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ORIGINAL ARTICLE

Valuation Techniques Under Construction—About the Dissemination of the CAPM in German Judicial Valuation

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Abstract Valuation techniques, such as discounted cash flow and multiples, are applied in transactions and are also relevant for accounting, tax, and litigation issues. Within these and other valuation purposes, the techniques are crucial for "social interactions" like market processes and legal affairs. We examine this "social dimension" of business valuation and look especially at the advancement of valuation knowledge and techniques. For this purpose, we employ an approach based on "actor-network-theory" (ANT). In order to study specific margins of business valuation, the focus lies on the dissemination of the capital asset pricing model (CAPM) in German judicial valuation. We conclude, inter alia, that "the" CAPM has developed into a growing actor-network over the time, a well-established infra-structure which allows other actors to link to it. The CAPM-network deploys specific actors which enable to conduct or implement advantageous actions. In this context we discuss concepts like co-authorities, (vague) labelling, vague referencing and responsibility at a distance. Moreover, we identify specific arguments which are used by courts regarding the application of the CAPM. We suggest that these arguments are particular important to solidify and perpetuate the application of the model in judicial practice. The present study intends to shed light on the process of the construction of valuation techniques, the actors which are involved in this process, and the interactions of these actors. In doing so, we intend to facilitate and objectify the dialogue between actors in business valuation and thus to improve further ambitions to construct valuation techniques.

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1 Introduction

In recent years, the Capital Asset Pricing Model (CAPM) has established as one conceptual basis for business valuation purposes in German courts (e.g., Ballwieser and Hachmeister 2016, pp. 264–265). Since then, the model has been a controversial issue in courts; it has been criticized and defended by judges as well as by experts. Usual circumstances of judicial business valuation already make this controversy understandable: Common occasions in which German courts are involved in business valuation issues are "squeeze-out" cases. Under specific conditions, majority shareholders can exclude minority shareholders, i.e., they can decide, that the shares of the minority shareholders are transferred to the majority shareholders. In return, § 327 a sec. 1 Stock Corporation Act (Aktiengesetz, AktG) prescribes an "appropriate compensation in cash".[1] It is the task of judges to determine what is "appropriate" in this delicate, dominated conflict situation (Matschke et al. 2010a, 2010b, p. 7). In court cases, parameters of valuation calculations are the common ground to argue and dispute about the different actors' understanding of "appropriate" compensation. These actors typically include judges and the opposing parties, i.e., majority shareholders (defendants) and minority shareholders (plaintiffs), while both parties are accompanied by their counsels (lawyers and economic experts). It can be expected that the opposing parties usually make opposing efforts to fix the compensation. Accordingly, arguing about parameters such as the CAPM is a common, *material* means to solve litigation and thus to distribute wealth. We understand "material" as the economic logic and the technical, mathematical functioning of valuation techniques (similar Quill 2016, pp. 5–6).

From this material perspective, the CAPM is used to calculate a risk premium. The sum of this risk premium and the "risk free" interest rate is implemented in the discount rate of a present value calculus (e.g., DCF); thus, the CAPM can technically or materially be described as a component of the denominator in a present value calculation. Before the CAPM prevailed in court, the discount rate had been calculated by using the "traditional method" (e.g., Aha 1997, pp. 32–34; IDW 2002, chapter A, sec. 208, 295–297): The procedure also starts with a "risk free" interest rate and includes further adjustments (e.g., additions for operating risk without using the CAPM).

Science provides alternatives to the CAPM to calculate risk adjusted cost of equity or, more generally, discount rates for business valuation purposes. Examples are Ross's (1976) multi-factor model Arbitrage Pricing Theory (APT), the arbitrage-

[1] The manuscript refers to articles and court decisions in German. All respective translations are made by the author.

free approach of Kruschwitz and Löffler (2006) and the investment approach of Hering (2014) and Matschke et al. (2010b).

The dissemination of the CAPM in court might indicate, that it is materially superior (e.g., more consistent, more precise) to potential alternatives. However, there are strong reservations regarding the application of the CAPM in business valuation, too (e.g., Matschke and Brösel 2013, pp. 26–51; Hering 2014, pp. VII, 230–239, 280–286, 297–300, 2017, pp. 297–310; Obermaier 2004, pp. 294–362; Schneider 1995, p. 54; with regard to underlying neoclassical theory see Gordon 1962, pp. 14–15; Herbener and Rapp 2016; Olbrich et al. 2015; for critical empirical findings see e.g., Fama and French 1992, 1996). Thus, from a material perspective it is at least difficult to identify the CAPM as an ultimate, superior scientific approach which is propagated by an agreeing community of scientists and other experts. This indicates that the material dimension has limited potential to explain, what has fostered the dissemination of the CAPM in court.

Court decisions indicate that there are controversies beyond this material perspective on valuation techniques. For instance, in a case of the OLG Düsseldorf litigants criticize the use and the relevance of announcements of the Institute of Public Auditors in Germany (IDW) in which, inter alia, the CAPM is recommended, and declare that their application results in business values that are structurally below "true" business values (OLG Düsseldorf 2018, sec. 19). The court rejects this criticism and announces: "The IDW S 1 and the announcements of the FAUB [expert committee for business valuation and business economics, the author] both are accepted in valuation studies and the profession of public auditors and they are also predominantly considered in practical business valuations" (OLG Düsseldorf 2018, sec. 343). The example indicates that issues such as pressure groups (IDW), lobbying, (biased) technical work (IDW/FAUB, IDW S 1) and (prestigious) expert opinions (accepted in theory/by public auditors) are relevant for discussions about valuation techniques, too. We describe this additional level as *social* dimension of valuation techniques (similar Quill 2016, pp. 5–6).

Against the background of still ongoing disputes regarding the CAPM in court and limited explanatory potential of the material dimension, our generic research question (Q1) is as follows: How do social aspects influence the dissemination of the CAPM in German judicial valuation? By answering this question, we intend to shed light on the construction of valuation techniques in Germany, especially with regard to social aspects such as relevant actors and interrelations between them (e.g., group formation, conflicts). The following aspects indicate that the focus on judicial valuation and on the dissemination of the CAPM are promising for this purpose: (a) Courts are places where different actors (e.g., judges, lawyers, economic experts, plaintiffs, defendants) interact. They provide an interface of judicial valuation, practice, and theory. (b) Assumingly, an idealized flow of knowledge runs from academics ("development and advancement of knowledge"), via practitioners ("preparing knowledge for practical application and implementing it"), to judges ("make a decision with regard to expert knowledge"). As courts are the "end consumers" of valuation techniques and they need to justify their proceedings, we expect them to comment on the application of new techniques, especially regarding their application or rejection. (c) Court decisions are available in written form and

thus provide publicly available *accounts* (Latour 2005, p. 133) about statements and lines of reasoning in courts. For the present study, court decisions and accompanying literature (e.g., technical literature, announcements of lobby groups) are the basic source of research. (d) The CAPM is still topical and controversial in valuation theory and practice. It is often extensively discussed in court decisions.

The starting point of the present study is a closer look at the theoretical basis as well as the generic research question in Sect. 2. Sect. 3–5 contain the core analysis regarding the construction of valuation tools in judicial business valuation from a sociological perspective. The basic statements of this paper and a critical discussion are presented in Sect. 6.

2 ANT, Judicial Valuation and the CAPM

2.1 ANT and Business Valuation

There are already many contributions on different topics of business economics, especially related to finance and accounting, by taking a sociological perspective (for an overview see Vollmer et al. 2009). A promising starting point for the present study is ANT (for an overview see Justesen and Mouritsen 2018), which is especially formed and influenced by Callon (e.g., 1998, 1999), Latour (e.g., 1987, 1996, 2005), and Law (e.g., 1986).

A basic idea of ANT is to reverse the usual sociological approach and to explain the social rather than to explain something by the social (e.g., Latour 2005, p. 23). Thus, the point of departure is not some preformed concept of a "social phenomenon" such as group formation and legitimacy which is applied only to a question that requires answers beyond "formal logic" and/or natural sciences. ANT does not intend to patronize actors with preformed concepts (e.g., interests, motivations); it rather starts with an unbiased attitude towards concepts of actors themselves. In other words, the default setting of ANT-fieldwork is letting the specific actors of an area under investigation "talk" and "act" and thus, letting *them* explain what happens (Latour 1987, pp. 204–205; 1996, p. 371; 2005, p. 23).

Fundamental concepts of ANT are actors, actor-networks, black boxes, translations, calculating tools and margins (see basically Justesen and Mouritsen 2018, pp. 425–427). According to ANT action is always conducted by an assemblage of actors, i.e., action is always collective, the outcome of an *actor-network* (Justesen and Mouritsen 2018, p. 425). *Actors* can be *any thing*, i.e., humans and non-humans, that change the relations they become a part of (Justesen and Mouritsen 2018, p. 425). Accordingly, an actor is connected to other actors and the connection impacts the interrelations of the whole actor-network. Actors are components of networks in a permanent interplay with other actor-networks. Principally, actor-networks are permanently reconstructing themselves. However, as soon as an actor-network has stabilized and is recognized "as an unproblematic object, technology or uncontested fact", this actor-network is recognized to act as an integrated hole, a *black box* (Justesen and Mouritsen 2018, p. 426). The outcome of a black box, the result of its interacting actors, is not challenged, it is taken as indisputable.

The focus of ANT is rather on momentary, brief connections between actors than on actors themselves: these associations are the objects of investigation. Thus, sociology according to ANT means the tracing of associations (Latour 1987, p. 202; 2005, p. 5). A specific focus is on *translations* which are associations or links between actors that have not existed before (Justesen and Mouritsen 2018, p. 426). Translations bring together human and non-human actors in new constellations and, in doing so, transport transformations, i.e., they change the functioning of the altered actor-network (Justesen and Mouritsen 2018, p. 426; Latour 2005, pp. 107–108). After associations are established, subsequent processes and interactions result in reciprocal influences of the newly connected actor-networks. These influences may create unexpected results—which can be described as social phenomena (see basically Latour 2005, pp. 59, 107).

Actor-networks may include equipment like *calculating tools* (e.g., Callon 1998, p. 23; Miller 1991, 1998). These tools are virtually the constructions or achievements of former assemblages of actors: they constructed, for instance, accounting tools like bookkeeping, valuation tools like present value (PV) calculation, and theories such as the CAPM. These mere concepts or formulas respectively can be implemented within technical devices like software (e.g., DCF calculus in an Excel model) (see basically, e.g., Knorr Cetina 1991, p. 118).

Miller (1998) examines general historical developments in accounting. He concludes that, inter alia, by "looking at the margins of accounting, we can understand how this influential body of expertise is formed and transformed" (Miller 1998, p. 189). He uses the term *margins* to "refer to that part of the terrain or surface of accounting that, at a particular point in time, is immediately within its boundaries" (Miller 1998, p. 174). Using the image of changing boundary lines, we describe *border authorities* as actors, who set or change margins. Regarding business valuation, border authorities indicate the course of the boundary of adequate business valuation (e.g., within a court decision) and, in doing so, set and/or strengthen this border.

2.2 Research Questions and Sources of Research

In order to employ an ANT approach to investigate our generic research question, we adopt the basic idea of ANT and understand the CAPM as a potential actor or actor-network respectively. Potential actor-networks in German business valuation in general and judicial valuation in particular may comprise different compositions of actors (previous studies have already indicated actors and relations between them in German business valuation, e.g., see Ballwieser 2001, p. 3; Quill 2016, pp. 252–255, 2017): Such actors may include (a) human actors like academics, public auditors, managers, consultants, investors, students, lawyers, and judges; (b) valuation tools/devices (e.g., DCF, PV, CAPM, Excel models); (c) relevant theories or academic disciplines like formal sciences (e.g., financial mathematics, econometrics), business economics (e.g., finance, decision theory, capital budgeting, accounting, tax), humanities (e.g., law), and economics (e.g., equilibrium theory, value theory, marginal utility theory, macro- and microeconomics); (d) labels that attribute properties to other actors and are thus used to identify, describe, connect, clarify, and/or separate

actors (e.g., functional, subject-related, market-oriented, IDW S 1, state of the art, best practice, supreme court ruling, prevailing doctrine, winner of the Nobel Prize, public auditor, judge, professor); (e) manifestations, which are accessible, verifiable accounts of assemblages of actors (e.g., court decisions, expert reports, transactions, market prices, expert publications, IDW announcements); and, finally, (f) arenas where the other actors (inter-)act (e.g., markets, lecture halls, meeting rooms, IDW website, literature, offices, courts).

From this perspective, we focus on (a) *actors* and *actor-networks*, especially with regard to judicial valuation as well as to the CAPM, (b) new *associations* between actors and actor-networks, and (c) *interrelations* between newly connected actors. Accordingly, we refine Q1 as follows: How does the actor CAPM link to the judicial valuation network (Q2)? How does the CAPM interact with the judicial valuation network (Q3)? Which actors are deployed by the CAPM that favor its dissemination in judicial valuation (Q4)? This structure implies a typical process that affects actors and actor-networks: First, actors connect to a network; second, actors interact with a network, and third, actors may finally disconnect from a network. We employ the process elements *connection* (Sect. 3) and *interaction* (Sect. 4) to structure our following analysis.

The focus of Q2 is on the initial establishment of ties between the actor-networks judicial valuation and CAPM. Respective investigations are presented in Sect. 3 and intend to identify relevant actors and how these actors establish links between the actor-networks. In order to identify relevant actors and initial efforts to connect, we examine the respective accounts (i.e., court decisions and accompanying literature) with regard to circumstances or actions, in which actors are deployed in favor of the CAPM. Such *pro positioning* means, that an actor introduces another actor (i.e., the CAPM) and sets outs circumstances in favor of connecting this actor to an existing actor-network. Thus, a pro-position is a translation that tailors an actor (e.g., the CAPM) in order to introduce it to an existing actor-network; for that purpose, further actors such as positive labels (see Sect. 3) are linked to this actor (see basically Latour 1987, pp. 108–109). In doing so, pro-positioning aims at "[t]ying up with new […] allies" (Latour 1987, p. 124). A pro-position implies that it is contingent to reactions: Other actors may confirm or adopt and reinforce the pro-position and thus strengthen it. Alternatively, actors may reject the pro-position, perhaps by setting out circumstances to the detriment of the proposed connection.

Q3 intends to reveal interrelations between the newly connected actor-networks, particularly regarding effects, that change their former, isolated way of functioning. Accordingly, in Sect. 4 we focus on reciprocal influences between the CAPM and judicial valuation. *On the one hand*, this includes how the CAPM alters judicial valuation. Following the concept of black boxes, we identify a sequential process that includes the de-construction of the parameter "discount rate" (which we associate with opening a specific black box), the de-legation of different components of the discount rate (which we associate with embedding new black boxes), and the re-construction of these components/black boxes (which we associate with closing the black box discount rate again). *On the other hand*, we analyze how judicial valuation influences business valuation in general via the CAPM.

Table 1 Dissemination of the CAPM in German court decisions

Date	Court	Case	Content regarding risk premium calculation
19.10.1995	BayObLG München	3Z BR 17/90	Use of traditional method
11.12.1995	BayObLG München	3Z BR 36/91	Use of traditional method
03.12.1998	LG München	5 HKO 14889/92	Use of traditional method; CAPM inappropriate
18.02.2002	LG Bremen	13 O 458/96	CAPM accepted
25.02.2002	LG München	5 HKO 1080/96	CAPM accepted; however, assumptions not realistic
31.01.2003	OLG Düsseldorf	19 W 9/00 AktE	CAPM principally accepted for listed companies
14.01.2004	OLG Düsseldorf	19 W 1/03 AktE	CAPM principally accepted for listed companies
15.01.2004	OLG Düsseldorf	19 W 5/03 AktE	CAPM accepted
28.01.2004	OLG Stuttgart	20 U 3/03	CAPM accepted
01.04.2004	LG Dortmund	18 AktE 2/03	CAPM principally accepted for listed companies; not in this case (not listed company)
20.10.2005	OLG Düsseldorf	19 W 11/04 AktE	CAPM accepted
28.10.2005	BayObLG München	3Z BR 71/00	CAPM not superior to old approach
02.05.2006	LG Frankfurt	3-5 O 153/04	CAPM not appropriate for "squeeze-out" cases
26.10.2006	OLG München	31 Wx 12/06	CAPM not superior to old approach
26.10.2006	OLG Stuttgart	20 W 14/05	CAPM supported
30.11.2006	OLG München	31 Wx 59/06	CAPM not superior to old approach
19.03.2007	LG Dortmund	18 AktE 5/03	Adequacy of CAPM approach questioned
19.04.2007	OLG Celle	9 W 53/06	CAPM accepted and propagated; traditional approach rejected
13.11.2007	LG Frankfurt	3-5 O 174/04	CAPM not appropriate for "squeeze-out" cases
23.01.2008	OLG Düsseldorf	26 W 6/06	CAPM and traditional approach are appropriate
14.01.2009	KG Berlin	2 W 68/07	CAPM accepted, no objections
27.05.2009	OLG Düsseldorf	26 W 5/07	CAPM accepted
26.08.2009	OLG Frankfurt	5 W 35/09	CAPM accepted
19.01.2011	OLG Stuttgart	20 W 2/07	CAPM accepted
02.05.2011	OLG Frankfurt	21 W 3/11	CAPM accepted
14.09.2011	OLG Stuttgart	20 W 4/10	CAPM preferable to traditional approach
17.10.2011	OLG Stuttgart	20 W 7/11	CAPM accepted; no objections
05.03.2012	OLG Frankfurt	21 W 11/11	(Tax-)CAPM accepted
04.07.2012	OLG Düsseldorf	26 W 8/10	(Tax-)CAPM accepted
30.04.2013	OLG Karlsruhe	12 W 5/12	(Tax-)CAPM accepted
05.06.2013	OLG Stuttgart	20 W 6/10	(Tax-)CAPM accepted
17.07.2014	OLG Stuttgart	20 W 3/12	CAPM accepted
28.03.2014	OLG Frankfurt	21 W 15/11	(Tax-)CAPM accepted

Table 1 (Continued)

Date	Court	Case	Content regarding risk premium calculation
18.12.2014	OLG Frankfurt	21 W 34/12	(Tax-)CAPM accepted
31.07.2015	LG München	5 HKO 16371/13	(Tax-)CAPM accepted
17.01.2017	OLG Frankfurt	21 W 37/12	(Tax-)CAPM accepted
18.05.2016	OLG Karlsruhe	12a W 2/15	(Tax-)CAPM accepted
02.07.2018	OLG Düsseldorf	26 W 4/17	(Tax-)CAPM accepted

Finally, Q4 focuses on circumstances that foster or facilitate the dissemination of the CAPM in judicial valuation. Regarding this, Sect. 5 approaches specific actors that are deployed by the CAPM that make it favorable for other actor-networks to link to the CAPM-actor-network, too. In doing so, the discussion in Sect. 5 brings together concepts of the preceding sections.

Our fundamental source of research are court decisions in squeeze-out cases, which refer to the CAPM. For ANT approaches especially the period of a new actor-network being still under construction is a promising source of research (e.g., Justesen and Mouritsen 2018, p. 423). In order to identify the respective accounts, we have examined court decisions regarding statements that refer to the CAPM. Table 1 shows a selection of court decisions between 1995 and 2018 that explicitly refer to risk premium calculation in general and/or to the application of CAPM in particular. The chronology especially reflects the following four steps: The traditional method was used until 1998. In 1998, LG München (1998) referred to the CAPM (beta factors) and, in reference to Böcking and Nowak (1998, p. 685), rejected it because of its discretionary powers. During the following years, from 2002 to 2005, the CAPM was accepted in different decisions. After this period, from about 2005 to 2008, there were again some court decisions that rejected the CAPM while others supported it. However, this second wave of criticism has flattened out. Since approximately 2009 the (Tax-)CAPM has prevailed as a common method to calculate risk premiums in court.

In subsequent court rulings, the decision and line of reasoning of the OLG Düsseldorf (2009) has been adopted. The application of the CAPM solidifies (e.g., OLG Stuttgart 2011a, 2011c, 2011d); courts focus on details of the CAPM (e.g., market risk premium, Tax-CAPM). This indicates that the decision of the OLG Düsseldorf (2009) has been a turning point of court rulings.

The dissemination of the CAPM in German litigation takes several years. The chronology indicates when the margins of business valuation for judicial purposes change. The focus of our further analysis is on the period between 2002 and 2010. Respective court decisions of this period give account about *who* changes the margins and *how* this specific actor *reasons* or *justifies* the acceptance or rejection of the method.

3 The CAPM Connects with Judicial Valuation

3.1 Pro-positioning by Judges

In a decision of the LG München the court juxtaposes the traditional approach with the CAPM (LG München 2002, pp. 22–23). The court's line of reasoning reflects a focus on temporal and inter-subjective attributes of the two approaches. On the one hand, the traditional approach is connected with a valuation standard which was "valid at *that* time", while the CAPM is connected to "modern economic literature" (LG München 2002, p. 22). On the other hand, the court labels the traditional approach to be hardly verifiable by third parties; contrarily, the CAPM is said to be "open to rational review and discussion" (LG München 2002, pp. 22–23). Finally, the court qualifies the traditional approach as *individual estimation* and the CAPM approach as *calculation* (LG München 2002, p. 23). Accordingly, the court deploys contradictory pairs of terms to *label* the alternative concepts: old/modern, not verifiable/verifiable, individual estimation/calculation (see basically Latour 1987, pp. 190–191). The labelling is part of the court's line of reasoning in favor of the CAPM and to the detriment of the traditional approach; the labels highlight positive attributes of the CAPM and negative attributes of the traditional approach. Accordingly, we specify labels as translations that describe a specific actor (e.g., the CAPM) in a specific context or a specific actor-network respectively (e.g., judicial valuation) (see basically Latour 1987, p. 116).

A further example of pro-positioning via labelling is the decision of the OLG Düsseldorf (2009). Obviously, the CAPM is of essential importance to the court: it is relevant in different sections of the decision and part of the decision's guiding principle: "In business valuation, the Capital Asset Pricing Model (CAPM) is currently the most important model for determining risk-adjusted cost of capital" (OLG Düsseldorf 2009, guiding principle). In the context of its general justifications to support the CAPM, the court equips the model with a number of labels as well as accompanying citations to verify these labels. According to the OLG Düsseldorf (2009, sec. 122–124), the CAPM is generally accepted in the (inter-)national valuation practice (*[inter-]national state of the art*). It is based on a broadly accepted theoretical foundation (*grounded in theory*); it embeds capital market data (*market related*); it fosters verifiability and increases objectivity via the use of generally accessible market data (*verifiable, objective*); it is based on facts rather than on estimation (*based on facts*). Although it has its weaknesses it is the best available alternative (*best alternative*).

The examples reflect that the CAPM enables courts to enrich their lines of reasoning regarding the discount rate with labels that highlight advantageous attributes of the CAPM. In doing so, they pro-pose in favor of the CAPM and thus initiate reactions of other actors (e.g., acceptance, confirmation, rejection, revision).

3.2 Pro-positioning in Literature

In 2007 and 2008, "Die Wirtschaftsprüfung" (WPg), an influential journal of the IDW (Follert 2020, p. 107), provides issues focusing on the CAPM and its judicial

application. The literature includes CAPM-related labelling such as the following: objectification via market relation (objective) (Kuhner 2007, p. 827), applied in international practice (state of the art) (Jonas 2007, p. 843; Kuhner 2007, pp. 827, 831, 834), fair value (Kuhner 2007, pp. 827–828), current professional standard of the IDW (Hüttemann 2007, pp. 819–820; Kuhner 2007, p. 827), outstanding acceptance in (inter-)national valuation theory (Hüttemann 2007, p. 820; Kuhner 2007, pp. 831–834), principle of business valuation (Kuhner 2007, p. 827), broadly accepted theoretical foundation (Hüttemann 2007, p. 820; Löffler 2007, pp. 809–810), acceptable empirical results (Löffler 2007, p. 810), best available alternative (Jonas 2007, p. 843; Löffler 2007, p. 809), new approach (Hüttemann 2007, p. 819), and market-related derivation (based on facts) (Hüttemann 2007, p. 820).

Moreover, contemporary legal commentaries take care of the issue. For instance, Paulsen (2010, sec. 126), who was president of the OLG Düsseldorf at that time, publishes an account, which includes, in part literally, elements of the CAPM-related reasoning of OLG Düsseldorf (2009, sec. 122). Thus, on the one hand, she repeats the reasoning of the court including its labelling and thus fosters and solidifies the arguments. On the other hand, she additionally transfers the content to a different source. As an author of a legal commentary, Paulsen takes another "role" than as a judge. While the author *gives general expert advice* on how to proceed, the judge must *make a decision* in a specific case—perhaps based on such expert advice. As a result, Paulsen literally duplicates the respective content: the pro-CAPM court decision represents legal legitimation and the article represents expert opinion (for instance, LG Berlin 2016, p. 44, cites both sources in order to verify a statement).

Finally, in the time frame under consideration, accounts by the IDW reflect an intensified consideration of the CAPM by the professional association. A prominent account for this is the development of the respective valuation standard, IDW S 1. Since 2000, the IDW allows for a mandatory application of the model to conduct a "market related calculation of the risk premium" (IDW 2000, sec. 98; 2005, sec. 100; 2008 sec. 92). While the respective wording in the IDW S 1 does not change, accompanying literature reflects a stronger shift on behalf of market-related calculation of the risk premium and the CAPM since 2005 (IDW 2007, chapter A, sec. 2, 188–196). Accounts of the IDW provide labelling of the CAPM, too. The professional association ties the CAPM to labels such as market-related calculation (e.g., IDW 2008, sec. 92), inter-subjectively comprehensible practice (IDW 2007, chapter A, sec. 196), based on modern portfolio theory (IDW 2007, chapter A, sec. 189), and applied in (inter-)national practice (IDW 2007, chapter A, sec. 185, 293).

3.3 Inviting to join "Good Company"

In 2007, interrelations between valuation theory, practice, and jurisprudence are discussed in an interdisciplinary discussion forum of business economists (Herzig, Löffler, Kuhner), a jurist (Hüttemann), a judge (Paulsen), and a practitioner/public auditor (Jonas) (Kuhner and Jonas 2007). While the academic state of knowledge as well as its implementation in practice and litigation are general topics of the discussion forum, a key issue is the application of the CAPM.

After the "capital market-oriented concept" is introduced to represent the current state of science—which apparently is represented by Kuhner—, the IDW, along with its announcements, is presented to basically reflect this state of knowledge (Herzig 2007, p. 807 with reference to Kuhner and Maltry 2006, pp. 53–57). According to Kuhner and Jonas (2007, p. 805) as well as Herzig (2007, p. 807), the CAPM pertains to this state of knowledge. In jurisprudence, however, a backlog is identified: With reference to judicial valuation, Kuhner announces that "an exclusive obligation to use capital market related methods has *not* prevailed *yet*. In jurisprudence, there is rather a plurality of methods" (Kuhner 2007, p. 831, emphasis by the author). Similarly, Herzig (2007, p. 807) and Jonas (2007, p. 843) describe a *hesitant* position of the courts. Hüttemann (2007, p. 821) expects that the CAPM will prevail in court and that further discussion will shift to details of its application.

Obviously, business economists put courts in a defensive position; they impose them to justify their hesitation and/or to follow suit. Against the background of the ambiguous reputation of the CAPM and opposing academic doctrines, this situation is remarkable. Specific actors label themselves as representatives of "the state of the art" and label the IDW including its announcements as proper proxies for this knowledge.

In a subsequent WPg series of articles, Ballwieser (2008, p. S105) presents three major properties of the CAPM which he assumes to be relevant to its significance. One of these reasons is the honoring of Sharpe with the Nobel Prize (Ballwieser 2008, p. S105; Nobel Media AB 2019). The label makes the network even more attractive and unique. Similarly, Großfeld refers to a Nobel-laureate as an indicator for "sophisticated [economic] models" (2002a, p. 350).

Especially labels such as "state of the art in science", "prevailing opinion in science", "best practice of public auditors" and "Nobel Prize-winning" indicate that important, powerful, and highly qualified actors favor the CAPM (see basically Latour 1987, p. 31: "bringing friends in"). Accordingly, the CAPM-valuation-network promises potential new actors to *be in good company* (similarly, Drukarczyk and Schüler 2009, pp. 55–56; Kruschwitz and Löffler 2015, p. 179). In other words, a specific actor-network deploys, i.e., it presents and offers important actors and powerful labels. Courts are invited to join this network.

With some time-lag, Paulsen discusses the matter again in the WPg and outlines that one might criticize that jurisprudence does not always seem to follow business economists directly when they follow new paths in business valuation (Paulsen 2008, p. S109; see further 2007). Paulsen (2008, p. S109) concludes that "jurisprudence should not ignore *verified* advances in knowledge of (business) economists" (2008, p. S109, emphasis by the author). Paulsen's (2008) further discussion implies that she basically favors the CAPM and recognizes it as such a verified advance in valuation theory. Thus, Paulsen confirms to accept the CAPM for judicial business valuation. However, she reminds (business) economists of their duty: "Further persuasive work is necessary to determine verified knowledge. This includes that (business) economists solve controversial issues *in using* the CAPM" (Paulsen 2008, pp. S112–S113, emphasis by the author). In doing so, Paulsen shifts the discussion from the question *whether* the model should be applied to *how* the model should be applied.

Paulsen's (2008) account is an example for a judge winding up the general debate in favor of the CAPM and thus confirming and solidifying its judicial application. However, her statement implies further interesting aspects. *First*, Paulsen follows the offered line of reasoning that (a) market-oriented valuation theory reflects the current state of knowledge in theory and (b) the professional opinion of the IDW is a proper proxy for this "state of the art". Although "the" current state of knowledge in German theory and practice are important issues, they are not in focus of the present analysis. However, we are sceptical to generalizations in such a heterogeneous and controversial subject like business valuation. Accordingly, we specify (a) and (b) as vague labels. Nevertheless, as court decisions (e.g., OLG Düsseldorf 2012, sec. 2.2.1.1.; OLG Stuttgart 2014b, sec. 81–82) indicate, judges follow similar lines of arguments up to today (further see Sect. 5.2). *Second*, Paulsen gives business economists an assignment to focus on details of the CAPM and to solve controversies about specific issues. Coming from a defensive position, jurisprudence turns the tables to business economists. By drawing the attention to details, further resources are mobilized in favor of the CAPM. Current and potential actors are invited to contribute to the network. *Third*, as a result, Paulsen's (2008, pp. S112–S113) account and her pro-positioning to the CAPM is an example for a transition from initial connections to interactions.

4 The CAPM Interacts with Judicial Valuation

4.1 The CAPM Influences Judicial Valuation

4.1.1 De-construction

We understand de-construction as disassembling a former black box (e.g., discount rate, CAPM). Accordingly, an actor-network which has formerly been recognized as an integrated whole providing specific action (e.g., calculating a discount rate for PV) is split up in different components. As a result, components or actors, which fulfill specific actions, are deployed. Regarding the dissemination of the CAPM in court, these components include the parameters of the CAPM formula, i.e., the risk-free rate of interest, the market risk premium (MRP), and the beta. When we look at the traditional approach of calculating the discount rate, especially the risk premium is labelled as subjective and dependent on discretion. While courts had accepted these conditions in the pre-CAPM era, the emergence of the CAPM allowed courts to open the black box discount rate (Latour 1987, p. 131) and to *structure, illustrate, formalize* and *modularize* it. As consequence, a huge range of new, CAPM-related actors were unfolded for judicial application.

We understand *structuring* as an instrument to give form and rules to the estimation of the discount rate. This procedure provides actors with a framework or a guide about how to proceed in valuation. Aligning the procedure helps to stabilize and perpetuate valuation and to make the valuation procedure more consistent and comparable (for a respective legal need see, for instance, Paulsen 2008, p. S110; 2010 sec. 95). For instance, Löffler (2007, p. 811) criticizes the traditional approach

and its lump-sum risk premiums. Especially for judicial application he identifies "typing" as an alternative: It includes the determination of (a) a specific model, namely the CAPM, (b) the relevant parameters, and (c) the procedures for deriving the parameters empirically (Löffler 2007, p. 811). Following this approach, the black box risk premium is re-specified as the result of specific parameters which are all re-integrated in the (judicial) discussion: In contrast to the traditional approach, courts are (potentially) re-enabled to participate in the discussion about risk premiums. Consequently, the disassemblage of the model steers the discussion to different components and thus allows to disassemble the solution, too. The adoption of the CAPM by courts enables them to structure their task to decide about the appropriateness of discount rates. In doing so, former commitments about form and rules of this structure ("typing") makes the courts' decisions more comprehensible: Finally, the mediator CAPM steers the discussion from a black box to mere "matter of facts" (i.e., parameters of the components). Literature describes this procedure as *objectification* (e.g., Hüttemann 2007, pp. 820–821; Kuhner 2007, p. 827; Paulsen 2010, sec. 79, 127, 131; see further OLG Karlsruhe 2008, sec. 72; OLG Düsseldorf 2009 and Großfeld 2002a, p. 361).

Moreover, *illustration* describes the way of presenting and explaining the discount rate as well as its components. Großfeld (2002b, p. 226) summarizes the underlying legal need beyond sheer numbers: "We continue to need people that can 'figure it out' (to display it in visionary form)". Regarding the significance of the CAPM, Ballwieser (2008, p. S105) describes one of three potential reasons as follows: "The equation is 'handy' and easy to interpret." As judicial business valuation usually involves important actors which are laymen regarding business economics (e.g., judges, lawyers, plaintiffs, defendants) (e.g., Großfeld 2002b, p. 227), good illustration enables them to better comprehend the discussion, the arguments and the result. It creates a (better) common basis of understanding, what is meant with "discount rate" and how "risk" is incorporated. The (superficially) easy logic of the CAPM makes the dialogue about a significant element of valuation models more vivid. For instance, the beta allows to explain the risk premium as simple, linear relationship between the beta factor and the MRP: at a beta of 1, the valuation object is as risky, as "the" market; if it is greater (less) than 1 it is riskier (less risky) than "the" market.

Formalization describes an approach that allows to embed mathematic calculations into the estimation of the discount rate. In contrast to the risk premium of the traditional approach, which is derived from a "subjective" black box ("expert estimate"), the CAPM allows to incorporate an impressive set of formulas (similarly, see Ballwieser 2008, p. S105). In doing so, the CAPM operationalizes components of the discount rate and thus makes them visible, calculable and accessible for discussion.

Recurring to the "original" CAPM, we can describe the expected cost of equity ($\mu\left(r_j\right)$) of a company j as follows (e.g., Ballwieser 2008, p. S105):

$$\mu\left(r_j\right) = r_f + \beta_j[\mu\left(r_M\right) - r_f] \tag{1}$$

with:

$$\beta_j = \frac{\sigma_{jM}}{\sigma_M^2} \tag{2}$$

Accordingly, the CAPM illustrates expected cost of equity of a specific company as the sum of a "risk-free" base rate (r_f) and its specific risk premium. The latter is the MRP ($\mu(r_M) - r_f$), which is weighted by a company related beta (β_j). The approach complies with the general trend in (business) economics to formalize and mathematize (e.g., see Großfeld 2002b, pp. 223–227; Quill 2016, pp. 80–83). We can outline this trend—which itself is an interesting issue of further research—with buzzwords like "making a social discipline more 'scientific'", "internationalization"[2] of German (business) economics and enabling for "empirical verification". Jurisprudence has recognized this trend (e.g., Großfeld 2002b, pp. 223–224, 227) and generally expressed to be willing to follow it (critical Großfeld 2002b, p. 227; 2002c, pp. 2–3). Although courts were sceptical at times (e.g., BayObLG 2005, pp. 157–158; OLG Düsseldorf 2009, sec. 103; OLG Frankfurt 2009, sec. 10), the possibility to incorporate formulas and (at least lean to) mathematical "precision", "scientific" approaches, "logical" proceeding and empirical "verifiability" is obviously tempting (similar Großfeld 2002b, p. 224, Großfeld 2012, sec. 18–19; further see Robson 1992, pp. 686–689). At least, any formula splits a problem to its variables and thus allows to steer or shift the discussion to these details. For instance, Paulsen (2008, p. S112) highlights the advantage of the CAPM to allow for arithmetic consideration and conversion of different debt ratios within the beta factor. This results in comparability, as the unlevered beta factor of companies with comparable operative risk must be similar (Paulsen 2008, p. S112).

Finally, *modularization* refers to the technical splitting of the discount rate in its components. Modularization allows to de-legate concrete working steps to estimate components of the risk premium (see Sect. 4.1.2). It increases the vertical integration and thus allows for outsourcing.

Besides the de-construction of the CAPM itself, even the judicial task is deconstructed. The discussion about using the CAPM also fosters the discussion about the split of the judge's task in a "legal question" and in "matter of facts" (e.g., Kuhner 2007; Paulsen 2008, p. S109; see further BGH 1978, sec. 30–34, 2015, sec. 10–14). The *former* focuses on the judge's core competence; it is reserved to be solved only by him-/herself. It refers to the clarification of relevant legal norms (Kuhner 2007, p. 825) as well as the definition of the objective of valuation (e.g., the meaning of "adequate compensation") and the choice of the proper valuation method in order to achieve this objective (Hüttemann 2007, pp. 812–813; Paulsen 2008, pp. S109–S110). The *latter* is about specific value aspects and factors within judicial valuation (Paulsen 2008, p. S109). It can be transferred to experts and is thus open(ed) for outsourcing.

The de-construction of the legal task is about the distribution of tasks, responsibilities, and competencies (similar Kuhner 2007, p. 825). Thus, it helps to organize

[2] "The term 'international' [...] adds a kind of glamour to their status" (Großfeld 2002a, pp. 342–343, also sceptical).

and clarify judicial valuation procedures. It includes a division of labor between jurists and economic experts (similar Hüttemann 2007, p. 812). While judges reserve fundamental elements for themselves, they delegate others to (usually economic) experts (e.g., public auditors). This describes how experts' written (valuation) reports and flanking oral explanations are embedded in court cases: They give experts appointed by courts and/or the opposing parties the possibility to explain and elaborate on their positions and opinions. However, this is strictly limited to "matter of facts".

Finally, for instance Hüttemann (2007) discusses the legal question in more detail. He highlights that the general value concept in judicial valuation is the "true value" (2007, pp. 813–814). He further elaborates that "true value" is unfortunately hardly specified and thus ambiguous (2007, p. 814). For judicial application, Hüttemann (2007, p. 814) presents the "fictive market value" as a helpful concretization of the true value (further see BGH 2001 as well as Jonas 2007, p. 839). In his further discussions regarding discount rate, risk premium and beta, he refers to "market-related" valuation and highlights the advantage of the CAPM, which is based on market returns and thus "on facts" (Hüttemann 2007, pp. 819–820). According to Hüttemann (2007, p. 827), market-oriented valuation fosters objectification. Hüttemann's line of reasoning indicates that the market relatedness of the CAPM harmonizes with a value concept that is preferred by courts (see similarly, Paulsen 2010, sec. 126; further see Sect. 5.1 lit. c).

Moreover, de-construction implies steering the focus from the general concept to its components. We can identify this step with court decisions which discuss components of the CAPM (e.g., OLG Stuttgart 2014b; LG Düsseldorf 2016), but also in accompanying literature (e.g., IDW 2007, chapter A, sec. 283–309). As de-construction is about focusing on CAPM details, it implies defocusing from the general discussion about the model, including fundamental criticism. We can find examples of *distancing* or *alienation* from criticism in written accounts (e.g., court decisions and literature) including their references. For instance, rather early court decisions deploy fundamental criticism directly (e.g., LG München 1998, BayObLG 2005, LG Dortmund 2007); some academics raise and expose strong criticism (e.g., Hering 2006, pp. V, 223–243; Matschke and Brösel 2007, pp. 31–49; Schneider 1995, p. 54 "Beta-Kokolores"), while others create more distance (e.g., Drukarczyk and Schüler 2009, pp. 55–56) or even disregard criticism (e.g., Wüstemann 2007, p. 2226).

4.1.2 De-legation

The de-construction of the CAPM as well as the de-construction of the judicial task pave the way to de-legate specific operations regarding the determination of CAPM components. We understand de-legation as passing over a specific task (e.g., prepare a valuation report, determine the MRP/beta/risk-free rate) to another actor (e.g., expert, IDW, "Bloomberg Terminal"), while, at the same time, the responsibility for the "quality" of the fulfillment of this task passes over to this actor, too. Via de-legation, further actors are integrated or embedded into judicial valuation.

As the examples have already indicated, de-construction takes place multilayered: Basically, courts involve economic experts to report about "matter of facts". These experts usually produce a (written) expert report that bases on a valuation model which is set up using a software (e.g., Excel). A possible and nowadays usual element of such valuation models is a CAPM-based discount rate. As the CAPM offers for de-construction, at the same time, it offers for further de-legation: For components such as the MRP, the risk-free base rate and the beta, additional actors have established and are thus available for incorporation in judicial valuation.

Since about 2006, the IDW (FAUB) provides recommendations regarding "proper" ranges of the MRP within its announcements (e.g., Wagner et al. 2006, p. 1019). The respective elaborations illustrate that these ranges are derived from "scientific studies" (e.g., see Stehle 2004) based on historical German capital market data (e.g., DAX and C-DAX) (e.g., Wagner et al. 2006, pp. 1016–1019). For instance, Bungert (2008, p. 817) describes the application of empirical data such as the "Stehle-study" as an improvement of valuation methods as it was a "factual element". The example illustrates the effect of de-construction (especially structuring and modularization), which allows to out-source or de-legate the calculation of a specific parameter (namely MRP) and thus fosters its "objectivity".

Since about 1997, the German federal bank (Deutsche Bundesbank) applies the "Svensson-method" to estimate yield curves for zero-bonds (Schich 1997). In order to "comply with requirements of inter-subjective reproducibility", the IDW (FAUB) recommends applying the method to derive the risk-free base rate, too (e.g., IDW 2007, chapter A, sec. 288). The German federal bank regularly publishes relevant interest rates in Excel format (e.g., Deutsche Bundesbank 2019). The valuation expert is thus enabled to calculate the proper risk-free base rate by implementing the Svensson-method and the capital market data in, for instance, an Excel calculation. According to Wagner et al. (2006, p. 1016), decisive advantages of this approach are "the high degree of objectification and the future orientation, because the calculation method as well as the empirical data are extracted from public sources."

Finally, there are information service providers that enable valuation experts to extract beta factors. Examples for popular service providers are Bloomberg and Thomson Reuters. For instance, Bloomberg advertises "Bloomberg Terminal" as "a modern icon" which brings "transparency to financial markets" and "connect[s] you with a powerful network" (Bloomberg 2019). The product delivers "access to indispensable news, data and trading tools from any internet-connected PC or mobile device" (Bloomberg 2019; for further reading on "(valuation) devices" see Kalthoff 2005; MacKenzie and Spears 2014a, 2014b; regarding "scopic systems" see Knorr Cetina 2006). Bloomberg Terminal (as well as other service providers) processes historical capital market data ("stock yields") in order to derive expected, future-related beta (e.g., Daske and Gebhardt 2006, pp. 534–536). A so-called "adjusted beta" consists of the historic beta of a specific stock ("raw beta") with a share of two-thirds and the market beta of 1 with a share of one-third (e.g., Daske and Gebhardt 2006, pp. 534–536).

In order to extract a beta from Bloomberg Terminal, a user is initially confronted with two possible cases. If the valuation object is a listed company, the beta factor will be related to the company itself. Alternatively, if the valuation object is not

listed (or the liquidity of the stocks is low or absent), the user will have to define or find a "peer group" (e.g., see Dörschell et al. 2009, pp. 257–258). A "peer group" is a number of listed companies that are "comparable" to the valuation object. Common qualitative "quality indicators" for comparability are industry classification, company size (e.g., regarding sales, EBIT, number of employees, capital structure and relevant sales/supply markets). The beta of the valuation object or the betas of its peer group are usually examined with regard to quantitative "quality indicators" such as t-test and coefficient of determination (R^2). Qualitative and quantitative quality indicators both allow the user to shape and influence the beta. Further discretionary powers are offered by choosing the market index (e.g., DAX, EUROSTOXX, MSCI-World), the time period for the regression (e.g., 200 days) and the frequency of used yields (e.g., daily, weekly, monthly) (e.g., Daske and Gebhardt 2006, pp. 534–535).

We can describe actors like Bloomberg Terminal as an access point that allows users to *join a network* and *extract important information*. Interestingly, the term "terminal" already indicates that the software is a point of departure to "cross borders" and "travel" to other places. At the same time, however, the term connotes describing an end or final point (terminus). Both views are helpful to indicate the "social" functioning of plug-ins (Latour 2005, pp. 207–212) such as Bloomberg Terminal (beta), IDW/FAUB (MRP) and the IDW/FAUB-Deutsche Bundesbank (risk-free base rate). Obviously, the plug-ins provide *access points* to necessary data or parameters and thus integrate further actors. But the plug-ins are *transitional points*, too. These points mark connections between actors, where specific barriers aggravate or even prevent to fully *travel to the other side* (i.e., for instance, understanding specific arithmetic). On the one hand, this is a compulsory result of complex tasks like business valuation which are characterized by the division of labor and the implementation of black boxes. On the other hand, transitional points describe connections, where responsibilities are transferred, i.e., where co-authorities are installed. Accordingly, plug-ins are transitions to co-authorities.

A further operation within beta calculation is the consideration of the financing structure of the valuation object (e.g., Dörschell et al. 2009, pp. 40–44; IDW 2007, chapter A, sec. 304–308). Basically, a formula which is derived from Modigliani and Miller (1963) is implemented in order to translate the "peer group" betas in fictively unlevered betas ("unlevering") and, in a subsequent step, "relevering" them with regard to the planned capital structure of the valuation object (IDW 2007, chapter A, sec. 305–307). The standard formula is as follows (IDW 2007, chapter A, sec. 305):

$$\beta_{\text{leverd}} = \beta_{\text{unleverd}} \cdot \left(1 + [1 - s] \cdot \frac{Market\,Value\,of\,Debt}{Market\,Value\,of\,Equity}\right) \tag{3}$$

with:

s= company tax rate

Modigliani and Miller (1963) presented the following formula to calculate cost of equity of a levered (L) company (r_j^L) in relation to cost of equity of an unlevered (U) company (r_j^U):

$$r_j^L = r_j^U + (r_j^U - r_f) \cdot (1 - s) \cdot \frac{Debt}{Equity} \tag{4}$$

Formula 3 can be derived as a simplified result of equaling formula 1 and 4 (see, e.g., Dörschell et al. 2012, pp. 193–205 and basically Hamada 1969). With reference to Modigliani and Miller, further Nobel laureates (Nobel Media AB 2019), further arithmetic as well as further elements from capital market theory are connected to the CAPM-actor-network. The integration of the Modigliani-Miller-model (MM) illustrates that the CAPM-actor-network facilitates to *integrate* further economic theory. However, while some of the underlying assumptions of the CAPM and MM indeed correspond, others contradict (e.g., see Hering 2000, pp. 443–447, 2006, p. 241; Matschke and Brösel 2007, pp. 31–48). Accordingly, the connection of the two theories is often criticized in theory (e.g., see Hering 2000, p. 445, 2006, p. 241, 2014, p. 337; Matschke and Brösel 2007, p. 47). The fact that the CAPM and MM are still combined illustrates that the CAPM fosters to connect, even when other actors "technically" do not actually fit to the CAPM. This indicates that specific actors within the CAPM-actor-network (e.g., CAPM-DCF-MM) have *strong actual ties despite of weak formal ties* (see further Sect. 6 and Fig. 2; see basically Latour 1987, p. 202).[3]

Of course, the final, overall responsibility for court decisions is with the deciding court. However, the integration of co-authorities results in a division of labor, in which courts rely on the integrity of specific sub-operations. This de-legation of responsibilities is even fostered by specific judicial practice in business valuation: Considering the impossibility to determine or calculate "true values", the judicial task is limited to estimation; for this purpose, requirements regarding proofs are reduced and courts are allowed to refer (i.e., to de-legate specific tasks) to experts (e.g., Hüttemann 2007, p. 813; and basically § 287 sec. 2 Code of Civil Procedure [Zivilprozessordnung, ZPO]; § 738 sec. 2 German Civil Code [Bürgerliches Gesetzbuch, BGB]).

4.1.3 Re-construction

For judicial application, the de-constructed and de-legated components must be re-assembled again. Usually, economic experts such as public auditors serve this purpose and prepare valuation reports for judicial application and/or make oral statements in court. From the judges' perspective, these actors are the ultimate authorities who represent the discount rate in court.

[3] As a network such as CAPM-DCF-MM has already been constructed at the time of its dissemination in German judicial valuation, analyzing its construction is beyond the present study. However, the question of what strengthens the ties of this network is promising for further research (regarding DCF see basically Miller 1991).

From a theoretical perspective, Ballwieser and Hachmeister (2016, pp. 104–112, 130–133) as well as Obermaier (2008, pp. 504–507) discuss the issue of combining the components of the discount rate; they stress incompatibilities between, inter alia, the risk-free interest rate and the risk premium. Recently, Castedello et al. (2018, pp. 808, 810) point out the conceptional dilemma of different chronological perspectives of the risk-free base rate (Deutsche Bundesbank/Svensson-method) and the MRP (IDW/FAUB). Obviously, the re-construction of CAPM for practical implementation reflects assembling an actor-network with strong actual ties despite of weak formal ties (further see Sect. 6 and Fig. 2).

Understanding the exact functioning of CAPM components is usually reserved to specific actors. Restrictions for the necessary access ("terminal") can be of different type. For instance, service providers use their own software, calculations, and databases to process beta factors; not all details are publicly available. Similarly, Kruschwitz and Löffler (2008, p. 808) state that "how service providers handle the intervalling-effect remains in the dark". Moreover, some aspects of the components require sophisticated knowledge in statistics. Even though most public auditors may at least have basic knowledge in statistics, it is doubtful that they usually understand all CAPM components in every statistical and mathematical detail. The responsible economic expert has to rely on the integrity of the preliminary work of his/her co-authorities. This reflects that after the CAPM had opened the black box "discount rate" via de-construction, de-legation created new black boxes (re-black-boxing) (see basically Latour and Woolgar 1986, p. 242; further see Latour 1987, pp. 61, 131).

When ultimate co-authorities prepare their valuation reports, the CAPM allows them to refer to and implement further co-authorities: The FAUB regarding the MRP, the IDW/FAUB in connection with the Deutsche Bundesbank with regard to r_f, and commercial information providers such as Bloomberg for the β_j. In doing so, the expert complies with the IDW S 1 and thus solidifies her/his professional statements. However, the expert does not usually conduct all relevant CAPM-calculations by her-/himself. She/he does not derive the Svensson-method (or tries to find a better, more suitable formula), she/he does not produce capital market studies (or tries to find alternative ways) to generate the MRP, and she/he does not collect data and conduct calculations to derive a proper β_j. She/he rather relies on the integrity of her/his co-authorities and thus redistributes responsibility for the integrity of her/his results to them.

Indeed, the commercial information provider Bloomberg is an issue in court decisions. The LG Dortmund (2007) criticizes the approach to generate the necessary data regarding peer-groups from commercial data providers to be "facts from hearsay" and thus not verifiable by the court. The OLG Düsseldorf (2009, sec. 125) revives the issue and reflects the expert's line of argumentation who applied Bloomberg data. Accordingly, the data was not "second-hand information" but rather from "Bloomberg" and therefore a "usual database" (OLG Düsseldorf 2009, sec. 125). The expert confirms that she/he is not able to verify the data by her-/himself, but that there have been no doubts about their accuracy until then (OLG Düsseldorf 2009, sec. 125). This reflects that one component is made a black box again, i.e., "something that passes undisputed and acts as an integrated hole.

[...] [T]he successfully constructed black box acts as one" (Justesen and Mouritsen 2011, p. 170). Because opening a black box involves costs (e.g., Latour 1987, pp. 61, 69–70, 80), not challenging the black box makes actors save costs and time.

Apparently, it is not necessarily expected that the expert is able to reproduce all details of her/his sub-contractors' or co-authorities' work. The example illustrates that the installation of further co-authorities enlarges the chain of responsible actors. The respective co-authority who is (or should be) *able* to give a *response* to the judge's request is not present in court. Consequently, the distance between giving proof (e.g., by the expert by using beta from Bloomberg) and the ability to explain the exact functioning of this proof (e.g., with regard to the underlying calculations, applied market data) is widened. While the judge must decide about a material question locally, the relevant witness is absent. Thus, the judge can trust the integrity of the responsible co-authority ("not second hand"; "Bloomberg as a usual database") or reject its contribution.[4] In the present case, the judge follows the expert while the ability to response in detail is put at distance. Accordingly, de-construction, delegation and black-boxing puts responsibility, at least partly, at a distance (for further reading regarding "action at a distance" see Latour 1987, pp. 219–232; Miller 1991; Robson 1992).

4.2 Judicial Valuation Influences Economic Business Valuation

4.2.1 Reverse Referencing and Vague Referencing

Written accounts such as technical articles and court decisions are potential actors of the judicial valuation network (see basically Latour 1987, pp. 31–62). These accounts usually include statements (e.g., "the CAPM is appropriate") and references to other written accounts. References connect different written accounts; they are usually employed to highlight that another actor has already made a specific statement. *Referencing*, i.e., embedding references in a written account, can be used to state that another actor is the source of a specific opinion. In doing so, the creator of an account indirectly highlights, for instance, that another actor is of the same opinion or that another actor has an opinion that is only reproduced. While the former can be used to strengthen a position ("x said the same"), the latter can be used to transfer the responsibility for a statement to the source account ("x made this statement") and thus put responsibility at a distance. Moreover, referencing indirectly embeds the other actor's line of reasoning to verify or substantiate a statement; it embeds further co-authorities (see basically Latour 1987, e.g., pp. 31, 53, 74).

According to its general construction plan (see IDW 2008, sec. 1) the valuation standard IDW S 1 develops principles based on opinions by theory, practice, and courts. More precisely, IDW (2018, chapter C sec. 123) explicitly refers to the (Tax-)CAPM: On the one hand, the IDW justifies its application with reference to its solidified acceptance by higher courts. On the other hand, according to the IDW (2018, chapter C sec. 123), the "predominant majority" of courts as well as ref-

[4] Moreover, the co-authority "Bloomberg" is even an abstract, non-tangible actor: Does it refer to the software, the underlying programming or formulas, Mr. Bloomberg, or rather a combination of all?

erences in literature consider the CAPM to be appropriate. The respective lines of reasoning ("R") indicate (see Fig. 1), how the IDW reasons its perception of a "predominant majority" of courts (R1) and literature (R2–R4). Besides direct references of court decisions (R1), "literature" reasons the application of the CAPM by quoting court decisions, too (R2). Moreover, the IDW quotes two sources from literature to represent the pro-CAPM attitude in literature: a legal commentary by Koch (2016, sec. 26), professor of law, and Dörschell et al. (2012, pp. 27–28), public auditors and IDW members. Koch (2016) justifies the application of the CAPM by pointing out that it allows to determine the risk premium mathematically (R3). However, he verifies this statement with quotes that rather state the opposite ("pseudo mathematical accuracy" [Emmerich 2013, sec. 69b; 2014, p. 141], "no mathematically exact determination of risk premium" [Großfeld 2012, sec. 853]). Finally, R4 rather reflects a nuanced insight into opinions in literature. Indeed, Dörschell et al. (2012, pp. 27–28) pro-pose to the CAPM and highlight its advantage to refer to capital market data. However, they also stress that it is empirically neither confirmed nor refuted and that there are methodical criticism and empirical difficulties.

R1 and R2 reflect that the IDW directly and indirectly deploys precedent court decisions in order to verify the appropriateness of the CAPM for judicial valuation. Moreover, the IDW (2018, chapter C sec. 123) condenses R3 and R4 to the statement that the predominant majority in literature considers the CAPM to be appropriate. As R3 rather indicates criticism regarding pseudo mathematical accuracy and R4 presents a nuanced, also critical image of the CAPM, the IDW's line of reasoning regarding literature opinion is rather vague.

Since 2007, Wüstemann annually prepares a summary of recent jurisdiction regarding business valuation. He introduces his summary with reference to Moxter's (1976a, 1976b, 1983) notion of principles of generally accepted valuation principles (GoU) (e.g., Wüstemann 2007, p. 2223). Wüstemann differentiates between superior and lower GoU: Superior GoU are reflected in decisions by the BVerfG and the BGH, while lower GoU evolve in decisions made by higher courts (OLGs) (2011, p. 1707). Accordingly, Wüstemann recommends to deduce GoU from judicial valuation.

Drukarczyk and Schüler (2009, pp. 55–56, 2016, p. 54) employ the CAPM for market-oriented valuation which they substantiate with being in good company. They indicate what they understand to be good company by referring to economic literature (e.g., Damodaran 2012; Koller et al. 2015). After discussing business valuation and court decisions in another chapter, Drukarczyk and Schüler conclude: "The list [of court decisions, the author] supports the conclusion that the application of the CAPM to determine the risk adjusted discount rate is a general rule" (2016, p. 461). In doing so, the authors justify their own approach to employ the CAPM. Moreover, they extend the CAPM list of "good company" by court decisions and thus strengthen the ties of the actor-network.

Courts refer to economic experts and economic literature as co-authorities to justify their application of the CAPM. The examples indicate that economic experts reciprocally refer to court decisions to justify their application of the CAPM. In doing so, i.e., via *reverse referencing*, economic experts strengthen connections and thus solidify the actor-network CAPM-judicial valuation. CAPM related court

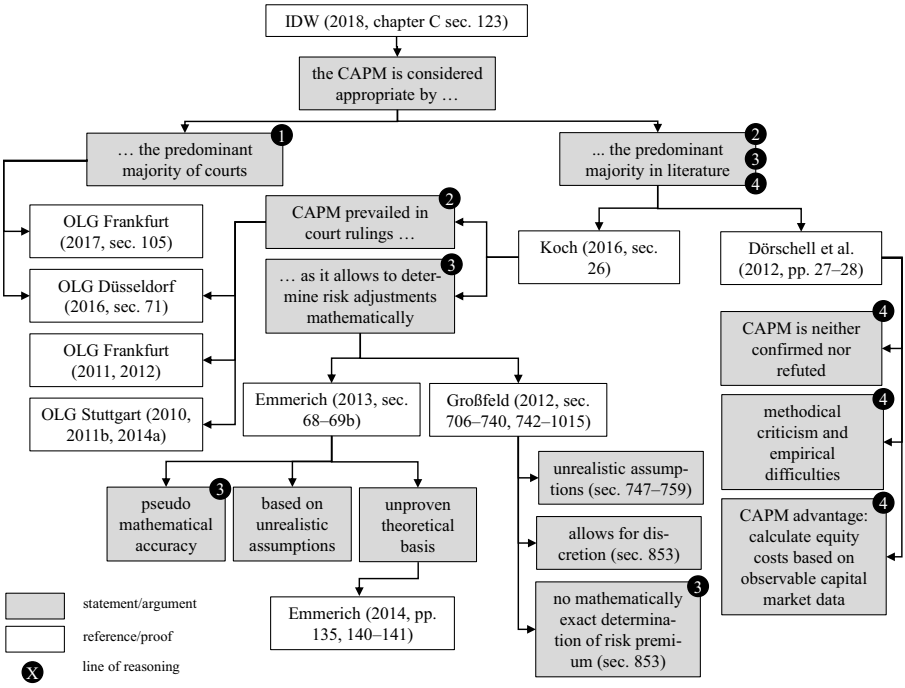

Fig. 1 Lines of referencing and reasoning

decisions provide economic experts with a source to justify pro-positioning to the CAPM. They enable economic experts to stress the practical relevance of the CAPM and thus highlight that the CAPM is not only a theoretical concept. Finally, Fig. 1 indicates that the CAPM actor-network increases potential sources to make statements regarding the CAPM (e.g., court decisions, accompanying literature such as legal commentaries). These sources enable actors to implement longer lines of referencing which increase costs to reproduce and verify/refute them (Latour 1987, pp. 60–61, 79–82). Not paying the price and, instead, believing and/or further using a statement "with no dispute" helps to "turn it into a fact" (Latour 1987, p. 60). Thus, long lines of referencing facilitate *vague referencing*, i.e., embedding references that do not exactly reflect the respective statement. Vague referencing is used to "verify" reasoning in favor of the CAPM.

4.2.2 Elevating a Key Co-authority

The BayObLG (1995a, 1995b) highlights that the court must usually solve valuation issues with expert advice from the field of business economics. The LG München (2002, p. 22) refers to "modern literature in business economics regarding business valuation". Its references to the so-called "modern literature" include academic literature (Peemöller and Kunowski 2002; Baetge et al. 2002) as well as professional literature (Copeland et al. 2000). The BayObLG (2005) refers to "accepted methods from business economics", too. The decision further reflects that the court under-

stands IDW announcements (e.g., HFA 2/1983 [IDW 1983]; IDW S 1) as proper proxies for accepted methods from business economics according to the BGH (2001) ruling as well as judicial estimation (§ 287 sec. 2 ZPO).

Initially, the wording in LG Dortmund (2007) has a stronger focus on academic knowledge: It prescribes an approach that is widely recognized and accepted in business economics. However, the decision further reflects that IDW announcements are generally accepted, too.

The OLG Stuttgart (2011a) explicitly discusses the relevance of IDW announcements. It concludes that they are a proper source of knowledge in order to verify appropriate "fundamental analytical" business valuation; however, they are not mandatory for the court (OLG Stuttgart 2011a, sec. 261). The OLG Stuttgart (2013, 2014b) again discusses the issue. The court highlights that valuation methods must be accepted in business economics and used in practice (OLG Stuttgart 2013, sec. 141; 2014b, sec. 82). According to the court, IDW announcements reflect what is accepted in science and used in practice (OLG Stuttgart 2013, sec. 144; 2014b, sec. 82). The court justifies this perception with the recognition of IDW announcements by the profession of public auditors and their application in practice (OLG Stuttgart 2013, sec. 144; 2014b, sec. 82).

Over time, specific actors have prevailed to take place as a general proxy of methods that are *accepted in business economics and applied in practice*, namely IDW and its announcements (e.g., OLG Stuttgart 2013, sec. 201; 2014b, sec. 82; OLG Zweibrücken 2017, sec. 18, 33; OLG Düsseldorf 2019, sec. 60–61; similar BGH 2015, sec. 33, 47–49; OLG Frankfurt 2014a; OLG Düsseldorf 2015, sec. 42; OLG München 2019, sec. 25, 45–49). For instance, the OLG Stuttgart announces that "the application of the CAPM is accepted in Germany at least since its recommendation by the IDW in 2000" (2011d, sec. 294 with references to IDW S 1, decisions by the OLG Düsseldorf and Paulsen 2008). More recent court decisions and opinions in literature indicate that critical voices to the prevalence of the IDW/FAUB increase (OLG Stuttgart 2011d, sec. 304; 2013, sec. 144; 2014b, sec. 82; Emmerich 2016; Fleischer 2016, p. 198). However, some of these accounts indicate at the same time that there is no other potent actor such as the IDW/FAUB.

Besides the IDW, other potential actors might serve as economic key co-authorities to courts: There are other relevant practitioners besides public auditors (e.g., financial analysts, M&A advisors, fund managers), there are other respective pressure groups besides the IDW (e.g., European Association of Certified Valuators and Analysts [EACVA] and the Society of Investment Professionals in Germany [DVFA]), and there is a heterogeneous academic community including opposing doctrines (functional school, market value-oriented school). We presume that the courts' preference of the IDW over other economic experts is related to specific actors that are deployed by the IDW and that strengthen potential ties between the actor-networks. First, norms suggest courts to refer to public auditors (e.g., § 293 d sec. 1 phrase 1 AktG in connection with § 319 sec. 1 phrase 1 Commercial Code [Handelsgesetzbuch, HGB]; see further § 2 sec. 3, no. 1 Public Accountant Act [Wirtschaftsprüferordnung, WPO]; IDW chapter C, sec. 1–12). Second, public auditors and their professional association are a fitting interface between judicial and economic knowledge. Public auditors know the "legal" and the "economic" world.

They are familiar with the semiotics of legal practice (e.g., working with law and referring to paragraphs) and economic practice (i.e., mathematics, models, formulas, economic relationships). Third, the IDW conducts profound technical and conceptional work (e.g., IDW S 1), has specific institutions (FAUB), and is very visible in literature (even with its own journal WPg). The labelling of the FAUB as "expert committee for business valuation and business economics" even suggests reflecting "the" opinion of theory. Thus, to courts, the IDW may have both "academic" and "practical" traits. Fourth, the geographical proximity of the IDW headquarter in Düsseldorf and the OLG Düsseldorf may have facilitated contacts between actors and thus played a role to connect judicial valuation and the IDW. Fifth, at least between 2000 and 2009, between judges/jurists and the IDW/FAUB a mutual dependency developed regarding business valuation issues. While the former are dependent on expertise or even a "handy" professional standard regarding business valuation, the latter are dependent on the recognition by courts: "An IDW standard which is no longer acknowledged by court is no longer a standard" (Bungert 2008, p. 819).

4.2.3 Circular Reasoning

In the interface of economic and judicial business valuation, some business economists limit the relevance of judicial valuation. Regarding potential sources of GoU, Moxter doubts that judges have a detailed and solid familiarity with the economic field of expertise (1976b, p. 990). He highlights that among potential sources of knowledge, science is the most independent and competent (Moxter 1976b, p. 991; further, see Quill 2016, pp. 223–224, 336–339).

Reversely, courts often highlight that they do not intend to solve disputes in business economics and that it is not the task of the judicial procedure to foster the development of business economics (see Sect. 5.2). In doing so, courts themselves limit their authority to shape business valuation. This self-imposed limitation of authority can be seen as a logical imperative of the courts' justification mechanism: Courts delegate a share of their own responsibility to economic expertise. Thus, they re-locate the necessity to justify the technical content to other actors. However, if these actors referred to the courts in order to justify their opinion regarding technical valuation issues as reverse referencing indicates (Sect. 4.2.1), at least over a period of time, circular reasoning would be created (see similarly Quill 2016, pp. 285–286 and also Aha 1997, p. 33). Circular reasoning suspends the epistemological primacy of business economics. Its very integrity, however, can be seen as prerequisite for the functioning of the courts' justification mechanism: If a court reasons its own decision with economic expertise that builds on former court decisions, it indirectly employs precedent case justification rather than economic expertise justification.

5 The CAPM Disseminates in Judicial Valuation

5.1 Deploying a Growing Actor-network

Chronologically, on the basis of an already existing actor-network (inter alia mathematics, Arabic numerals, [English] language, neo-classical theory, portfolio theory [e.g., Markowitz 1959], technical devices [e.g, typewriter, calculator]), different economists developed different versions of a capital asset pricing theory. The economists put down their works in writings which have been published in a series of articles in prestigious journals (e.g., The Journal of Finance, Econometrica) (see basically Sharpe 1964; Lintner 1965; Mossin 1966). Since then, the standard formula (see formula 1) has been developed, the classical CAPM papers have been quoted in countless other (academic) writings, the model has been issue of (academic) discussions, it has become content of curricula and lectures, and it has been tested empirically. However, the model has overcome this mere academic world, it has been *embedded* (Callon 1998, p. 23; Granovetter 1973, 1985) in practice, too: The model has been implemented in other models (e.g., DCF) and applied for practical purposes (e.g., shareholder value approach, capital budgeting). In doing so, the model has been combined with other models basing on other assumptions (e.g., PV, MM); it has been adapted and modified (e.g., Tax-CAPM, adjusted beta, [FAUB-]MRP); it has been implemented in software models (e.g., Excel) and thus made visible and accessible for routine work (e.g., by analysts or professionals in consulting/auditing companies); the model as well as its components have been customized, have become salable products, and "state of the art" (e.g., as content of valuation reports offered by auditing or consulting companies, beta factors in Bloomberg Terminal); institutions (e.g., professional bodies such as the IDW, courts) have recognized the model and implemented it for their very own type of practical work (e.g., as a formal standard such as IDW S 1, as established jurisprudence).

During this "journey" the CAPM changed its shape and form of appearance. It also became part—and label or brand—of a growing actor-network, a well-established infra-structure. Through this network, i.e., by using this network, "the" CAPM allows other actors to share and to refer to it and its components. In other words, the CAPM brings into action numerous other actors, it deploys a network, which can be used by potential new actors. In the context of judicial valuation in general and the judicial decision regarding the discount rate specifically, we identify the following advantages that are offered by the CAPM and that foster its judicial application.

(a) The CAPM Allows for Positive Labelling The CAPM infrastructure contains numerous labels that allow other actors to link to these labels. As these labels often connote positive meanings, connecting to the CAPM implies connecting to those positive meanings. Thus, actors can link their own action (e.g., making court decisions) to those labels in order to enforce or foster specific interests or objectives within these actions (e.g., making proper, solid, and trustworthy court decisions).

Courts often do this when they highlight attributes of sources which they refer to. For example, they employ notions like "*modern* literature in business economics

regarding business valuation" (LG München 2002, p. 22), "*accepted* methods from business economics" (BayObLG 2005, BGH 2001, LG München 2015, p. 52), "*generally accepted*" method (e.g., OLG Stuttgart 2011d, sec. 340) or "*state of the art*" (OLG Düsseldorf 2009, sec. 122). Positive labels (e.g., modern, market-related, state of the art) are implicitly related to technical properties of valuation methods in general and the CAPM in particular. They imply that their application is appropriate or even necessary. For instance, by using a "state of the art"-model an actor can demonstrate the compliance with the technical, professional requirements for valuation and thus avoid the risk of being accused for an outdated, inadequate, non-professional proceeding. Positive labelling allows courts to lean to the positive "aura" of the CAPM. Thus, the actor's own line of reasoning is supported and immunized against criticism.

(b) The CAPM Invites to join "Good Company" Specific labels already indicate—and some authors explicitly highlight (e.g., Drukarczyk and Schüler 2009, pp. 55–56)—that the model offers actors to join good company. Terms like "(international) state of the art" or "(international) best practice" connote general consensus among experts (in science and/or in practice). General consensuses in business valuation can be interpreted as assemblages of actors including subjects that agree upon a common understanding about technical valuation issues. Thus, general consensus reflects the expert opinion of a group which may even be the majority of all experts in a field of knowledge (e.g., of all practitioners and/or academics).

A concrete example for experts recommending the CAPM for judicial application is the interdisciplinary discussion forum in 2007 as well as the accompanying articles in the WPg (see Sect. 3.3). Kuhner, Jonas, and Hüttemann introduce the CAPM to courts/jurists in a way that makes it easier for them to accept it as proper method: This includes highlighting the model to be "state of the art" in theory and practice and to be propagated by the majority of academics and practitioners. Accordingly, Kuhner, Jonas, and Hüttemann act as the condensed voice or proxy for economic knowledge. For jurists and courts, this aggregated description of the economic "state of the art" makes it easier to react and, finally, to accept the model. As (economic) laymen, they are usually not familiar with the "whole" literature, details of doctrinal disputes, and the "dominant" doctrine—perhaps, such overall knowledge is even rare among economic scholars themselves. However, courts are required to employ *accepted methods from business economics*: For instance, the BGH (2001) clarifies that the fair market value must be calculated by estimation using accepted methods from business economics. This very BGH decision and/or this line of reasoning is regularly referred to in court decisions regarding the CAPM, too (e.g., BayObLG 2005, LG München 2015, OLG Düsseldorf 2009, OLG Stuttgart 2014b). Compared to the traditional approach as well as other alternatives, the CAPM makes it easier for actors to represent themselves as proxies for "dominant" positions in economic issues.

(c) The CAPM Harmonizes with the Courts' Favorite Value Concept Basic business valuation knowledge includes the distinction between "value" and "price" as well as different value concepts (e.g., subject-related, objective, objectified, [fair]

market value/price). Labels such as "fair" and "market" suggest objectivity and may connote positive attributes like transparent, non-arbitrary, reasonable or market-related ("wisdom of the crowd"). Accordingly, it is not surprising that courts and jurists prefer apparently "objective" rather than "subject-related" values. Decisions from higher courts demonstrate and solidify this preference. For instance, the BVerfG (1999) clarified that "full compensation" is at least represented by the "fair market value" (further see BGH 2001) (critically see Matschke et al. 2010a).

The CAPM is based on neo-classical theory including assumptions that result in equilibrium. A consequence of equilibrium is the identity of (subjective) values and ("objective"—because "market-related"—) prices. Accordingly, the assumptions of neo-classical models such as the CAPM allow to deduce fictive market prices (critical see Hering 2014; Hering and Brösel 2004, p. 938; Matschke and Brösel 2013, pp. 652–653; Matschke et al. 2010b, pp. 34–35). The courts' preference for "market oriented" rather than "subjective" values harmonizes with (upcoming) market-oriented business valuation. The CAPM is a fundamental content of this doctrine.

(d) The CAPM Allows "Laymen" to Participate in "Expert" Discussions About Details We have proposed that the de-construction of the CAPM results in the structuring, illustration, formalization and modularization of the discount rate. All these aspects foster the "objectivity" of the calculation method as well as of its results. In doing so, they enable judges to make the discount rate visible and discussable. This reveals the judges' basis for conclusions, so that their respective decision is made transparent and comprehensible.

More specifically, the CAPM enables actors to formalize and operationalize components of the discount rate. *First*, they already become visible as variables (e.g., r_f or β_j) in formulas. *Second*, experts operationalize them via own calculations, perhaps in cooperation with service providers or co-authorities, respectively (e.g., IDW/FAUB [MRP]; Deutsche Bundesbank/Svensson-method [risk-free rate]). *Third*, they are presented in expert reports and/or oral discussions. At this point, the discount rate materializes, gets visible and finally accessible for critical discussion in court. Similarly, Großfeld (2002b, p. 225) highlights that "[m]athematics show our ability to work with abstract concepts and to understand, to order, and to control what the eye cannot see" (for further reading see Robson 1992, pp. 691–700).

Ballwieser (2008, p. S105) already describes the feature of being "handy" as an important attribute of the CAPM equation. The attribute implies that the formula reduces complexity, makes an abstract parameter tangible, and thus facilitates access to this parameter, even for "laymen": The basic formula of the CAPM (formula 1) provides (a) a modest number of variables, (b) intuitively comprehensible relations between the variables (e.g., risk free rate plus risk premium, individually weighted market risk premium), and (c) a narrative for the abstract parameter "cost of equity" (e.g., market-related, risk adjusted rate of return). Indeed, an armada of further actors, that make the CAPM complex even for economic experts, cruises behind this intuitive, understandable surface of the CAPM. However, the *surface* provides a safe haven even for laymen; it enables them to participate in the discussion about the

parameter. In other words, the CAPM enables jurists to use and refer to (aggregated) formulas, formalism, and statistics without the need to (fully) understand them.

The CAPM does not only allow judges to implement "expert" discussions about this material question in court but also to participate in these discussions. In doing so, courts can demonstrate and document that this material valuation parameter is subject of diligent considerations. We can find examples of this procedure in court decisions (e.g., OLG Karlsruhe 2008, sec. 72; OLG Stuttgart 2006; 2011c; 2011d, sec. 294–299).

(e) The CAPM Brings Along "Prestigious" Co-authorities As a consequence of the de-construction of the CAPM (components) as well as of the judicial task (material questions), co-authorities, especially with a business economic background, are integrated to legal proceedings. We can identify different levels of co-authorities: *First*, the judicial framework (i.e., law and supreme court decisions, see § 287 sec. 2 ZPO and BGH 2001) generally enables judges to resort to experts in order to solve judicial valuation problems.

Second, for judicial valuation purposes, the IDW has established an important professional body: Usually, public auditors are appointed by courts (as independent experts) and/or by the litigating parties (as party experts). Moreover, courts usually understand and apply the professional opinion of the IDW, which is reflected especially in the IDW S 1 as well as further announcements by the FAUB, as proxy for accepted methods from business economics—including "the" opinion of academics (see Sect. 4.2.2). In precedent cases as well as in supreme court decisions, the opinions of the IDW are the essential economic point of reference. Accordingly, we can identify the IDW as a key co-authority for judicial business valuation. Since about 1998, the IDW refers to the CAPM (IDW 1998, sec. 186, 190–193). By referring to the CAPM, courts thus demonstrate that they keep referring to their key co-authority, too.

Third, via modularization, the CAPM embeds additional actors who also serve as co-authorities. In order to calculate cost of equity, the expert usually focuses the components risk-free rate of interest (r_f), the beta of the valuation object (β_j), and the MRP. On the basis of capital market studies (e.g., "Stehle-study"), the FAUB provides an "appropriate" range for the MRP. The IDW further recommends the approach of the Deutsche Bundesbank to derive the r_f by using the "Svensson-method" and capital market data; the latter is regularly published by the Deutsche Bundesbank (see Sect. 4.1.2). Finally, commercial information providers such as Bloomberg offer their services to extract β_j (e.g., Bloomberg Terminal).

Fourth, the different components of the CAPM allow actors to refer to capital market data. Historical and thus observable capital market data is especially used for the calculation of r_f (interest rates which are regularly provided by the Deutsche Bundesbank), MRP (capital market studies), and β_j (stock market returns). "The market" is a powerful co-authority, as it enables actors to refer to a source of (inter-)national information that promises to be objective, neutral, and publicly accessible (e.g., "wisdom of the crowd" rather than individual/subjective/biased opinion).

Fifth, the CAPM formalizes cost of equity and thus allows actors to integrate mathematics as a co-authority. Großfeld already discusses the effect of mathematics from a judicial perspective and stresses, albeit sceptically, its seductive power: "Numbers 'look' so precise, so reliable [...]. The somewhat supernatural aura of mathematics, appearing like science to judges, lends authority to its results and leads to an augmentation of its answers. [...] It 'naturalizes' the result as inevitable" (2002b, p. 224). In line with Großfeld, we argue that the CAPM enables jurists to implement mathematics as co-authority. In doing so, the *semiotics* (Großfeld 2002b, pp. 221–228) of "modern" capital market theory are adopted and integrated in judicial discussion: The CAPM-cosmos comes along with equations (e.g., see formula 1, 2, and 3), parameters (e.g., β_j, σ^2_M), and formalized quality indicators (e.g., R^2, t-test). Mathematization is a further example for an important terminal (see Sect. 4.1.2):[5] It provides an *access point* to exploit a new field of knowledge for judicial valuation and *a final point* or border. The latter restricts specific actors to fully understand every calculation within the formalized part of the CAPM-cosmos. This sub-network remains reserved to specialists (especially mathematicians, econometricians, and economists).

(f) The CAPM Helps to end Disputes The CAPM allows to embed terminals (i.e., specific co-authorities) to judicial valuation. On the one hand, terminals (e.g., mathematics, Bloomberg) *cross* long distances and thus link additional actors to the actor-network (e.g., formal reasoning, capital market data). These additional actors bring along further labels to the network (e.g., objective, mathematical precision, market-related). On the other hand, terminals *create* long distances. There is local distance when there is physical distance between a court hearing and a co-authority that is responsible for a specific CAPM component in this very hearing (e.g., Bloomberg, see Sect. 4.1.3). Moreover, there is technical distance when co-authorities such as mathematics or statistics require specific knowledge to reproduce their statements. Both types of distancing put responsibility at a distance (see Sect. 4.1.3). If the distances had to be overcome (e.g., invite a representative for Bloomberg to court, explain mathematical and statistical details in court), costs would incur. However, courts avoid retracing these paths and rather refer to the integrity of co-authorities and their professional judgement. Accordingly, integrating specific co-authorities creates local and technical distances and thus enables judges to refer to statements that are difficult to be further retraced in court. In doing so, these co-authorities foster or facilitate to end disputes.

5.2 Coining the Courts' Narrative

In court decisions, judges regularly present, discuss, and take position regarding business valuation issues in general and the CAPM in particular. We understand statements and lines of reasoning that are used frequently and/or similarly by dif-

[5] As a byproduct, mathematization potentially fosters "internationalization": "Mathematics is the only 'language' shared by all human beings [...]. It uses symbols and words that seem to provide a universal conceptual framework for seeing and understanding the world" (Großfeld 2002b, p. 225, also critically).

ferent courts as elements of the courts' narrative in favor of the CAPM. We have identified especially the following narrative elements:

(A1) There is no Better Alternative In 2009, the OLG Düsseldorf reasons its support in favor of the CAPM inter alia as follows: "A convincing valuation approach that could replace the CAPM has not yet been established" (2009, sec. 122 with reference to Drukarczyk 2003, p. 363). Additionally, the court cites Brealey et al. (2006, p. 205): "The capital asset pricing theory is the best-known model of risk and return" (OLG Düsseldorf 2009, sec. 122, with reference to p. 228 in a different edition). The OLG Stuttgart (2009, sec. 206–207) criticizes an expert report which itself criticizes the CAPM, as it does not contain any better alternative. The court mentions the APT and the traditional approach as potential alternatives; however, according to the court, both are no better alternatives (OLG Stuttgart 2009, sec. 207; 2011d, sec. 295, 310). The LG Stuttgart (2012, sec. 104) refers to precedent court rulings by the OLG Stuttgart and joins its line of reasoning that the CAPM is, despite its weaknesses, appropriate as there is no better alternative. Similarly, the OLG Frankfurt (2013 sec. 78) shares the opinion of the court-approved expert who states that, compared to other approaches, the CAPM is preferable. Finally, the matter is even discussed by the BGH (2015, sec. 49): According to the supreme court, there are no objections to the application of the model, especially because neither the LG nor the OLG implemented a better estimation for the risk premium.

By using the argument of "no better alternative", courts document that they pay attention to the shortcomings, imperfections, and inaccuracies of the CAPM as well as to potential alternative approaches. They verify that they do not apply the model without reflections. At the same time, they indicate their willingness to apply an alternative approach as soon as a better one is available, i.e., as soon as economic experts provide one (see, e.g., Paulsen 2007, 2008).

(A2) It is Accepted in Business Economics and Applied in Practice Over time, the IDW and its announcements have prevailed to take place as a general proxy of methods that are *accepted in business economics and applied in practice* (see Sect. 4.2.2). Courts elevate the IDW as its major co-authority and the gatekeeper of the boundaries of business valuation. In doing so, courts shield themselves from doctrinal disputes in valuation theory: As the IDW edits and canalizes "theory" and "practice", courts themselves dissociate from a "complete" overview of literature, opinions, and disputes. Courts avoid exposing themselves to a heterogeneous and controversial field of knowledge and follow a single proxy for economic expertise. Especially the condition "applied in practice" exerts a powerful effect. It restricts the necessity to consider or even incorporate any opinion from or advancement in theory. Especially against the background of the heterogeneous and controversial business valuation theory, the condition vaccinates judicial valuation against the ambiguity in business economics.

(A3) The Model must only meet the Demands of Estimation Responding to criticism that the "CAPM only produces allegedly precise results", the BGH (2015, sec. 42) emphasizes that the model involves estimation, just like the complete cal-

culation of the business value by means of the capitalized earnings method itself. The OLG Düsseldorf (2018, sec. 40–41) discusses criticism against the MRP. It refers to unsolved questions in business economics and highlights that it can only be an estimation. Based on this argument, the court rejects respective criticism. Following similar lines of reasoning, other courts refer to the judicial requirement for estimation according to § 287 sec. 2 ZPO, its inevitable inaccuracies, and the corresponding requirements to the CAPM (e.g., OLG Frankfurt 2017, sec. 28, 105–119; OLG Stuttgart 2006, pp. 114–117; 2009, sec. 137, 220–221; 2014b, sec. 107–125).

Accordingly, courts clarify that inaccuracies are acceptable as it is not required (or even possible) to calculate the "true" value but rather to estimate an acceptable one. In doing so, courts demonstrate that they do not naively expect valuation in general and the CAPM in particular to provide "exact" or "true" results. Moreover, they reinforce their line of reasoning to reject criticism on the basis of reduced requirements.

(A4) Courts do not Intend to Solve Disputes in Business Economics With the proceeding dissemination of the CAPM in judicial practice, courts increasingly point out the limits of their decisions. For instance, the KG Berlin (2009, sec. 36) recognizes and confirms that there are no generally accepted principles in business economics. It then emphasizes that the court is not the correct place to constantly play off opposing doctrines against each other (KG Berlin 2009, sec. 36). Even more precisely, the OLG Stuttgart (2014b) discusses the role of the court regarding the development of valuation models and techniques. It stresses that the development of valuation models and techniques is a question that must be clarified within the academic discourse of business economics (OLG Stuttgart 2014b, sec. 97). The court explicitly points out that it is not the task of the judicial procedure to foster the development of business economics (OLG Stuttgart 2014b, sec. 97; see further OLG Stuttgart 2006, 2011d, sec. 306; OLG Karlsruhe 2013, sec. 47). Similarly, the OLG Zweibrücken (2017, sec. 11, 18) argues that it is neither the court's task to clarify nor contribute to academic controversies regarding business valuation.

Courts increasingly point out that they do not provide the appropriate platform to discuss, dispute, and clarify unsolved and/or controversial questions from business economics and thus elaborate the academic discipline. In doing so, courts demonstrate that they do not intend to take a side regarding technical, economic issues but rather leave them to the economic experts. The argument reflects that courts principally intend to take a neutral position regarding the development of valuation techniques. Regarding the heterogeneous and controversial discipline, the argument protects courts from—at least—the direct accusation of being biased.

(A5) Business Economics Shall Clarify open Questions and Solve Disputes The other side of the coin regarding the preceding argument is that business economics itself shall clarify open questions and solve disputes. In the context of the role of the CAPM we can differentiate two main directions of such disputes: (a) alternatives to its application and (b) details of its application. Paulsen (2008) has already steered the focus to details and A1 has already indicated the courts' respective attitude.

Accordingly, courts rather steer the focus of economic experts to details of the CAPM. With regard to the respective economic(-legal) literature, courts give green light for providing further accounts (e.g., articles, studies, books) that address details of CAPM application. In other words, courts pro-pose to join the judicial CAPM-network, too. Accordingly, we can identify two ends or poles in a pro-position, the invitation and the acceptance. As soon as the invited actor accepts and links to the network, the actor himself favors the network and pro-poses others to follow suit. Accordingly, the *state* of pro-position is a bridge-element of the network, a connector. The reciprocal effect solidifies and perpetuates the CAPM for judicial application: Economic experts have the opportunity to provide publications and thus to position themselves as experts regarding a developing topic and in a growing market: Finally, experts in literature sometimes provide valuation services for judicial application, too. For courts, the accompanying, flanking accounts verify that they comply with the "state of the art" in business valuation. We can find indicators for this development in literature in the interface of economic and judicial topics. Examples are (series of) articles regarding judicial valuation in the WPg (e.g., in 2007 and 2008) and monographs regarding the discount rate (e.g., by Dörschell et al. 2009, 2012 [issued by the IDW]).

Contrarily, literature that criticizes the very foundation of the CAPM and questions its appropriateness for judicial application are usually not reflected by courts or jurists. Following Matschke and Brösel (2005, preface) in a similar context, we can explain this as follows: "Only those who sing along with the choir stay in the choir". Both, focusing on details and distancing from fundamental criticism solidifies and perpetuates the judicial application of the CAPM.

6 Results and Discussion

The present study intends to take a broader perspective of social sciences in order to gain new insights on business valuation in science and practice. This may help to better understand this field of knowledge, especially regarding the way how knowledge develops and how valuation tools are constructed. In order to analyze the construction of business valuation, particularly the dissemination of the CAPM in judicial valuation, we employ an actor-network approach, i.e., we focus on actors and associations between them. Connections between actors are permanently evolving, i.e., new ones are established, old ones are cut, solidified, forgotten, or altered. This image may help to understand business valuation not only regarding its social aspects but also regarding its dynamics.

Our analysis structures the dissemination of the CAPM in German judicial valuation as a process in which an actor-network between judicial valuation and the CAPM is established (for an overview of relevant actors see Table 2). This process is characterized by "the careful plaiting of weak ties" (Latour 1996, p. 370). *First*, the CAPM is not connected to judicial valuation. Initial accounts indicate that pro-positions by specific actors initiate and solidify first connections between the CAPM and judicial valuation. Pro-positions by judges as well as in literature are implemented by deploying specific actors which we describe as labels. Via labels,

Table 2 Summary: Actors and actions I

Actor	Action	Specific Effect	Example
Label	Pro-position	Embeds positive attributes; invites to join "good company"	Market-related, Nobel Prize-awarded, best practice, generally accepted
Border authority: judge	Border demarcation	Marks boundary of judicial valuation	Judge confirms the application of CAPM in court
	Establish co-authorities	De-constructs the judicial task and specifies the judge's role	Judge refers to economic experts to clarify matter of facts
		Delegates specific tasks and responsibility to experts; embeds economic expertise	
(Co-)authority	Referencing	Embeds further co-authorities; strengthens reasoning, puts responsibility at a distance, increases costs to retrace line of reasoning	"The predominant majority in literature considers the CAPM to be appropriate (source 1, source 2, source 3)."
Co-authority	De-construction	Fosters to connect further co-authorities (de-legation)	Basic CAPM equation provides components to describe cost of equity
		Structures, illustrates, formalizes and modularizes the discount rate	Illustration: beta explains the risk premium as simple, linear relationship between the beta factor and the MRP
		Focuses on details of the CAPM; distances from general criticism	The beta factor is discussed in court
	Re-black-boxing	Fosters to end up discourses	Expert employs Bloomberg Terminal to generate beta; IDW/FAUB provides range for MRP
	Border demarcation	Marks boundaries of valuation	IDW/FAUB adds CAPM to IDW S 1
	Mathematization	CAPM formalizes the discount rate; embeds formal logic and formal reasoning; objectification	$\mu(r_j) = r_f + \beta_j[\mu(r_M) - r_f]$

positive connotated attributes such as market-related, Nobel-Prize awarded, and objective are embedded to the network; they help to invite further actors to "join good company". *Second*, the CAPM and judicial valuation form an actor-network, they interact with each other. We describe the impact of the CAPM to judicial valuation as a sequential process of de-constructing the discount rate to specific components, delegating the components to co-authorities, and re-constructing the components for judicial application. In doing so, the border authority judge delegates responsibilities to co-authorities (e.g., mathematics, Bloomberg Terminal, public auditors) and thus embeds specific (economic) expertise to judicial valuation. The other way around, judicial valuation influences economic business valuation as well as the CAPM, too. Respective actions include reverse referencing and the elevation of the IDW as key co-authority. As a consequence, the relevance of the CAPM in a practical field of application, judicial valuation, is confirmed and thus solidified.

Moreover, we focus on specific circumstances that favor the dissemination of the CAPM in judicial valuation. These circumstances can be described as actors within the CAPM network that enable other actors to tie the CAPM to judicial valuation. The respective CAPM-related actors allow for specific action. Examples are labels that facilitate to link positive attributes, to pro-pose "good company", and to embed a suitable value concept. Moreover, de-construction results in structuring, illustrating and modularizing the discount rate. It allows judges to participate in expert discussions and to prove diligent considerations, to integrate co-authorities that adopt a share of the judges' responsibilities and to end up discourses.

Court decisions reflect that judges establish typical narrative elements that rely on the CAPM. More specifically, the narrative elements refer to the judicial valuation network and its actors as well as interrelations. Accordingly, the courts' narrative clarifies ties between the actors. It stresses what is within the network (e.g., CAPM, IDW as key co-authority), what is outside the network (e.g., alternatives to the CAPM) and when this status quo is intended to get adjusted (e.g., alternative approach that is accepted in business economics and applied in practice).

Finally, our analysis indicates actors and actions within the dissemination process that are unexpected or unusual (see Table 3). *First*, labels connect specific, positive attributes to the actor-network. However, we suggest that some of these labels are rather vague. Not only German but also international literature reveal a nuanced image of the CAPM. For instance, Copeland et al. (2000, pp. 224–226, also cited by LG München 2002, p. 22), raise criticism of the model and conclude: "If beta is not dead, then surely it's wounded". In some German business valuation textbooks of this time (ca. 2002–2010) we can also find reservations and limitations (e.g., Ballwieser 2007, pp. 93–99; Drukarczyk 2003, pp. 363–364; Kuhner and Maltry 2006, pp. 166–167) and even strong rejections (e.g., Matschke and Brösel 2007, pp. 31–49; Hering 2006, pp. V, 223–231) regarding the application of the CAPM in business valuation. Moreover, Großfeld (2002c, pp. 134–139) discusses the CAPM for the first time in his widely recognized monograph on business valuation with a focus on economic theory and legal implementation (back then the 4th edition). Although he points out that the "inventors" of the CAPM have been awarded the Nobel Prize—and thus deploys a further label—his conclusions regarding judicial application of the CAPM are rather critical (Großfeld 2002c, p. 134–139). Finally,

Table 3 Summary: Actors and actions II

Actor	Action	Specific Effect		Example
Border/Co-authority	Vague labelling	Links attributes of the "formal" CAPM to the "operationalized" and/or the "implemented" CAPM		A court describes the CAPM as being generally accepted in theory
Border authority	Unintended constructing initiative	Judicial business valuation affects economic business valuation (potential circular justification)		IDW refers to court decisions to verify IDW S 1 (reverse referencing)
		Elevates IDW/FAUB as key co-authority		Court states that IDW announcements represent what is accepted in business economics and applied in practice
Co-authority: Terminal	Crossing long distances	Puts responsibility at a distance	Connects actors	Bloomberg Terminal connects (inter-) national capital market data to beta calculation; CAPM arithmetic shifts the discussion about discount rates to formal logic
	Creating long distances		Increases costs to follow and retrace paths; fosters to end up discourses	
Co-authority: economic expert	Reverse referencing	Strengthens the connection between economic expertise and judicial valuation; justifies economic valuation		IDW refers to court decision in order to highlight the adequacy of the CAPM
	Vague referencing	Extended lines of references increase costs to reproduce and verify/refute them: enables to link statements to sources, that do not exactly reflect them		A co-authority "verifies" a technical statement regarding the CAPM with a reference to a source that states the contrary

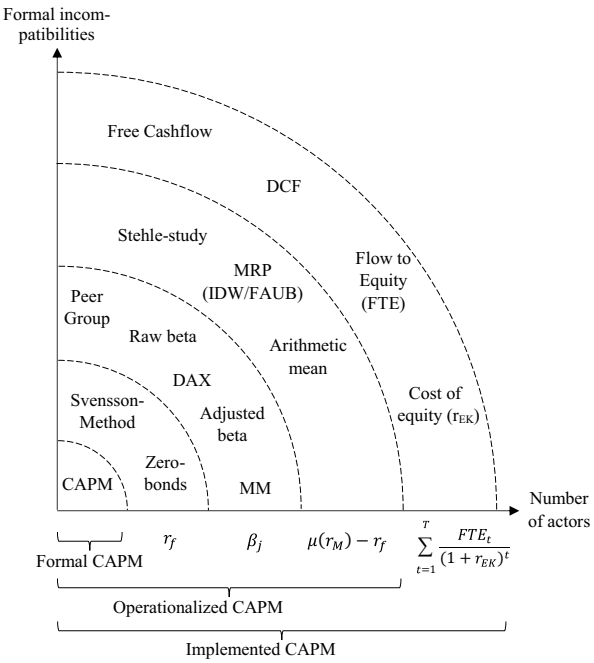

Fig. 2 Scopes of potential CAPM actor-networks

the IDW relativizes the applicability of the CAPM, too (e.g., IDW 2007, chapter A, sec. 195–196).

A specific example is labelling "the" CAPM as being objective, mathematically precise, and generally accepted in theory. Basically, the CAPM provides an equation. Regarding this equation, mathematical precision and objectivity cannot be denied. The basic model indeed can be seen as generally accepted theory. This impressively reflects in the honoring of Sharpe for his contributions which are related to the CAPM with the Nobel Prize (Nobel Media AB 2019). However, this is rather valid for the core model within its restrictive assumptions ("formal CAPM"); it does not *devolve* or *migrate* to any implementation of the model compulsorily. To implement the CAPM in judicial practice ("implemented CAPM") requires specifying its variables ("operationalized CAPM"). This includes de-constructing, de-legating, and re-constructing its components. The process allows for discretion and embeds black boxes that are not necessarily objective, mathematically precise or generally accepted in theory. Starting from the restrictive assumptions of the formal CAPM, an increasing number of actors embeds formal incompatibilities to the growing CAPM actor-network (for an exemplary illustration see Fig. 2). These incompatibilities inter alia refer to the relevant period (one period, multi-period, perpetuity), the temporal reference of relevant data (historical, forward-looking), the scope of the market portfolio, the handling of a lack of available data (e.g., non-listed valuation objects) and adjustments for different debt ratios (for details see Ballwieser and Hachmeister 2016, pp. 104–112, 130–133; Hering 2000, pp. 445–447, 2014, pp. 297–330, 336–337, 2017, pp. 297–310; Matschke and Brösel 2013, pp. 33–51; Obermaier 2004, pp. 294–312, 2008, pp. 504–507).

Accordingly, there is a difference between the CAPM as a formal, theoretical model and the CAPM as an implemented concept in judicial valuation. From an ANT perspective, we specify this difference in relation to the scope of the actor-network: While the former can be described as a rather narrow actor-network, the latter is much broader and includes the former. Our analysis indicates that the imbalance between the actor-networks is not necessarily highlighted or recognized. Attributes or labels are often transmitted from one to another. As the additional actors transform the judicial actor-network and impact its functioning as well as attributes/characteristics, we describe this procedure as *vague labelling*.

Second, the examples in Sect. 4.2.1 illustrate that economic experts refer to court decisions to reason statements regarding business valuation issues. Court decisions are entangled in the construction of valuation tools and impact technical opinions and/or lines of reasoning of economic experts. This is neither intended by the courts themselves, nor do academic experts generally support this endeavor (e.g., Moxter 1976b; Matschke and Brösel 2013, pp. 771–776). Courts make an impact on "economic" business valuation although they do not intend to do so; they exert an *unintended constructing initiative* regarding economic business valuation. The courts' intention to stay out of constructing economic business valuation is thus "a 'probation facta contraria,' a verbal announcement that is falsified by contrarian facts" (in another context Großfeld 2002a, p. 360).

Third, specific co-authorities, namely terminals such as mathematics and service providers like Bloomberg, allow to cross and create long distances. Terminals embed more actors to the judicial valuation network and thus enlarge it. At the same time, local and technical distances between actors—which we can describe as complexity—make the actor network more fragmented: Some sub-actor-networks are reserved to technical experts (e.g., mathematicians, statisticians); for other actors the functioning of these sub-networks are black boxes. We suggest that the ability of the CAPM to integrate long distances via terminals makes it favorable for judicial valuation: Long distances increase costs to follow and retrace paths; it puts responsibility at a distance and thus fosters to end up discussions.

Fourth, the CAPM-actor-network comprises written accounts about technical statements regarding this network. Sect. 4.2.1 indicates that this technical literature refers to court decisions to justify the application of the CAPM. Reverse referencing perpetuates the application of the CAPM. However, bearing the courts' intention in mind to embed economic expertise, circular reasoning might dilute the integrity of economic opinion.

Fifth, Sect. 4.2.1 indicates that the scope of literature allows to embed long lines of referencing. Long lines of referencing increase costs to reproduce and verify them (Latour 1987, p. 61). Our example reflects that longer lines of referencing and reasoning can be employed to conduct vague referencing in favor of the CAPM.

From a material perspective, criticism to the application of the CAPM in judicial valuation especially aims at *weak formal ties* of this network (e.g., DCF-MM-CAPM). Beyond this material perspective, the actual dissemination of the CAPM in judicial valuation indicates *strong actual ties* of this network. The preceding discussion is an attempt to trace some of these ties.

7 List of Court Decisions

7.1 Bundesverfassungsgericht (BVerfG)—Federal Constitutional Court

BVerfG, Decision from 27.04.1999—1 BvR 1613/94, *Entscheidungen des Bundesverfassungsgerichts* 100: 289.

7.2 Bundesgerichtshof (BGH)—Federal Court of Justice

BGH, Decision from 13.03.1978—II ZR 142/76, *juris*.

BGH, Order from 12.03.2001—II ZB 15/00755, *Deutsches Steuerrecht* 2001: 754.

BGH, Order from 29.09.2015—II ZB 23/14, *NZG* 2016: 139.

7.3 Bayerisches Oberstes Landesgericht (BayObLG)—Bavarian Higher Regional Court

BayObLG München, Order from 19.10.1995 (1995a)—3Z BR 17/90, *Betriebs-Berater* 1996: 259.

BayObLG München, Order from 11.12.1995 (1995b)—3Z BR 36/91, *Betriebs-Berater* 1996: 687.

BayObLG München, Order from 28.10.2005—3Z BR 71/00, *Neue Zeitschrift für Gesellschaftsrecht* 2006: 156.

7.4 Oberlandesgerichte (OLG)—Higher Regional Courts

OLG Celle, Order from 19.04.2007—9 W 53/06, *juris*.

OLG Düsseldorf, Order from 31.01.2003—19 W 9/00 AktE, *juris*.

OLG Düsseldorf, Order from 14.01.2004—19 W 1/03 AktE, *juris*.

OLG Düsseldorf, Order from 15.01.2004—19 W 5/03 AktE, *Neue Zeitschrift für Gesellschaftsrecht* 2004: 622.

OLG Düsseldorf, Order from 20.10.2005—19 W 11/04 AktE, *Neue Zeitschrift für Gesellschaftsrecht* 2006: 911.

OLG Düsseldorf, Order from 23.01.2008—26 W 6/06, *juris*.

OLG Düsseldorf, Order from 27.05.2009—26 W 5/07, *Beck-Rechtsprechung* 2009: 26638.

OLG Düsseldorf, Order from 04.07.2012—26 W 8/10, *Beck-Rechtsprechung* 2012: 20476.

OLG Düsseldorf, Order from 17.12.2015—26 W 22/14, *Beck-Rechtsprechung* 2016: 7667.

OLG Düsseldorf, Order from 15.12.2016—26 W 25/12, *Beck-Rechtsprechung* 2016: 124835.

OLG Düsseldorf, Order from 02.07.2018—26 W 4/17, *Beck-Rechtsprechung* 2018: 18257.

OLG Düsseldorf, Order from 21.02.2019—26 W 5/18, *Beck-Rechtsprechung* 2019: 6564.

OLG Frankfurt, Order from 26.08.2009—5 W 35/09, *juris*.
OLG Frankfurt, Order from 02.05.2011—21 W 3/11, *Beck-Rechtsprechung* 2011: 19452.
OLG Frankfurt, Order from 05.03.2012—21 W 11/11, *Beck-Rechtsprechung* 2012: 6905.
OLG Frankfurt, Order from 05.12.2013—21 W 36/12, *juris*.
OLG Frankfurt, Order from 28.03.2014a—21 W 15/11, *juris*.
OLG Frankfurt, Order from 18.12.2014b—21 W 34/12, *Die Aktiengesellschaft* 2015: 241.
OLG Frankfurt, Order from 17.01.2017—21 W 37/12, *Beck-Rechtsprechung* 2017: 102412.
OLG Karlsruhe, Order from 16.07.2008—12 W 16/02, *juris*.
OLG Karlsruhe, Order from 30.04.2013—12 W 5/12, *juris*.
OLG Karlsruhe, Order from 18.05.2016—12a W 2/15, *juris*.
OLG München, Order from 26.10.2006 (2006a)—31 Wx 12/06, *juris*.
OLG München, Order from 30.11.2006 (2006b)—31 Wx 59/06, *juris*.
OLG München, Order from 20.03.2019—31 Wx 185/17, *Beck-Rechtsprechung* 2019: 4039.
OLG Stuttgart, Decision from 28.01.2004—20 U 3/03, *juris*.
OLG Stuttgart, Order from 26.10.2006—20 W 14/05, *Neue Zeitschrift für Gesellschaftsrecht* 2007: 112.
OLG Stuttgart, Order from 18.12.2009—20 W 2/08, *juris*.
OLG Stuttgart, Order from 17.03.2010—20 W 9/08, *Beck-Rechtsprechung* 2010: 9848.
OLG Stuttgart, Order from 19.01.2011 (2011a)—20 W 2/07, *juris*.
OLG Stuttgart, Order from 19.01.2011 (2011b)—20 W 3/09, *Beck-Rechtsprechung* 2011: 1678.
OLG Stuttgart, Order from 14.09.2011 (2011c)—20 W 4/10, *juris*.
OLG Stuttgart, Order from 17.10.2011 (2011d)—20 W 7/11, *juris*.
OLG Stuttgart, Order from 05.06.2013—20 W 6/10, *juris*.
OLG Stuttgart, Order from 01.04.2014 (2014a)—20 W 4/13, *Beck-Rechtsprechung* 2011: 20592.
OLG Stuttgart, Order from 17.07.2014 (2014b)—20 W 3/12, *juris*.
OLG Zweibrücken, Order from 02.10.2017—9 W 3/14, *Beck-Rechtsprechung* 2017: 134513.

7.5 Kammergericht (KG) Berlin—Higher Regional Court in Berlin

KG Berlin, Order from 14.01.2009—2 W 68/07, *juris*.

7.6 Landgerichte (LG)—District Courts

LG Berlin, Order from 11.10.2016—102 O 105/11, https://www.spruchverfahren-direkt.de/wp-content/uploads/2019/08/Gameforge-Berlin-AG-2016-10-11-LG-Berlin-BGV.pdf. Accessed 9 November 2019.
LG Bremen, Order from 18.02.2002—13 O 458/96, *juris*.

LG Dortmund, Order from 01.04.2004—18 AktE 2/03, *Neue Zeitschrift für Gesellschaftsrecht* 2004: 723.

LG Dortmund, Order from 19.03.2007—18 AktE 5/03, *Beck-Rechtsprechung* 2007: 05697.

LG Düsseldorf, Order from 14.10.2016—33 O 72/10, *Beck-Rechtsprechung* 2016: 116188.

LG Frankfurt, Order from 02.05.2006—3-5 O 153/04, *juris*.

LG Frankfurt, Order from 13.11.2007—3-5 O 174/04, https://www.spruchverfahren-direkt.de/wp-content/uploads/2019/08/Carl-Schenck-AG-2007-11-13-LG-Frankfurt-aM-Squeeze-out.pdf. Accessed 28 April 2020.

LG München, Order from 03.12.1998—5 HKO 14889/92, *Der Betrieb* 1999: 684.

LG München, Order from 25.02.2002—5 HKO 1080/96, http://www.spruchverfahren-direkt.de/wp-content/uploads/2019/08/Frankona-Rückversicherungs-AG-2002-02-25-LG-München-I-BGV.pdf. Accessed 28 April 2020.

LG München, Order from 31.07.2015—5 HKO 16371/13, *Die Aktiengesellschaft* 2016: 51.

LG Stuttgart, Order from 05.11.2012—31 O 55/08, *juris*.

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References

Aha, Christof. 1997. Aktuelle Aspekte der Unternehmensbewertung im Spruchstellenverfahren. *Die Aktiengesellschaft* 42:26–36.

Baetge, Jörg, Kai Niemeyer, and Jens Kümmel. 2002. Darstellung der Discounted-Cashflow-Verfahren (DCF-Verfahren) mit Beispiel. In *Praxishandbuch der Unternehmensbewertung*, 2nd edn., ed. Volker H. Peemöller, 263–360. Herne/Berlin: NWB.

Ballwieser, Wolfgang. 2001. Unternehmensbewertung aus Sicht der Betriebswirtschaftslehre. In *Unternehmensbewertung im Wandel*, ed. Jörg Baetge, 1–24. Düsseldorf: IDW.

Ballwieser, Wolfgang. 2007. *Unternehmensbewertung*, 2nd edn., Stuttgart: Schäffer-Poeschel.

Ballwieser, Wolfgang. 2008. Betriebswirtschaftliche (kapitalmarkttheoretische) Anforderungen an die Unternehmensbewertung. *Die Wirtschaftsprüfung* 61:S102–S108.

Ballwieser, Wolfgang, and Dirk Hachmeister. 2016. *Unternehmensbewertung*, 5th edn., Stuttgart: Schäffer-Poeschel.

Bloomberg Finance L.P.. 2019. The Terminal. https://www.bloomberg.com/professional/solution/bloomberg-terminal/. Accessed 18 Oct 2019.

Böcking, Hans-Joachim, and Karsten Nowak. 1998. Der Beitrag der Discounted Cash Flow-Verfahren zur Lösung der Typisierungsproblematik bei Unternehmensbewertungen. *Der Betrieb* 51:685–690.

Brealey, Richard A., Stewart C. Myers, and Franklin Allen. 2006. *Principles of corporate finance*, 8th edn., New York: McGraw-Hill Irwin.

Bungert, Hartwin. 2008. Rückwirkende Anwendung von Methodenänderungen bei der Unternehmensbewertung. *Die Wirtschaftsprüfung* 61:822–825.

Callon, Michel. 1998. Introduction: the embeddedness of economic markets in economics. In *The laws of the markets*, ed. Michel Callon, 1–57. Oxford: Blackwell.

Callon, Michel. 1999. Actor-network theory—the market test. In *Actor network theory*, ed. John Law, John Hassard, 181–195. Oxford: Blackwell.

Castedello, Marc, Martin Jonas, Sven Schieszl, and Christian Lenckner. 2018. Die Marktrisikoprämie im Niedrigzinsumfeld. *Die Wirtschaftsprüfung* 71:806–825.
Copeland, Thomas E., Tim Koller, and Jack Murrin. 2000. *Valuation*, 3rd edn., New York: Wiley.
Damodaran, Aswath. 2012. *Investment valuation: tools and techniques for determining the value of any asset*, 3rd edn., Hoboken: Wiley.
Daske, Holger, and Günther Gebhardt. 2006. Zukunftsorientierte Bestimmung von Risikoprämien und Eigenkapitalkosten für die Unternehmensbewertung. *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung und Praxis* 52:530–551.
Deutsche Bundesbank. 2019. Geld und Kapitalmärkte. https://www.bundesbank.de/dynamic/action/de/statistiken/zeitreihen-datenbanken/zeitreihen-datenbank/723444/723444?treeAnchor=GELD&statisticType=BBK_ITS. Accessed 16 Nov 2019.
Dörschell, Andreas, Lars Franken, and Jörn Schulte. 2009. *Der Kapitalisierungszinssaz in der Unternehmensbewertung*, 1st edn., Düsseldorf: IDW.
Dörschell, Andreas, Lars Franken, and Jörn Schulte. 2012. *Der Kapitalisierungszinssaz in der Unternehmensbewertung*, 2nd edn., Düsseldorf: IDW.
Drukarczyk, Jochen. 2003. *Unternehmensbewertung*, 4th edn., Munich: Vahlen.
Drukarczyk, Jochen, and Andreas Schüler. 2009. *Unternehmensbewertung*, 6th edn., Munich: Vahlen.
Drukarczyk, Jochen, and Andreas Schüler. 2016. *Unternehmensbewertung*, 7th edn., Munich: Vahlen.
Emmerich, Volker. 2013. 305 Abfindung. In *Aktien- und GmbH Konzernrecht*, 7th edn., ed. Volker Emmerich, Mathias Habersack. München: C.H. Beck.
Emmerich, Volker. 2014. Kapitulation vor der Komplexität – Zur Praxis der Unternehmensbewertung in der aktuellen Rechtsprechung. In *Festschrift für Eberhard Stilz zum 65. Geburtstag*, ed. Mathias Habersack, Karl Huber, and Gerald Spindler, 135–142. München: C.H. Beck.
Emmerich, Volker. 2016. Wirtschaftsprüfer als Ersatzgesetzgeber? *EWeRK* 8:153–154.
Fama, Eugene F., and Kenneth F. French. 1992. The cross-section of expected stock returns. *The Journal of Finance* 47:427–465.
Fama, Eugene F., and Kenneth F. French. 1996. The CAPM is wanted, dead or alive. *The Journal of Finance* 51:1947–1958.
Fleischer, Holger. 2016. Unternehmensbewertung zwischen Tat- und Rechtsfrage. *Die Aktiengesellschaft* 61:185–199.
Follert, Florian. 2020. *Zur Unternehmensbewertung im Spruchverfahren aus interessentheoretischer Sicht*. Wiesbaden: Springer Gabler.
Gordon, Myron J. 1962. *The investment, financing, and valuation of the corporation*. Homewood: Irwin.
Granovetter, Mark. 1985. Economic action and social structure: the problem of embeddedness. *American Journal of Sociology* 91:481–510.
Granovetter, Mark S. 1973. The strength of weak ties. *The American Journal of Sociology* 78:1360–1380.
Großfeld, Bernhard. 2002a. Changing concepts of rules: global corporate assessment. *Law and Business Review of the Americas* 8(3):341–370.
Großfeld, Bernhard. 2002b. Global valuation: geography and semiotics. *SMU Law Review* 55:197–228.
Großfeld, Bernhard. 2002c. *Unternehmens- und Anteilsbewertung im Gesellschaftsrecht*, 4th edn., Cologne: Otto Schmidt.
Großfeld, Bernhard. 2012. *Recht der Unternehmensbewertung*, 7th edn., Cologne: RWS.
Hamada, Robert S. 1969. Portfolio analysis, market equilibrium and corporate finance. *The Journal of Finance* 24:13–31.
Herbener, Jeffrey M., and David J. Rapp. 2016. Toward a subjective approach to investment appraisal in light of Austrian value theory. *The Quarterly Journal of Austrian Economics* 19(1):3–28.
Hering, Thomas. 2000. Konzeptionen der Unternehmensbewertung und ihre Eignung für mittelständische Unternehmen. *Betriebswirtschaftliche Forschung und Praxis* 52:433–453.
Hering, Thomas. 2006. *Unternehmensbewertung*, 2nd edn., Munich: Oldenbourg.
Hering, Thomas. 2014. *Unternehmensbewertung*, 3rd edn., Munich: De Gruyter Oldenbourg.
Hering, Thomas. 2017. *Investitionstheorie*, 5th edn., Berlin: De Gruyter Oldenbourg.
Hering, Thomas, and Gerrit Brösel. 2004. Der Argumentationswert als „blinder Passagier" im IDW S 1 – Kritik und Abhilfe. *Die Wirtschaftsprüfung* 57:936–942.
Herzig, Norbert. 2007. Einführungsstatement: Unternehmensbewertung und Wirtschaftswissenschaft. *Die Wirtschaftsprüfung* 60:806–807.
Hüttemann, Rainer. 2007. Rechtliche Vorgaben für ein Bewertungskonzept. *Die Wirtschaftsprüfung* 60:812–822.
IDW. 1983. Stellungnahme HFA 2/1983: Grundsätze zur Durchführung von Unternehmensbewertungen. *Die Wirtschaftsprüfung* 36:468–480.
IDW. 1998. *Wirtschaftsprüferhandbuch 1998*. Vol. 2. Düsseldorf: IDW.

IDW. 2000. IDW Standard: Grundsätze zur Durchführung von Unternehmensbewertungen (IDW S 1). *Die Wirtschaftsprüfung* 53:825–842.
IDW. 2002. *Wirtschaftsprüferhandbuch 2002*. Vol. 2. Düsseldorf: IDW.
IDW. 2005. IDW Standard: Grundsätze zur Durchführung von Unternehmensbewertungen (IDW S 1). *Die Wirtschaftsprüfung* 58:1303–1321.
IDW. 2007. *WP Handbuch 2008*. Vol. 2. Düsseldorf: IDW.
IDW. 2008. IDW Standard: Grundsätze zur Durchführung von Unternehmensbewertungen (IDW S 1 i.d.F. 2008). *IDW Fachnachrichten* 2008:271–292.
IDW. 2018. *WPH Edition, Bewertung und Transaktionsberatung*. Düsseldorf: IDW.
Jonas, Martin. 2007. Unternehmensbewertung: Methodenkonsistenz bei unvollkommenen Märkten und unvollkommenen Rechtssystemen. *Die Wirtschaftsprüfung* 60:835–843.
Justesen, Lise, and Jan Mouritsen. 2011. Effects of actor-network theory in accounting research. *Accounting, Auditing & Accountability Journal* 24(2):161–193.
Justesen, Lise, and Jan Mouritsen. 2018. Actor-network theory and accounting research. In *Methodological issues in accounting research: theories and methods*, 2nd edn., ed. Zahirul Hoque, 422–441. London: Spirasmus Press.
Kalthoff, Herbert. 2005. Practices of calculation. *Theory, Culture and Society* 22:69–97.
Knorr Cetina, Karin D. 1991. Epistemic cultures: forms of reason in science. *History of Political Economy* 23:105–122.
Knorr Cetina, Karin D. 2006. The market. *Theory, Culture and Society* 23:551–556.
Koch, Jens. 2016. 305 Abfindung. In *Aktiengesetz*, 12th edn., ed. Uwe Hüffer, Jens Koch. München: C.H. Beck.
Koller, Tim, Marc Goedhart, and David Wessels. 2015. *Valuation*, 6th edn., Hoboken: Wiley.
Kruschwitz, Lutz, and Andreas Löffler. 2006. *Discounted cash flow*. Chichester: Wiley.
Kruschwitz, Lutz, and Andreas Löffler. 2008. Kapitalkosten aus theoretischer und praktischer Perspektive. *Die Wirtschaftsprüfung* 61:803–810.
Kruschwitz, Lutz, and Andreas Löffler. 2015. Preise, Werte und Arbitragefreiheit: Erwiderung auf Gleißner. *Corporate Finance* 6:176–181.
Kuhner, Christoph. 2007. Unternehmensbewertung: Tatsachenfrage oder Rechtsfrage? *Die Wirtschaftsprüfung* 60:825–834.
Kuhner, Christoph, and Martin Jonas. 2007. Unternehmensbewertung – Ein Rechtsproblem? *Die Wirtschaftsprüfung* 60:805.
Kuhner, Christoph, and Helmut Maltry. 2006. *Unternehmensbewertung*, 1st edn., Berlin Heidelberg: Springer.
Latour, Bruno. 1987. *Science in action*. Cambridge: Harvard University Press.
Latour, Bruno. 1996. On actor-network theory: a few clarifications. *Soziale Welt* 47:369–381.
Latour, Bruno. 2005. *Reassembling the social*. New York: Oxford University Press.
Latour, Bruno, and Steve Woolgar. 1986. *Laboratory life. The construction of scientific facts*. Princeton: Princeton University Press.
Law, John. 1986. On the methods of long distance control: vessels, navigation, and the Portuguese route to India. In *Power, action and belief*, ed. John Law, 234–263. London: Routledge.
Lintner, John. 1965. The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics* 47(1):13–37.
Löffler, Andreas. 2007. Was kann die Wirtschaftswissenschaft für die Unternehmensbewertung (nicht) leisten? *Die Wirtschaftsprüfung* 60:808–811.
MacKenzie, Donald, and Taylor Spears. 2014a. 'A device for being Able to book P&L': the organizational embedding of the Gaussian copula. *Social Studies of Science* 44:418–440.
MacKenzie, Donald, and Taylor Spears. 2014b. 'The formula that killed wall street': the Gaussian copula and modelling practices in investment banking. *Social Studies of Science* 44:393–417.
Markowitz, Harry. 1959. Portfolio selection. *The Journal of Finance* 7:77–91.
Matschke, Manfred J., and Gerrit Brösel. 2005. *Unternehmensbewertung*, 1st edn., Wiesbaden: Gabler.
Matschke, Manfred J., and Gerrit Brösel. 2007. *Unternehmensbewertung*, 3rd edn., Wiesbaden: Springer Gabler.
Matschke, Manfred J., and Gerrit Brösel. 2013. *Unternehmensbewertung*, 4th edn., Wiesbaden: Springer Gabler.
Matschke, Manfred J., Gerrit Brösel, and Behzad Karami. 2010a. Unternehmensbewertung im Rahmen der Rechtsprechung aus Sicht der funktionalen Lehre. In *Unternehmensbewertung*, ed. Heinz Königsmaier, Klaus Rabel, 421–450. Vienna: Linde.

Matschke, Manfred J., Gerrit Brösel, and Xenia Matschke. 2010b. Fundamentals of functional business valuation. *Journal of Business Valuation and Economic Loss Analysis* 5:1–39.
Miller, Peter. 1991. Accounting innovation beyond the enterprise: problematizing investment decisions and programming economic growth in the U.K. in the 1960s. *Accounting, Organizations and Society* 16(8):733–762.
Miller, Peter. 1998. The margins of accounting. In *The laws of the markets*, ed. Michel Callon, 174–193. Oxford: Blackwell.
Modigliani, Franco, and Merton H. Miller. 1963. Corporate income taxes and the cost of capital: a correction. *The American Economic Review* 53(3):433–443.
Mossin, Jan. 1966. Equilibrium in a capital asset market. *Econometrica* 34:768–783.
Moxter, Adolf. 1976a. *Grundsätze ordnungsmäßiger Unternehmensbewertung*, 1st edn., Wiesbaden: Gabler.
Moxter, Adolf. 1976b. Grundsätze ordnungsmäßiger Unternehmensbewertung – Bedeutung und Quellen. *Betriebs-Berater* 31:989–991.
Moxter, Adolf. 1983. *Grundsätze ordnungsmäßiger Unternehmensbewertung*, 2nd edn., Wiesbaden: Gabler.
Nobel Media AB. 2019. All prizes in economic sciences. https://www.nobelprize.org/prizes/lists/all-prizes-in-economic-sciences/. Accessed 23 Oct 2019.
Obermaier, Robert. 2004. *Bewertung, Zins und Risiko*. Frankfurt am Main: Peter Lang.
Obermaier, Robert. 2008. Die kapitalmarktorientierte Bestimmung des Basiszinssatzes für die Unternehmensbewertung: the Good, the Bad and the Ugly. *Finanz Betrieb* 10:493–507.
Olbrich, Michael, Tobias Quill, and David J. Rapp. 2015. Business valuation inspired by the Austrian school. *Journal of Business Valuation and Economic Loss Analysis* 10:1–43.
Paulsen, Anne-José. 2007. Statement: Rezeption wissenschaftlicher Thesen durch die Gerichte. *Die Wirtschaftsprüfung* 60:823–824.
Paulsen, Anne-José. 2008. Unternehmensbewertung und Rechtsprechung. *Die Wirtschaftsprüfung* 61: S109–S113.
Paulsen, Anne-José. 2010. 305 Abfindung. In *Münchener Kommentar zum Aktiengesetz*, 3rd edn., ed. Wulf Goette, Mathias Habersack, and Susanne Kalss. Munich: Vahlen.
Peemöller, Volker H., and Stefan Kunowski. 2002. Ertragswertverfahren nach IDW. In *Praxishandbuch der Unternehmensbewertung*, 2nd edn., ed. Volker H. Peemöller, 199–261. Herne/Berlin: NWB.
Quill, Tobias. 2016. *Interessengeleitete Unternehmensbewertung*. Wiesbaden: Springer Gabler.
Quill, Tobias. 2017. Der moderne Objektivismusstreit der Unternehmensbewertung: Der Weg in die selbstverschuldete Unmündigkeit. *Betriebswirtschaftliche Forschung und Praxis* 69:275–299.
Robson, Keith. 1992. Accounting numbers as "inscriptions": action at a distance and the development of accounting. *Accounting, Organization and Society* 17:685–708.
Ross, Stephen A. 1976. The arbitrage theory of capital asset pricing. *Journal of Economic Theory* 13:341–360.
Schich, Sebastian T. 1997. Schätzung der deutschen Zinsstrukturkurve. https://www.bundesbank.de/resource/blob/615948/6a0198c6c8fb9831c1792f4a948913cb/mL/1997-10-01-dkp-04-data.pdf. Accessed 17 Oct 2019.
Schneider, Dieter. 1995. Unternehmensdimensionierung und Unsicherheitsverringerung. In *Die Dimensionierung des Unternehmens*, ed. Rolf Bühne, Klaus Dittmar Haase, and Jochen Wilhelm, 45–59. Stuttgart: Schäffer-Poeschel.
Sharpe, William F. 1964. Capital asset prices: a theory of market equilibrium under conditions of risk. *The Journal of Finance* 19:425–442.
Stehle, Richard. 2004. Die Festlegung der Risikoprämie von Aktien im Rahmen der Schätzung des Wertes von börsennotierten Kapitalgesellschaften. *Die Wirtschaftsprüfung* 57:906–927.
Vollmer, Hendrik, Andrea Mennicken, and Alex Preda. 2009. Tracking the numbers: across accounting and finance, organizations and markets. *Accounting, Organization and Society* 34:619–637.
Wagner, Wolfgang, Martin Jonas, Wolfgang Ballwieser, and Andreas Tschöpel. 2006. Unternehmensbewertung in der Praxis – Empfehlungen und Hinweise zur Anwendung von IDW S 1. *Die Wirtschaftsprüfung* 59:1005–1028.
Wüstemann, Jens. 2007. Basiszinssatz und Risikozuschlag in der Unternehmensbewertung: aktuelle Rechtsprechungsentwicklungen. *Betriebs-Berater* 62:2223–2228.
Wüstemann, Jens. 2011. BB-Rechtsprechungsreport: Unternehmensbewertung 2010/11. *Betriebs-Berater* 66:1707–1711.