## Contents

Ι	Fi	nancial calculus	1
1	Cor	Common financial laws	
	1.1	Basic vocabulary	3
	1.2	Simple Interest and Simple Discount	6
		1.2.1 Change of time measure: equivalent rates	8
		1.2.2 Floating interest rates	8
		1.2.3 Some remarks on zero coupon bonds	9
		1.2.4 Computing the future value of annuities	12
	1.3	Compound accumulation and compound discount	13
		1.3.1 The meaning of compound accumulation: "compounding" the	
		interest	13
		1.3.2 Floating interest rates	14
		1.3.3 Changing the unit measure of time: equivalent rates	14
		1.3.4 Simplifying the computations for annuities	16
	1.4 Accumulation with advanced simple interest and linear (bank)		19
		1.4.1 Floating discount rates	20
		1.4.2 Simplified computations for annuities	21
	1.5	Comparison between financial laws described with different formulas .	21
2	Fin	ancial laws depending on one variable	23
	2.1	Various generality levels	23
	2.2	Characteristic parameters	24
	2.3	Decomposability	28
3	Fina	ancial laws depending on two variables	29

	<b>a</b>
1V	Contents

	3.1 3.2 3.3	Various generality levels	29 30 32 35 36
4	Inte	rest rate term structure	37
5	<b>Amo</b> 5.1 5.2	Generalities	47 47 47 52 53 53 56
6	Exa	mples and applications	59
II	Fi	nancial choices	69
7	Fina 7.1 7.2 7.3	What is a financial objective?	<b>71</b> 71 72 72
8	Net 8.1 8.2	Present Value The basic scheme	<b>75</b> 75 81
9	<b>APV</b> 9.1 9.2	V and GAPV First notions	<b>85</b> 85 87
10	10.1 10.2 10.3	Remarks on the use of the model: portfolio duration	
11		V and ROE  Decomposition of global indices	105 105 109 111
12	12.1	ulation Models General ideas	115 115 116

	Contents	v
12.3 Multiple objectives		118
13 Incoherent methods: a short review		121
13.1 Recovery time		121
13.2 Return on Equity		122
13.3 Internal (or Implicit) Rate of Return		122
14 Some complements		127
14.1 How to manage uncertainty		127
14.1.1 Hard approach		127
14.1.2 Soft approach		128
14.2 "Legal" profitability or cost indicators		128
14.2.1 General aspects		128
14.2.2 Some weaknesses		
14.2.3 Objectives or constraints?		
14.3 Other objectives		130
15 Appendix		131
III Financial applications		135
16 Leasing and consumer credit		137
16.1 Contract construction		137
16.2 The profitability of leasing contracts		139
16.2.1 Flexible contracts		
16.3 Average profitability of contract portfolios		144
16.4 Consumer credit		
16.4.1 How to construct an instalment sale contract		145
16.4.2 The question of the amortization plan		147
16.4.3 The TAEG		150
7 Bonds		153
IV Exercises and problems		161
18 Exercises with elaborated solutions		163
19 Exercises to be elaborated		189
19.1 Financial laws		190
19.2 Discounted Cash Flow and implicit interest rate		197
19.3 Amortizations, leasing and instalment sales		
19.4 Interest rate term structure		
19.5 Financial choices		203
References		205
Index		209

## Index

Accumulation advanced simple interest factor, 20	Bank discount, 19 Bank transparency, 128		
continuation factor, 25, 31	Bond		
factor, 4	fixed income, 153		
process, 3	zero coupon, 37		
simple factor, 6 Adjusted Present Value, 86 Amortization, 47 closure conditions, 48 in pursuit, 57 with constant instalments (French), 53 with constant quotas (Italian), 53 with prepayment of interest (German), 56 with two rates (American), 56 Annual Nominal Interest Rate, 128 Annuity, 6	Cantelli's Theorem, 34 Compound     accumulation factor, 13     discount factor, 13     interest rate, 14 Conjugate factor, 5 Consumer credit, 128, 145 Convertible Nominal Rate, 15 Coupon     bond, 153     rate, 128, 153  DCF, see Discounted Cash Flow		
due, 16 fractionated, 18	Debt ratio, see Financial leverage		
future value, 6, 12, 17	Decomposability, 28, 32, 39 Discount, 4		
ordinary, 16	factor, 4		
present value, 6, 16, 21	linear factor, 19		
value, 6 APV, see Adjusted Present Value	process, 3		
Arbitrage	rate, 5, 7, 13, 24, 30 Discounted Cash Flow, 76		
time, 37	Discounted Value, see Present Value		

Duration, 95, 99	force of, 26, 32
of portfolio, 96	forward rate, 41
modified, 100	Global Annual Effective Rate, 128, 150
Economic Value Added, 108, 132	Global Effective Rate, 129
Equivalent rates, 8, 15	instantaneous intensity, see Force
EVA, see Economic Value Added	of interest
Exponential	overnight rate, 26
accumulation factor, 13	quota, 154
discount factor, 13	rate, 5, 24, 30
	simple period rate, 8
Final Value, see Future Value	spot rate, 41
Financial	Internal Rate of Return, 61, 79, 122
decomposable law, see Decompos-	Invested Capital, see Principal
ability	IRR, see Internal Rate of Return
law, 4	
law of one variable, 23	Leasing, 137
law of two variables, 29	Liquidity, 156
leverage, 61, 87, 112	rate, 158
objective, 72	
Floating Rates, 8, 14, 20	Market
Fundamental Analysis, 17	perfect, 37
Future Value, 3, 8, 14	with non-friction, 37
in real terms, 36	MCDA, see Multi-Criteria Decision Analysis
GAPV, see Generalized Adjusted Present	Multi-Criteria Decision Analysis, 119,
Value	128
Generalized Adjusted Present Value, 86	
decomposition of, 109, 112	Net Present Value, 75
Generalized Net Present Value, 82	NPV, see Net Present Value
decomposition of, 105, 131	
GNPV, see Generalized Net Present Value	Opportunity Cost of Equity, 75, 78
Gordon's Formula, 18	Option
T	implicit, 133
Immunization, 93	Outstanding capital, 106
Instalment	Day Dady David 191
of amortization, 48	Pay-Back Period, 121
of an annuity, 6	PBP, see Pay-Back Period
Instantaneous	Period interest rate
rate of mortality, 36	compound, 14 Perpetuity
Insurance	present value, 17
accumulation factor, 35 Interest, 4	Portfolio
advanced simple, 20	replicating, 39
advanced simple, 20 average intensity, 26	Present Value, 3
capitalization, 13	Price
compound rate, 13	ex-coupon, 154
continuous capitalization, 27	forward, 38
committee capitalization, 21	101 110111, 00

```
invoice, 154
    issuing, 153
    spot, 37
Principal, 3
Rational Discount, see Simple discount
Redemption, see Amortization
Return on Equity, 63, 88, 112, 122
Risk Premium, 80
ROE, see Return on Equity
Simple
    discount, 7
    gross return, 9
    interest, 6
    interest accumulation, 7
    interest rate, 7
    net return, 11
TAEG, see Interest Global Annual Ef-
         fective Rate
TAN, see Interest Annual Nominal Rate
TEG, see Interest Global Effective Rate
Term structure
    flat, 42
    humped, 41
    of force of interest, 42
    of prices, 39
    of yield rates, 41
Time horizon, 71
Time Profile, 138
Value
    face, 3, 153
    fundamental, 17
    nominal, 3
    of portfolio, 94
Volatility, 100
WACC, see Weighted Average Cost of
         Capital
Weighted Average Cost of Capital, 79,
         85, 132
Yield
    curve, see Term structure
    expected rate, 155
    rate of coupon, 156
    rate to maturity, 154
```