
Contents

Preface	xv
A reader's guide	xix
1 Free competition and long-period positions	1
1 The English classical economists and Marx	3
1.1 Adam Smith (1723–1790)	3
1.2 David Ricardo (1772–1823)	7
1.3 Karl Marx (1818–1883)	11
1.4 Characteristic features of the classical approach to the theory of value and distribution	14
2 Some formal analysis	15
3 The traditional neoclassical approach	20
3.1 Characteristic features of neoclassical long-period analysis	20
3.2 Léon Walras (1834–1910)	22
3.3 The “non-substitution theorem”: A special case of neoclassical analysis	26
3.4 Alfred Marshall (1842–1924)	28
4 Preview of the argument and its premises	33
5 Historical notes	35
2 A one-commodity model	42
1 Technology	43
2 Viability	44
3 Growth and consumption	44
4 Wages and profits	45

5	Saving and investment	46
6	Choice of technique	48
7	Distribution and growth	51
8	Historical notes	54
9	Exercises	56
3	Two-commodity models	58
1	A first simple case	59
1.1	Viability	60
1.2	Growth and the concept of sub-system	60
1.3	Prices	62
2	A model with two basic commodities	63
2.1	Basic and non-basic commodities	63
2.2	Viability	64
2.3	The maximum rate of profit	65
2.4	Prices	68
2.5	Growth	69
3	Non-basic commodities reconsidered	70
4	A complete taxonomy	73
5	Choice of technique	74
5.1	The model with two basic commodities	75
5.2	Another way to look at the same problem	77
5.3	A model with a basic and a non-basic commodity	79
6	Self-reproducing non-basics reconsidered	82
7	Historical notes	84
8	Exercises	90
4	Models with any number of commodities	94
1	A model with only basic commodities	95
1.1	Basic and non-basic commodities	95
1.2	Viability	96
1.3	The maximum rate of profit	97
1.4	The price system	98
1.5	Prices and the wage rate as differentiable functions of the rate profit	99
1.6	The wage rate as the independent variable	100
1.7	Growth	101
2	Models with basic and non-basic commodities	104
2.1	Indispensability	106
2.2	Viability	106
2.3	The maximum rate of growth	107
2.4	The price system	108

2.5	$G^* \leq r < G$	108
2.6	Growth	110
2.7	A final remark	110
3	The labor theory of value	113
4	The choice of a numeraire	113
4.1	The unit of consumption	116
4.2	Labor commanded	116
4.3	The Standard commodity	119
5	Historical notes	121
6	Exercises	
5	Choice of technique	127
1	A simplified case: All commodities are required for use	128
1.1	The indirect approach	128
1.2	The direct approach	132
2	A special case: All commodities are basic in all systems	134
3	A more general case: Some commodities are not required for use	135
3.1	An example	135
3.2	The direct approach	136
3.3	The indirect approach	139
3.4	The indirect approach: An alternative framework	143
4	A general framework of the analysis	146
5	The wage-profit frontier	147
6	An extension: The small open economy	149
7	Historical notes	150
8	Exercises	153
6	Alternative descriptions of a technique	164
1	Reduction to dated quantities of labor	165
2	Vertically integrated technical coefficients	168
3	Techniques defined by price vectors	169
4	Further remarks on regular and irregular techniques	174
5	Concluding remarks	175
6	Historical notes	175
7	Exercises	180
7	Fixed capital	186
1	Basic definitions	187
2	A single technique	191
3	A useful device: The core processes	194
4	The choice of technique	197

- 5 On the positivity of prices 202
- 6 Depreciation, annual charge, and efficiency 203
- 7 The problem of capital utilization 204
- 8 The plant 207
- 9 Historical notes 208
- 10 Exercises 215

- 8 Joint production 219**
 - 1 Joint production and demand: Some examples 220
 - 2 Joint production and demand: The direct and the indirect approach 225
 - 3 A uniform growth rate equal to the rate of profit 228
 - 4 A uniform growth rate lower than the rate of profit 231
 - 5 Toward more general models 234
 - 6 Elements of the indirect approach 236
 - 7 Historical notes 240
 - 8 Exercises 245

- 9 Jointly utilized machines 250**
 - 1 Fixed capital technology 251
 - 2 Main results 256
 - 3 Depreciation 260
 - 4 "Depreciation by evaporation" 262
 - 5 The problem of scrap 264
 - 6 On the plant once again 266
 - 7 Historical notes 268
 - 8 Exercises 271

- 10 Land 277**
 - 1 Models of extensive and intensive rent 278
 - 1.1 Extensive rent 280
 - 1.2 An example 285
 - 1.3 Order of fertility and order according to rent per acre (order of rentability) 287
 - 1.4 Intensive rent proper: Intensification of the use of land 288
 - 1.5 External differential rent: Economy in the use of the product of land 293
 - 2 Given net products and land: The general model 294
 - 2.1 On the robustness of some previous results 296
 - 2.2 The model 297
 - 3 Toward more general models 300

4	Wage-profit and rents-profit frontiers	303
5	Price-output and rents-output relationships	304
6	Historical notes	305
7	Exercises	311
11	Persistent wage and profit rate differentials	321
1	Heterogeneous labor	322
1.1	The aggregation of different kinds of labor	322
1.2	Wage differentials	325
2	Differential employments of capital	334
3	Historical notes	335
12	On limits to the long-period method	339
1	Self-reproducing non-basics	341
2	Obsolete used machines	348
3	Renewable resources	351
4	Exhaustible resources	357
4.1	The model	358
4.2	A numerical example	366
5	Historical notes	368
6	Exercises	374
13	Production as a circular flow and the concept of surplus	379
1	Origins of the concept of production as a circular flow	380
1.1	Early contributions	381
1.2	More general models	382
2	Further developments: Von Bortkiewicz and von Charasoff	384
2.1	Ladislaus von Bortkiewicz	384
2.2	Georg von Charasoff	387
3	Wassily Leontief and input-output analysis	390
3.1	The economy as a circular flow	390
3.2	Input-output analysis	393
4	Remak on "superposed prices"	397
4.1	Methodological issues	397
4.2	"Superposed prices"	398
5	The problem of the choice of technique and the Rule of Free Goods	400
5.1	The use of inequalities	400
5.2	The Rule of Free Goods	403
6	The von Neumann growth model	403

7	On alternative interpretations of the von Neumann model	407
7.1	The Walras–Cassel model	408
7.2	Some difficulties in the conventional interpretation	410
7.3	Von Neumann and Remak	412
8	Sraffa and the revival of the classical approach	414
8.1	From partial to general analysis	415
8.2	<i>Production of Commodities by Means of Commodities</i>	416
8.3	The question of no assumption on returns	418
9	Sraffa and von Neumann	421
9.1	The “Champernowne connection”	421
9.2	Comparing the analyses of Sraffa and von Neumann	423
14	The neoclassical theory of distribution and the problem of capital	427
1	The core of traditional neoclassical theory	428
2	Versions of traditional neoclassical theory	432
2.1	The aggregate production function	433
2.2	Capital as a factor of production	434
2.3	Real capital: A fund of subsistence goods	438
2.4	Real capital: A vector of heterogeneous capital goods	439
2.5	Capital as a value magnitude	441
3	The critique of traditional neoclassical theory	443
3.1	The aggregate production function	443
3.2	Capital as a factor of production	445
4	Neoclassical responses	449
4.1	In defence of traditional neoclassical theory	449
4.2	“General” versus “special” theories	451
5	Intertemporal and temporary equilibrium	455
5.1	Erik Lindahl	456
5.2	John Richard Hicks	458
5.3	Friedrich August Hayek	459
5.4	Gérard Debreu	460
5.5	Temporary and intertemporal equilibrium and the problem of capital	464
15	On some alternative theories of distribution	468
1	Classical approaches to the theory of distribution	469
1.1	Adam Smith	469
1.2	David Ricardo	472
1.3	Karl Marx	474
2	The post-Keynesian theory of growth and distribution	475

2.1	An analytical exposition	475
2.2	The technological relationship: Single production	477
2.3	The technological relationship: Joint production	480
3	On monetary explanations of the rate of profit	480
4	Historical notes	483

Mathematical appendix		492
A.1	Basic concepts	493
A.1.1	Sets	493
A.1.2	Numerical sets	494
A.1.3	Vector spaces	495
A.1.4	Linear combinations and related issues	496
A.1.5	Linear transformations	497
A.1.6	Transposing and partitioning matrices	500
A.1.7	Determinants, minors, and the inverse of a (square) matrix	501
A.1.8	Systems of linear equations	503
A.1.9	Eigenvalues and eigenvectors	504
A.2	Theorems of the Alternative	506
A.3	Perron–Frobenius Theorems	509
A.3.1	Perron–Frobenius Theorems for nonnegative matrices	510
A.3.2	Perron–Frobenius Theorems for indecomposable semipositive matrices	516
A.4	Linear programming	519
A.4.1	Standard and canonical forms	519
A.4.2	Duality and related theorems	521
References		527
Name index		555
Subject index		561