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Gerrit Brösel

Business Valuation

Functions, Methods, Principles



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Prof. Dr. Manfred Jürgen Matschke is one of the original exponents of the functional business valuation theory presented in this book that has grown incrementally in popularity in Germany over the last 50 years.



Prof. Dr. Gerrit Brösel, a former student of Matschke, is a successful author of textbooks. He has worked for one of the Big Four international auditing firms and the Chamber of Industry and Commerce as a publicly appointed expert on business valuation.

Manfred Jürgen Matschke / Gerrit Brösel

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Preface

Valuation methods originating in the Anglo-Saxon world (especially those methods from the USA) are considered *state of the art* when it comes to business valuation. These valuation methods are spread through numerous English-language articles and books and are applied in practice almost without exception. However, these market-value-oriented valuation methods were established through a theoretical model based on neoclassical finance theory. Moreover, what we now recognize as unrealistic premises are inconsistently combined. The result is for some kind of market value because that is what everyone seems to ask for. In practice especially, when money is to be earned, the methods used are most often those in vogue. However, buyers or sellers can find the purchase price they pay or are paid based on those valuation methods disregarded their decision value, and consequently, their good faith in fashionable valuation methods can lead to their incurring accompanied by an economic loss. Moreover, those buyers and sellers neither know the appropriate decision value nor are they aware of how it is derived.

The alternative valuation theory, functional business valuation theory, arose in Germany in the 1970s and has been developing ever since. Its central aspect is that any valuation conducted is purpose-driven. While several studies dealing with these ideas can now be found in the English-language literature, the ideas of functional business valuation have not yet been made available to an international audience in a compact form.

This book, which has already been published in German, Polish, and Russian, now offers an audience of English-speaking valuation professionals a theoretically sound alternative to the fashionable market-value-oriented form of valuation. The first chapter of the book presents the basics of functional business valuation theory and the three main functions of business valuation in the following three chapters. This book certainly does not ignore methods for determining market values but tests their suitability in real-world situations. Those methods are assigned to the relevant main function of business valuation to show the context in which they can be useful in practice. Chapter 5 then summarizes the purpose-oriented principles of business valuation.

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MANFRED JÜRGEN MATSCHKE

GERRIT BRÖSEL

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List of Symbols

Chapter 1

a, b	price of goods X and Y expressed in monetary units
$\beta_j^{FK=0}$	beta factor of an unencumbered enterprise j
$\beta_j^{FK>0}$	beta factor of the indebted enterprise j
β_j	beta factor as a measure of the systematic risk of an investment j compared with the market portfolio M
$D_{j,t+1}^*$	expected distributions of an investment j at time t + 1
$D_{j,t}^{*EK}$	expected distributions of a fraction of the equity of entity j at time t
Δr_M	market risk premium for systematic market risk
Δr_j	risk premium for an investment j
FT_j	pure financing title (ARROW-DEBREU financing title) with a deposit of one monetary unit in the state s_j
i	risk-free capital market interest rate
$K_{j,t+1}^*$	expected market value of an investment j at time t + 1
$K_{j,0}$	expected market value of an investment j at time 0
$K_{j,t}$	market value of an investment j at time t
$K_{j,0}^{EK}$	market value of a fraction in the equity of company j at time 0
λ^*	price of a unit of risk (related to the standard deviation)
λ	price of a unit of risk (related to variance)
$N([1]_0)$	utility of the risk-free monetary unit at time 0
$N([1+i]_1)$	utility of $1+i$ risk-free monetary units at the moment
n	number of net single financial instruments
p^*	ARROW-DEBREU price of securities portfolio
p_i^*	equilibrium price of security i
p_i	price of a security i
ρ_j	price of a pure financing instrument j; discount factor for a payment in state s_j
$\rho_{j,M}$	correlation coefficient between investment j and market portfolio M
r_j^*	expected one-period returns on investment j
r_{iFK}^*	return required by a company's equity investors j (cost of equity)
r_{jFK}^*	return required by a company's lenders j (cost of debt)
r_{jGK}^*	return required by a company's investors j (weighted average cost of capital)
r_M	expected return of a risky market portfolio
r_M^*	expected return of the risky optimal market portfolio

$r_{j,EK}^{*FK=0}$	return required by equity investors of an unlevered firm j; cost of equity of an unlevered firm j
$r_{j,EK}^{*FK>0}$	return required by equity investors of an indebted firm j; cost of equity of an indebted firm j
σ_j	standard deviation of the one-period return capital investment j
$\sigma_{j,M}$	covariance between the uncertain single-period returns on investment j and the market portfolio M
σ_M	standard deviation of the (optimal) market portfolio
σ_M^2	variance of the (optimal) market portfolio
s_j	environmental status j
(s_1^*, \dots, s_n^*)	characteristics of facts relevant to conflict resolution S_1, \dots, S_n , on which the conflict parties have agreed in an agreement
$tg \alpha, tg \beta$	price as a quantitative ratio of exchangeable goods X and Y
S_1, \dots, S_n	facts relevant to conflict resolution
$W_{j,0}$	market value of a company j at time 0
$W_{j,0}^{EK}$	market value of the equity of a company j at time 0; market value of all equity securities of a company j at time 0
$W_{j,0}^{FK}$	market value of the debt capital of a company j at time 0; market value of all debt instruments of a company j at time 0
WP_i	security i
x	quantity of good X
$X_{j,t}^*$	expected cash flow per all capital investors of enterprise j at time t
$X_{j,t}^{*EK}$	expected cash flow for all equity investors of a company j at time t
$X_{j,t}^{*FK}$	expected cash flow per all investors of borrowed capital of enterprise j at time t
y	quantity of good Y
z_{ij}	conditional payment of a security i in the environmental state s_j
$Z_{j,t+1}^*$	expected payment of an investment j at time $t + 1$
$Z_{j,t+2}^*$	expected payment of capital investment j at time $t + 2$

Chapter 2

A_K	advantage of a buyer
A_V	advantage of a seller
α_{\min}	minimum shareholding (marginal shareholding) in the new company created by the merger
$\alpha_{\min h}^{\bar{U}_f}$	minimum share (marginal share) of shareholder h in the demerger company \bar{U}_f after the demerger
\mathfrak{A}	set of all alternatives a_i
a_i	alternative i of the set \mathfrak{A}
a_{opt}	optimal alternative; base program

β	participant's share in the company \ddot{U} without merger
β_h	fraction of shareholder h in the company UG without demerger
\mathfrak{B}^*	valuation program; subset of the alternatives $B(s_1, \dots, s_n)$ open to the decision subject after agreement on the conflict resolution (s_1, \dots, s_n) , for which the utility $N(b_{opt}(s_1, \dots, s_n))$ is just equal to or minimally greater than the utility $N(a_{opt})$ of the base program
b_{kt}	(not sign-constrained) autonomous deposit surpluses of the investment and financing objects from the buyer's perspective at time t
b_{vt}	(not sign-constrained) autonomous deposit surpluses of the investment and financing objects from the seller's perspective at time t
$\mathfrak{B}(s_1, \dots, s_n)$	set of all possible actions b_j when conflict resolution is agreed upon (s_1, \dots, s_n)
$b_j(s_1, \dots, s_n)$	alternative j in case of agreement on conflict resolution (s_1, \dots, s_n)
$b_{opt}(s_1, \dots, s_n)$	optimal alternative in case of agreement on conflict resolution (s_1, \dots, s_n)
BW_0	present value of a growing pension
C_K	net present value from the buyer's perspective
C_V	net present value from the seller's perspective
C_{Kj}^{Be}	(non-negative) net present value for an investment or financing object included in the buyer's valuation program j
C_{Vj}^{Be}	(non-negative) net present value for an investment or financing object included in the seller's valuation program j
ΔKW_K^{Be-Ba}	net present value difference due to restructuring from the base to the valuation program from the buyer's perspective
ΔKW_V^{Be-Ba}	net present value difference due to restructuring from the base to the valuation program from the seller's perspective
δ	dual variable for the restriction of the protection of the extraction current
d_t	dual variables for the liquidity constraints in $t = 0, \dots, T$
\mathfrak{E}	agreement set as the intersection of those quantities that comprise the conflict resolutions that are reasonable from the perspective of each conflict party
e_{ij}	preference-relevant consequence of an alternative i in the environmental state s_j ; result constellation
e_{bt}	current investment deposit
EN	width of the withdrawal flow for consumption purposes
$EN_K^{Ba \max}$	maximum width of the withdrawal flow of the base program from the buyer's perspective
$EN_V^{Ba \max}$	maximum width of the withdrawal flow of the base program from the seller's perspective
EN_K^{Be}	width of the withdrawal flow of the valuation program from the buyer's perspective

EN_V^{Be}	volume of the cash withdrawal stream of the seller's valuation program
$EN_F^{I\max}$	maximum possible withdrawals of the company F created after the merger (merger program); maximum benefit of all conflicting parties from the company F after a merger
$EN_{opt}^{I\max}$	maximum width of the extraction flow based on the optimistic input data variant
$EN_{pess}^{I\max}$	maximum width of the extraction flow based on the pessimistic input data variant
$EN_{real}^{I\max}$	maximum amount of cash withdrawal based on a realistic version of the baseline data
$EN_{\ddot{U}f}^{I\max}$	maximum width of the withdrawal flow from the company created by the demerger \ddot{U}_f
$EN_{UG}^{I\max}$	maximum width of the withdrawal flow from the company UG without splitting
$EN_{UA}^{I\max}(P^{UB})$	maximum amount of withdrawal flow from enterprise A depending on the price of enterprise B
$EN_{UB}^{I\max}(P^{UA})$	maximum amount of withdrawal flow from enterprise B depending on the price of enterprise A
$EN_K^{I\max}$	maximum width of the withdrawal flow from the buyer's perspective; benefit of the base program from the buyer's perspective
$EN_V^{I\max}$	maximum width of the withdrawal flow from the seller's perspective; benefit of the base program from the seller's perspective
$EN_{\ddot{U}}$	maximum possible withdrawals of the contributing company \ddot{U} of the valuation subject (pre-merger program); maximum benefit of the valuation subject from the company \ddot{U} without agreement on merger
EW	(objectified) capitalized earnings value (as arbitration or as argumentation value)
$f(a_i, z_j);$ $f: \mathfrak{A} \times \mathfrak{Z} \rightarrow \mathfrak{R}$	outcome function; assignment of an outcome constellation e_{ij} to an alternative i and an environmental state z_j
g_{Kjt}	(not sign-constrained) cash inflows of the investment and financing objects from the buyer's perspective at time t
g_{Vjt}	(unsigned) cash inflows of the investment and financing objects from the seller's perspective at time t
g_{UKt}	future cash inflows of the company to be valued U from the buyer's perspective
g_{UVt}	future cash inflows of the company to be valued U from the seller's perspective
$H_{ij}(r)$	result level r per alternative i and per environmental state z_j
$H_{ijt}(r)$	result level r per alternative i and per environmental state z_j at time t
$H_{ijv}(r)$	result level r per alternative i and per environmental state z_j as well as per result type v

$H_{ijtv}(r)$	result level r per alternative i and per environmental state z_j as well as per result type v at time t
i	(uniform subjective) calculation interest rate in determining the future performance value ZEW
i_t	(period-specific subjective) calculation interest rate in determining the future performance value ZEW
i_K	calculation interest rate from the buyer's perspective
i_V	calculation interest from the seller's perspective
i_t^{Ba}	period-specific internal rates of return (internal interest rates) of the base program
i_{Kt}^{Ba}	period-specific internal rates of return (internal interest rates) of the base program from the buyer's perspective
i_{Vt}^{Ba}	period-specific endogenous marginal interest rate feet of the base program from the seller's perspective
i_t^{Be}	period-specific internal rates of return (internal interest rates) of the valuation program
i_{Kt}^{Be}	(period-specific endogenous) marginal interest rate feet of the valuation program from the buyer's perspective
i_{Vt}^{Be}	period-specific endogenous marginal interest rate feet of the valuation program from the seller's perspective
I_b	investment objects available for the valuation subject with $b \in \{1, \dots, B\}$
IF	internal financing of the company
\mathcal{R}	set of all possible preference-relevant consequences or result constellations e_{ij}
K	amount of investment capital available to the valuation subject at valuation time $t = 0$
K_1, \dots, K_9	alternative combinations of the non-price conflict-resolution-relevant facts
\emptyset	empty set
μ	expected value
$N\left(\left[1\right]_0\right)$	utility of a monetary unit expected at time 0
$N\left(\left[1+i\right]_1\right)$	utility of $1+i$ at time 1 expected monetary units
$N(a_i)$	benefit of an alternative i
$N(a_{opt})$	success/benefit of the base program
$N(b_j(s_1, \dots, s_n))$	success/utilization of an alternative b_j when conflict resolution is agreed upon (s_1, \dots, s_n)
$N(b_{opt}(s_1, \dots, s_n))$	success/benefit of an alternative b_j when conflict resolution is agreed upon (s_1, \dots, s_n)
N_b	utility value assigned to the investment object I_b by the decision subject
N_{Ba}	utility of the base program
N_{Be}	utility of the valuation program

n_{ij}	partial benefit of a result constellation e_{ij}
$N_K(a_{opt})$	overall utility of the base program from the the buyer's perspective
N_U	value in use of the company from the perspective of the valuation subject
$N_V(a_{opt})$	overall utility of the base program from the seller's perspective
N_{VO}	benefit of the comparison object
P	agreement price
P_b	price to be paid for investment object I_b at valuation time $t = 0$, investment amount per unit of investment object
P_{max}	maximum price payable from the buyer's perspective
P_{min}	minimum asking price from the seller's perspective
P_{max}^{opt}	maximum price payable on the basis of the optimistic input data variant
P_{max}^{pess}	maximum price payable on the basis of the pessimistic input data variant
P_{max}^{real}	maximum payable price based on the realistic input data variant
P_U	price of the company still to be negotiated U
P_{VO}	price of the comparison object
$P_{max}^{UA}(P^{UB})$	maximum payable price for the company U_A in dependence for the price of the company U_B
$P_{max}^{UB}(P^{UA})$	maximum payable price for the company U_B in dependence for the price of the company U_A
q^t	compounding factor $1 + i$
ρ_{Kt}^{Ba}	period-specific discount factors applicable to the buyer's base program
ρ_{Vt}^{Ba}	period-specific discount factors applicable to the seller's base program
ρ_{Kt}^{Be}	period-specific discount factors applicable to the buyer's valuation program
ρ_{Vt}^{Be}	period-specific discount factors applicable to the seller's valuation program
r_K	internal interest rate of the comparative object from the buyer's perspective
r_V	internal interest rate of the comparative object from the seller's perspective
r_{VO}^K	internal rate of return (interest rate) of the comparative object of the buyer
r_{VO}^V	internal rate of return (interest rate) of the comparative object of the seller
r_{VO}	internal interest rate of the comparative object
s	standard deviation
s_1, \dots, s_n	characteristics of the facts relevant for conflict resolution
(s_1, \dots, s_n)	a conflict resolution; possible settlement solution

S_1, \dots, S_n	facts relevant to conflict resolution
SI_{Objekt}	reliability index
\mathcal{S}	set of all conflict resolutions $\{(s_1, \dots, s_n)\}$
\mathcal{S}_{zK}	set of reasonable conflict resolutions from the buyer's perspective
\mathcal{S}_{zV}	set of reasonable conflict resolutions from the seller's perspective
\mathcal{S}_z	set of reasonable conflict resolutions from the perspective of one party
t	time, time index
τ	(auxiliary) time index
U	company to be valued
u_j	dual variables for the capacity constraints with $j = 1, \dots, J$
VG_{objekt}	advantageousness of an object
\mathfrak{W}	multi-dimensional decision value; set of all conflict resolutions (s_1, \dots, s_n) for which the utility $N(b_{\text{opt}}(s_1, \dots, s_n))$ is equal to or minimally greater than the utility $N(a_{\text{opt}})$ of the base program
w	constant growth rate of an annuity
w_{Kt}	time structure factor for the withdrawals from the buyer's perspective
w_{Vt}	time structure factor for the withdrawals from the seller's perspective
x_{Kj}	Number of investment or financing object to be realized from buyer's perspective
x_{Kj}^{\max}	capacity constraints per investment or financing object from the buyer's perspective
\mathfrak{Z}	set of all environmental states z_j
z_b	number of investment objects I_b that can be acquired by the valuation subject with $0 \leq z_b \leq z_{b\max}$ (in case of arbitrary divisibility) or $z_b \in \{0, 1, 2, \dots, z_{b\max}\}$ (in case of integer)
z_j	state of the environment j
z_U	variable characterizing the acquisition/sale of the company
ZE	consistent subjective future success
ZE_t	period-specific subjective future success
ZE_K^*	constant (optimal) future success (cash surplus per period) from the buyer's perspective
ZE_K	future success from the buyer's perspective
ZE_V	future success from the seller's perspective
ZE_U	future success of the company being valued
ZE_{VO}	future success of the comparison object
ZEW, ZEW_U	(subjective) future performance value (as decision value/border price) of the enterprise U
ZEW_K	future performance value from the buyer's perspective
ZEW_V	future performance value from the seller's perspective

$ZEW_U^K(\rho_{Kt}^{Ba})$	future performance value of company U from the buyer's perspective based on the period-specific discount factors of the base program
$ZEW_U^K(\rho_{Kt}^{Be})$	future performance value of company U from the buyer's perspective based on the period-specific discount factors of the valuation program
$ZEW_U^V(\rho_{Vt}^{Ba})$	future performance value of company U from the seller's perspective based on the period-specific discount factors of the base program
$ZEW_U^V(\rho_{Vt}^{Be})$	future performance value of company U from the seller's perspective based on the period-specific discount factors of the valuation program

Chapter 3

a	method-specific weighting factor of traditional combinatorial methods
AW	arbitration value
\mathcal{E}	agreement set
\mathcal{E}'	modified agreement set in a dominated conflict situation
$\hat{\mathcal{E}}$	subset of efficient, non-dominated conflict resolutions from the agreement set
$\bar{\mathcal{E}}$	subset of inefficient, dominated conflict resolutions from the agreement set
E	constant future earnings surplus (for capitalized earnings value)
EVA	economic value added
EW	earned value
g	goodwill amortization rate
GR	goodwill annuity; excess profit
GW_{deri}	derivative goodwill
GW_{orig}	original goodwill
i^*	capitalization/calculation interest rate (for capitalized earnings value)
i^{**}	goodwill annuity interest rate; capitalization/calculation interest rate for discounting the goodwill annuity (excess profit) (in the profit-shifting method/procedure II of goodwill annuities)
k	cost of capital as weighted average of cost of equity and cost of debt, decision value of buyer
MVA	market value added
NG	normal profit
NOA	net operating assets
NOPaT	net operating profit after taxes
P_{max}	decision value of the buyer; maximum payable price
P_{min}	decision value of the seller; minimum price to be demanded

$r_{\text{NOA } t}$	return on invested capital NOA (defined individually for each company as required for operation) in a period t
SW	substance value
T	number of years to consider a goodwill annuity GR
UW	company value
v^t	discount factor; reciprocal of the compounding factor q_t

Chapter 4

AA_{BO}	number of shares issued in the valuation object
AK_{BO}	(average) price of the shares of the valuation object
AK_{VU}	price of the share of the comparable company
BG_{BO}	selected reference value of the valuation object
BG_{VU}	selected reference value at the comparable company
CV_{τ}^{FCF}	continuing value, terminal value, residual value, value of all performance indicators discounted to the end of the detailed planning period
E_T	success variable at time T
EK	market value of equity
EK^{APV}	market value of the equity of an indebted company according to the adjusted present value approach
EK^{FCF}	market value of the equity of an indebted company according to the free cash flow approach
EK^{FTE}	market value of the equity of an indebted company according to the flow-to-equity approach
EK^{TCF}	market value of the equity of an indebted company according to the total cash flow approach
EM_0	success multiplier at time 0
FA	fungibility discount
FK	market value of debt capital
FCF	free cash flow; cash flow available to providers of equity and debt capital
FTE	flow to equity; inflow to equity providers (after income taxes)
GK	market value of total capital of the company
GK^e	market value of the total capital of an unleveraged (only self-financed) company
GK^f	market value of the total capital of an indebted (i.e., also or only debt-financed) company
i, i_{rf}	risk-free capital market interest rate; borrowing rate
k	risk-adequate capitalization rate
k^e	cost of capital of an unleveraged, only self-financed company
k^f	cost of capital of an indebted, equity- and debt-financed company
M_{VU}	multiplier applicable at the comparable company
MK_{VU}	market capitalization of the comparable company