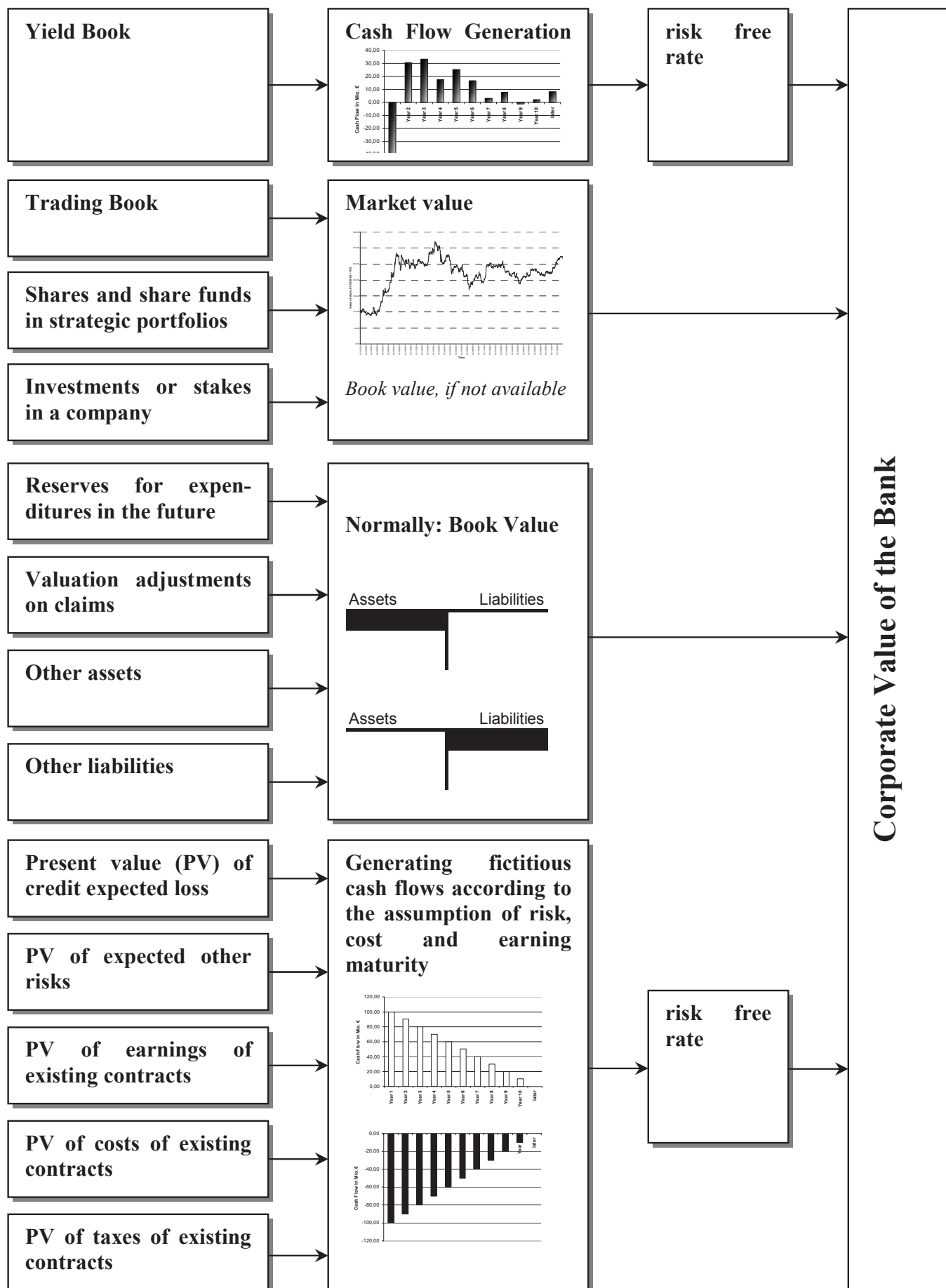
The model shall be as simple as possible. The central methodical assumption is: every additional expected earning that can be generated has to be discounted with a risk-adjusted yield as it is insecure. The best idea is to implement only those cash flows that are nearly risk free or risk adjusted. As a consequence, the discounting factor is nearly risk free as well and the CAPM, which was often discussed critically in literature, can be avoided in a very elegant way.

3.2 Definition of the Model

The idea of the used theoretical aspects is not really new. Several authors developed a present value-oriented risk covering mass model implementing the market interest rate and the cash flow generation approaches. The core aspect of the model is to use these central ideas and modify them.

This new model is defined as the treasury approach. It can be set up as shown in figure 3 (Reuse 2007, p. 88, referring to of Goebel and Schumacher and Sievi 1997, p. 389; Behr and Dörner 2001, p. 24; Schierenbeck 2001b, p. 18; Parchert and Markus 2002, p. 22, p. 44; Weinzirl 2002, p. 95; Bimmler and Mönke 2003, p. 31 – 33; Friedag and Klassen and Robers 2003, p. 36; Gröning 2004, p. 343; Giesecke and Kühne 2005, p. 134; Thaller 2005, pp. 144–152; Dauber and Pfeifer 2006, p. 232; Hortmann and Seide 2006, p. 317; Reuse 2006, p. 428).

Fig. 3 Central structure of the treasury approach

| Yield Book | → | **Cash Flow Generation** | → | **risk free rate** | → | |

Trading Book	→	**Market value**				
Shares and share funds in strategic portfolios	→					
Investments or stakes in a company	→	*Book value, if not available*	→			

Reserves for expenditures in the future	→	**Normally: Book Value**				
Valuation adjustments on claims	→	Assets — Liabilities				
Other assets	→					
Other liabilities	→	Assets — Liabilities	→			

Present value (PV) of credit expected loss	→	**Generating fictitious cash flows according to the assumption of risk, cost and earning maturity**				
PV of expected other risks	→					
PV of earnings of existing contracts	→		→	**risk free rate**	→	
PV of costs of existing contracts	→					
PV of taxes of existing contracts	→					

Corporate Value of the Bank

Source: Reuse 2007, p. 88

The idea is to divide a bank into several value centres, similar to what Behm and Vettiger suggest. The reason is that the market interest rate method presented above and discussed in Schierenbeck and Rolfes offers the possibility of separating the margin of customer transfers from the maturity transformation. This approach follows the main argumentations offered above. They can be summarized as follows:

1. Only the existing contracted transfers are considered (Reuse 2006, p. 427).

2. No new deals with customers, no treasury results and no results of the trading book are implemented in this approach, as everybody else can generate them without having to buy the bank.

3. According to this, only the costs and other earnings deriving from existing transfers are transformed into cash flows and are discounted. Taking the total value of all costs and earnings of the future would be too much.

4. As a consequence, only risk free cash flows exist. They can be discounted at a risk free rate.

Finally, adding all assets, liabilities, present value of costs, earnings and taxes could be defined as the present value of a bank. The evaluation of these parts of a bank's value will be discussed in a more detailed way in the following chapters.

3.2.1 Yield Book

The most important part of a bank's balance sheet of is the so-called yield book (Drosdzol and Hager 2005, p. 124 and Hortmann and Seide 2006, p. 317). It lists all parts of the balance sheet, on which a bank receives or pays interests. This could be credits, bonds, current accounts, deposits, savings, emitted bonds or even derivate instruments. All these transactions are transformed into cash flows.

The simplest way is the most effective one: why not take the cash flows that could be derived from the market yield method? Every loan, bond, deposit and savings generate cash flows (Done in Schierenbeck 2001a, p. 109, p. 220), which are much more exact than those that are derived from the profit and loss account (Sonntag 2001, pp. 113–114). Further, this evaluation is done for the strategic treasury management as well (Reuse 2006, p. 407) – the requirement that existing controlling approaches should be integrated into the new model is fulfilled. The result is that the present value of every financial asset can be quantified in a very sophisticated but easy and exact way. Normally, the exactness of cash flows in an earnings value method decreases over the considered time period (Börner and Lowis 1997, p. 100). However, when discounting the cash flows of all financial transfers that occur in the balance sheet, the exactness stays the same (Vitt 2002, p. 554). The cash flows appearing in the balance sheet have to be distinguished into those with a fix maturity and those that do not have an interest fixing. While the cash flows of the first category can be set up very simply, the second category is more difficult to modulate. Examples are customer's savings, current deposits and liabilities on current accounts. As a consequence, a fix cash flow cannot be evaluated. To solve this problem, fictitious cash flows have to be defined. Sievi evaluated a system that offered the possibilities to do this at the end of the 1990s (Sievi 1999. Widened for example in Böttrich and Drosdzol and Hager and Schleicher 2004, p. 28). He called this the theory of

a gliding average. Sievi's theory is that the less volatile an interest rate is, the longer the fictitious cash flows stay in the balance sheet and lead to a constant margin. On the one hand, a bank changes the interest rate exactly at the point at which the customer would close the transaction, if he did not get a better interest rate. Many savings banks and cooperative banks face this situation at the moment as the market is saturated. On the other hand, a bank wants to generate a constant interest margin (Sievi 1999; Böttrich and Drosdzol and Hager and Schleicher 2004, p. 29; Lüders and Herrmann and Sternberg 2005, p. 234).

The next step is to discount the cash flows. Taking a nearly risk free rate fits with the cash flow definition. But the normal spot rates are not used (Rolfes and Dartsch 1998, p. 67). Derived from the spot rates, the so-called zdf (zerobond discounting factors) are applied onto the cash flows (Kotissek 1987; Marusev 1988; Grabiak and Kotissek and Küsters and Marusev 1998 and Biermann and Grosser 1999, p. 203). While classical discounting methods use one yield for all cash flows (Drukarczyk 1996, p. 9), the zerobond discounting factors are used consistently with the maturity (Rolfes 1999, p. 52). Every cash flow is discounted with the interest rate of the related maturity. Normally, the zerobond yield is a little bit higher than the spot rate because there is the assumption of reinvestment of interest payments.

All cash flows of the yield book are discounted by the help of the zdf. Normally, the assets are worth more than the book value and liabilities are worth less than the nominal value. This refers to the central assumption of the market yield method: Customers pay more for assets than they would pay on the market and receive less for their savings than the market would pay (Rolfes 1999, p. 13). So assets are worthier than the book value while liabilities are less worth. The sum of these present values represents the yield book value (Hortmann and Seide 2006, p. 317).

3.2.2 Further Assets and Further Liabilities

The next asset that has to be considered is the trading book (Reuse 2006, p. 428). The present value of the trading book is the current share price multiplied by the number of shares. Setting up cash flows related to this position is not usual, even though in an ideal case a share might represent the expected cash flows of another company (Hortmann and Seide 2006, p. 318).

Shares and share funds in strategic portfolios are handled similarly. The present value is defined as the current price at the market (Hortmann and Seide 2006, p. 318).

Normally, investments or stakes in a company have a book value in the bank's balance sheet. But the present value shall be used if available (Parchert and Markus 2002, p. 44). Consequently, a corporate evaluation of the company the bank invested in should be done. Hence, the different methods discussed before can be applied here. The result may be that a bank has hidden reserves on the participation. But the result may also be that the book value is much higher than the present value. In case of a company not listed at the stock exchange, the book value is often used (Dauber and Pfeifer 2006, p. 233) in order to prevent a large-scale corporate evaluation for a small part of the bank's assets.

At the end, other assets have to be quantified. Usually, the most important positions of a bank's portfolio are buildings and branches. They could be calculated with the book value, but if a current market value could be defined, this one would represent the present value of the buildings better. For other assets like accruals and deferrals, the book value is chosen (Hortmann and Seide 2006, p. 318 and Reuse 2006, p. 428).

Typical further liabilities for banks are reserves for expenditures in the future and valuation adjustments on claims. Often the present value is not available, so the cash flows cannot be taken from the internal controlling. The book value is chosen accordingly (Reuse 2006, p. 428).

The equity is the only part of the balance sheet, which is not considered as a liability when defining the bank's value. The present value of the equity is the residual value that results from discounting all other assets and liabilities (Weinzirl 2002, p. 44). It is the value of the bank.

Similarly to the other assets, other liabilities are quantified with their book value as well. They usually consist only of accruals and deferrals.

3.2.3 Expected Losses of Taken Risk

After having discussed the assets and liabilities in the balance sheet, the risks a bank has in its portfolio have to be discussed. Along with the existing assets the credit risk and the operational risk should be mentioned, explained and discounted (Bimmler and Mönke 2003, p. 31).

Generally, the expected loss of the credit portfolio is the most important risk. It has to be deducted from the bank's value (Giesecke and Kühne 2005, p. 128; Hortmann and Seide 2006, p. 319). Every year some parts of the credit exposure will come to bankruptcy. A correction for these risk premiums should be done. The procedure is as follows: a bank has to define an average of credit losses which will occur in the future. These expected losses are often generated from an ex-post analysis. In the next step, this expected loss has to be divided by the current credit exposure. This relation defines which percentage of a credit exposure will be lost per year. This relation has to be applied on the average credit exposure of the following years, which results from the yield book.

Last, these cash flows have to be discounted. They could be defined as the present value of the expected losses of the current credit exposure. Unexpected losses, which can be quantified with the VaR (Value at Risk) are not deducted here. They represent all those unexpected factors investors do not implement into their calculations normally. The expected default risk is the biggest risk banks face today, so the evaluation of this number is very important.

Credit risk also occurs in the bond portfolio of a bank. The procedure differs for evaluating the expected losses of a bond portfolio. The so-called spread is used. It is defined as the difference between the risk free rate and the risk individual rate, a bond has to be discounted with. It quantifies the expected losses of a bond. First, the bond is discounted with the risk-individual interest rate and after that, with the risk-free rate. The

difference of these present values is the present value of the expected losses of the bond portfolio.

Another risk a bank faces is the operational risk. It occurs when people make mistakes or machinery does not work in the right way. Even risks resulting from lost legal proceedings are defined as operational risks (Pfeifer 2006, p. 446). The expected losses, which result from this risk category, must be discounted as well. The procedure is similar to the method of discounting the expected credit losses. First, the average sum spent onto operational risk has to be quantified. This is difficult enough, as processes have to be transparent in banks in order to define losses from operational risk. After that, the bank has to sum up all its transactions that exist at a certain moment. The yield book and all other assets and liabilities are added. The result is a relation between the expenditures on operational risks and the sum of all transactions. As these transactions will stay in the bank related to their interest fixings or gliding average, the relation will be applied to a decreasing stock of transactions.

Expected losses are thus implemented into the treasury approach. Hence, the usage of the risk free rate is verified. In this model, the equity investor has no risk, as all risks are deducted with their expected value.

3.2.4 Costs and Earnings related to Active Transactions

In the next step, the costs have to be discounted as well (Weinzirl 2002, p. 44). First of all, they have to be divided into several categories in order to define whether they have to do something with existing transfers or future deals. The idea is to discount only the costs that have to do with existing transactions (Giesecke and Kühne 2005, p. 134). The following categories of costs could be defined in figure 4 (Bimmler and Mönke 2003, p. 31).

Fig. 4 Categorization of costs

Kind of costs	Back office costs	Overhead	Sales services
Description	All costs that are related to the handling of customer's transactions. The best example is the credit department.	All costs that have nothing to do with customer's transactions, for example controlling, organization, audit department and other strategic departments including the management board.	All personal staff related to sales. Typically, the employees of the branches and the specialists in investment banking can be mentioned here.
Exists for	Partly for new deals Partly for existing deals	Partly for new deals Partly for existing deals	Only for new deals
Denominator	Sum of customer's transactions	Whole balance sheet sum	---

Source: Reuse 2007, p. 100

The following paragraphs describe the way of discounting those costs. It has to be kept in mind that only those costs should be considered which are related to existing transactions (Giesecke and Kühne 2005, p. 134). Costs that only come up when new deals occur must not be discounted, as the related earnings are not considered either. The next question is how long the costs and earnings may appear.

Back Office costs: The same idea that occurs when discounting risks is used when discounting costs. After defining the part of the overhead costs that belongs to existing contracts, this sum has to be discounted over the time. Back office costs will remain related to the average sum of current account deposits and credits generated by fixed maturities or gliding averages (Thaller 2005, p. 147).

The most important number that has to be figured out is how many percent of the existing costs belong to the existing transactions in the balance sheet. This is solved as follows: the sum of all customers' transactions at a certain moment is compared to the sum which remains one year later. Dividing these two numbers leads to the factor the current costs have to be multiplied with in order to receive the costs that belong to existing deals. If on 31st December 2007, 1,000 € customer deals exist and one year later 350 € remain, the factor is 35%. 65% belong to existing deals.

Overhead costs (fix costs) have little relation to the daily business of a bank, but they are important as well. The procedure is similar to the back office costs. The only difference is that the whole balance sheet sum is considered when generating the above described multiple as shown in the sector operational risk. The percentage of the overhead costs relating to existing deals has to be defined as well (Dauber and Pfeifer 2006, p. 232). To

simplify the model in the practical section, the overhead costs can be treated in the same way as the back office costs.

Sales services are related to generating new contracts. As a consequence, they have not been considered when discounting costs of existing transactions. The conclusion is that sales forces do not generate additional value for the bank in relation to the existing deals. Surely, they generate earnings with new deals, but this aspect of sales forces is discussed later on.

As there are several cost aspects that have to be discounted in relation to active transactions, some earning positions have to be considered as well. The procedure is always the same:

1. Defining the earnings per year.

2. Evaluating how long these earnings will last according to the existing balance sheet transactions.

3. Discounting those earnings.

A bank has some typical earnings positions that are related to existing transactions. Figure 5 gives a short review and describes how the discounting should be done (Reuse 2007, p. 101).

Fig. 5 The present value of earnings

Earning position	Description	Discounting method
Earnings of guarantees	Many customers need guarantees for several purposes. This is strictly related to the existing asset balance sheet transactions.	The earnings of guarantees will decrease related to the decreasing asset transactions in the yield book.
Safe fees	Earnings from safes have a long maturity. They are stable earnings for a bank.	For evaluating this, two figures have to be known: the sum of all current accounts and the average closing rate of accounts. With these two numbers, the earnings can be simulated and discounted.
Earnings of depot accounts	Many customers deal with shares. They need custodianship accounts for this. A yearly fee has to be paid for having such an account.	Similar to the earnings of safes.
Rental income	A bank may have several buildings, which bring earnings as well. These earnings are stable and belong to the existing stock in the balance sheet.	Buildings are depreciated with 4% a year. The earnings will decrease with the same rate.

Source: Reuse 2007, p. 101

This detailed information is often not available. As a simplification, a percentage of how much of the earnings belong to existing contracts is estimated and discounted in relation to the whole balance sheet sum deduction.

3.2.5 Tax Effect

The tax effect is one of the most important aspects. Taxes are treated as costs; they are discounted corresponding to the deduction of the balance sheet sum. The aim is to quantify the taxes belonging to existing contracts. The procedure is as mentioned above. Usually, all deals of the balance sheet are used to discount the taxes resulting of existing business. Further, a tax rate has to be estimated. If no historical data is available, the standard tax rate that fits to the tax legislation of the bank's main headquarters has to be chosen (Reuse 2007, p. 102).

3.2.6 Performance Aspects

Last, the performance aspects have to be discussed. The central question is whether they will bring additional earnings. Three sectors have to be considered here:

- treasury,

- trading,

- future deals with customers.

According to the treasury a positioning in a maturity transformation structure does not generate additional value. The same aspects mentioned in the previous sections could be used here. As everyone who has access to the capital market would be able to duplicate the maturity transformation portfolio of a bank, the expected earnings do not increase the value. In the long run no one can beat the market, so additional value cannot be generated in this sector (Sonntag 2001, p. 81).

However, another aspect has to be mentioned – the realized earnings of maturity transformation have to be implemented. If a loan is granted and the treasurer decides not to close the position, a realized shareholder value results, if the interest rates decrease (Bannert 2000, p. 6 and Lach and Neubert and Kirmße 2002, p. 8). The argumentation for the liability side is similar. These realized earnings can be found in the present value of the yield book – if the treasurer closes the position today, exactly the present value of the yield book can be realized (Lach and Neubert and Kirmße 2002, p. 18). The same is done with trading. It does not generate value and can be neglected as mentioned.

The last performance part consists of expected deals with customers. New loans and new savings will generate an additional interest margin in the future. However, they also generate new cost cash flows, which were not considered in the sector above. This is not an individual advantage of a bank, sales people are interchangeable. So this part is set as zero as well.

As only secure cash flows shall be considered, all performance aspects are treated as zero – otherwise discounting with a risk free ratio is not possible.

3.3 Theoretical Analysis of the Model

3.3.1 Structuring the Model according to Existing Literature

Structuring the model according to the categorization mentioned in section 2.3, a clear allocation is not possible. On the one hand, it is a separate evaluation method, as all parts of the bank are described without the synergies (Thaller 2005, p. 147 and Hortmann and Seide 2006, p. 317). They define the parts used in the model explicitly as a separate evaluation method.

A classical reproduction or realization approach would be the result. The main argument is that new deals are not considered; only existing contracts are discounted. On the other hand, the (available) assets, liabilities, cost and earnings are transformed into cash flows and thus discounted according to an equity approach. As the yield book implements the refinancing side, the cash flow is defined according to the equity approach without the usage of the CAPM. It is not an entity approach, as the paid interests for the liability side are deducted directly in the beginning before discounting; a subtraction of the liability side in the end is not done and the WACC is not used.

As a consequence, the presented model is a mixed method, combining the aspects of a separate evaluation approach with those of a risk free equity approach.

3.3.2 Conclusions and Theory-Based Criticism of the Model

The presented model consists of existing approaches and is extended by aspects that are hardly described in literature. The model quantifies the value of a bank more exactly than every other approach. Theoretically, this approach has to lead to a lower value than the equity and earnings value approach, because maturity transformation is not considered as a value center.

The model offers several advantages. First, the usage is relatively simple. A bank that practices an integrated bank controlling can offer all required data very easily. Further, the separated evaluation has the advantage of showing the real value drivers or even value destroyers in a bank. This helps to manage a bank in a value based management style. Further, the exactness of results is given, as maturities of customer deals help to quantify the value in a balance sheet for the next years. Further, the earnings generated by the treasury are eliminated in an elegant way. Hence, the value of the bank consists of its efforts in the past only. Further, the risk free rate is taken, the CAPM discussion is solved in a very elegant way. Possible risks are discounted as well and subtracted from the value of the bank, so that there is hardly any remaining risk.

Of course, several disadvantages can be mentioned. The first one is data availability. Gliding averages and the other discussed data are only available from the internal strategic controlling, so that the approach can only be applied, if internal data are available. This is very difficult for the standard investor. Standard equity approaches could be done based on the balance sheet and the profit and loss account. But the target group of the bank's value often is the management that wants to do value based management. The management has access to all internal data, so this disadvantage only occurs for external investors.

Every method of corporate evaluation has its critical parameters which influence the value of a bank. The standard equity approaches need an individual discounting factor and forecasted annual surpluses as well as a terminal value. Varying these factors will lead to different values. The presented treasury approach does not need the terminal value or the individual discounting factor. The gliding averages, the percentages of costs belonging to existing transactions and the assumptions of discounting those earnings, risks and costs have strong influence on a bank's value. This has to be kept in mind when interpreting the results derived from this approach.

Further, synergies are not directly implemented. The simple addition of the value parts is unable to consider synergies. However, it can be argued that these synergies are inherently quantified in the existing present value, as they must have led to higher contribution margins in the end.

4 Empirical Test of the Treasury Approach

4.1 Survey and Basic Data

In order to achieve empirical results to test the model, a survey was done in 2006 (Reuse 2007, p. 53). In addition to the questions asked in the survey, the questionnaire offered the possibility to evaluate the value of those banks that offer specific data. Nineteen banks wanted to have a corporate evaluation of their bank's value. Therefore, they offered their data to the author in order to apply several approaches of corporate evaluation. The treasury approach as well as the equity approach, the earnings value approach and the multiplier approach based on data before the financial crisis were applied. The detailed process of setting up the model can be found in Reuse 2007, pp.105–124.

A corporate evaluation was done for the following banks as shown in figure 6:

Fig. 6 Structure of the banks with an interest in a corporate evaluation

Type of Bank	Number of answered surveys	Wanting an Evaluation	Percentage
Big Bank	2		
Bank	7	3	42.86%
Clearing House			
Geno	21	8	38.10%
Geno special.	3	2	66.67%
Mortgage Bank	2	1	50.00%
Savings Bank	16	5	31.25%
Sum	**51**	**19**	**37.25%**

Source: Reuse 2007, p. 125

It is not surprising that the two big banks did not fill out the questions due to the fact that they treat internal data as very sensitive. The other results lead to the conclusion that the interest in a corporate evaluation exists in all banking groups. Nevertheless, it is a success that so many banks offered internal data in order to get a corporate evaluation.

4.2 The Corporate Value of the 19 Banks

These 19 banks were analysed by using five approaches of corporate evaluation. The empirical analysis can be found in detail in Reuse 2007, pp. 105–124. All five approaches, their setup and parameters are discussed in detail there. But the main focus of this article is to present the results of these findings based on the treasury approach. Therefore, a detailed description of the model parameters and the calculations is left out here.

After using the approaches mentioned above, the corporate values of the 19 banks can be stated as shown in figure 7. Specialized banks (not defined as all-purpose banks) are marked bold in figure 7. The next step is to index these findings. This is done in figure 8.

Fig. 7 Results of the corporate evaluation for all banks, n = 19

Data of the banks		Absolute Results				
Number	Name of the Bank	Equity Value	Treasury Approach	Equity Approach	Earnings Value Approach	Multiplier Method
11	Bank 11	29.00	67.18	69.67	56.46	53.72
22	Bank 22	15.00	18.69	35.33	49.67	28.67
51	**Bank 51**	**1,500.00**	**4,671.62**	**3,720.74**	**6,473.83**	**3,450.20**
159	Bank 159	10.00	13.87	28.70	22.82	22.31
160	**Bank 160**	**5.20**	**6.31**	**13.16**	**11.53**	**9.56**
185	**Bank 185**	**513.00**	**498.11**	**1,019.12**	**1,900.29**	**985.59**
277	Bank 277	393.00	575.33	722.17	1,004.09	687.29
311	Bank 311	232.26	200.99	250.72	354.94	288.33
346	Bank 346	160.84	218.14	342.80	117.24	282.61
365	Bank 365	21.20	32.49	45.49	44.98	40.47
398	Bank 398	726.00	1,059.76	1,360.18	1,577.65	1,301.97
476	Bank 476	11.00	39.89	21.06	14.69	22.15
488	Bank 488	33.21	48.10	78.70	83.64	62.12
489	Bank 489	14.30	21.02	28.24	25.64	26.45
607	Bank 607	15.26	30.38	30.41	29.48	28.94
621	Bank 621	83.00	137.39	99.15	86.47	122.17
637	Bank 637	20.76	17.36	28.26	37.93	31.39
695	Bank 695	22.20	28.90	51.56	38.15	42.21

Source: Reuse 2007, p. 126

Fig. 8 Indexed value of all banks based on all approaches, n = 19
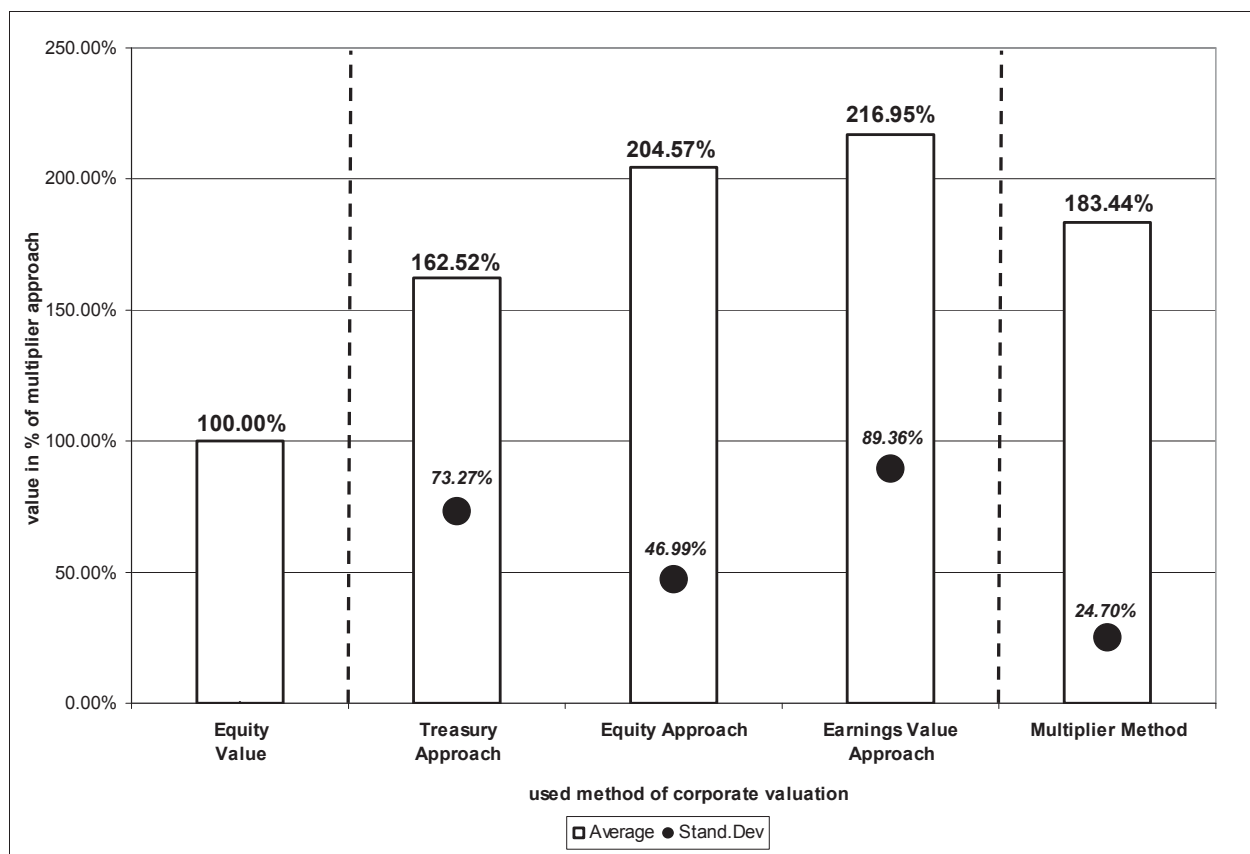
Source: Reuse 2007, p. 127

4.3 Summing up the Main Results

The results of the findings can be summed up as follows: The value generated by all other approaches is higher than the equity value. This is a good indication for the validity of the data. Analyzing the approaches in detail leads to the following results: The multiplier method generates a value that is 183.44% of the equity on average – with a standard deviation of only 24.70%. The internal approaches lead to higher standard deviations. This implies that the multiplier approach is better than the other models, as the results are very stable. But this has to be seen critical. The multiplier approach is only an external approach. It does not consider internal aspects and can thus be treated as a first hint only. Further, corporate values react more sensitively to internal data changes. A higher volatility is usual.

The equity approach, often discussed as the best model in theory, leads to the lowest standard deviation and a corporate value of about twice the equity. The earnings value approach leads to nearly the same result but with a higher standard deviation. Both approaches state that the bank is worth about 205%–215% of the equity. This is very interesting, as this result is higher than the 183.44% coming out of the multiplier approach, based on the stock-listed German big banks. A possible conclusion is that smaller banks in Germany have a higher value than the stock-listed companies – but no one considers this. This is the main problem in the German banking sector. Genos and savings banks represent themselves under value, even though many hidden reserves and a

high potential of growth are given in these sectors. However, the banks do not realize this. Both shareholder value based management and the evaluation of their own value belong together. Nevertheless, both are not realized completely in practice. Most investors think that the major stock listed banks have the highest value – but this is not the fact. A missing brand management or a better shareholder value management might help to increase in particular the value of Genos and savings banks.

Last, the verification of the treasury approach is also given – even though the underlying data are not reliable in a quantitative way. This leads to a higher standard deviation compared to earnings value and equity approach. The treasury approach reacts more sensitively to changes in the parameters than the other approaches. But the value of the bank is lower when using the treasury approach, even though a real risk free ratio is used. The reason is that the expected result of maturity transformation is set as zero. Therefore, the value of the banks generated by the treasury approach must be lower than in the other approaches. This is a fact – the value is about 1/4 lower when using the treasury approach. This verifies the quality of the approach; it is proven by the practical application. It is interesting to see that the resulting value is even lower than the value resulting from the multiplier approach. A conclusion can be that even the market has not recognized that maturity transformation is worth nothing regarding the question of corporate value.

5 Critical Discussion and Outlook

Summing up the results of this work leads to the following conclusion: Existing approaches of corporate evaluation cannot be used directly for banks. The entity approach for example is not useful in the banking sector as it does not consider the fact that banks earn money with the liability side.

The central value driver that has to be discussed is the value of maturity transformation. The developed treasury approach takes this into consideration. Using the present value extension of the market interest rate method and the gliding average approach, only the cash flows of existing deals and positions are considered. Costs, expected losses, taxes and earnings are subdivided into those that belong to new deals and into those that belong to existing deals. Discounting all those cash flows can be done with a risk free rate, so the CAPM can be neglected. The value of treasury is set as zero.

Accordingly, every bank that does integrated bank controlling should be able to apply this approach. Surely, the assumptions are debatable, as some of them react very sensitively to changes.

As no new deals of the future have to be forecasted, the prognosis risk does not occur. This is a very important advantage. Further, the model enables the bank to get management impulses out of it. As it is a mixture between a separate evaluation approach and a discounted cash flow approach, the parts of the bank that generate the most value can be defined. The management thus knows about its critical success factors and about its core competencies. This information is not generated by classical approaches.

The parts of the developed model are completely known in theory and even often in practice – but their combination and their usage as a corporate evaluation tool is new and

could help the model to become accepted in the banking sector. Applying the approach onto 19 banks has shown that at least a weak empirical verification can be stated.

The current financial crisis in the banking sector (Frère, Reuse and Svoboda 2008) leads to the importance of quantifying the value of a bank in an exact way – and to make the value drivers and especially the value destroyers separable.

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