

The Price Index and its Extension

A chapter in economic measurement

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Contents

<i>Foreword</i>	xvii
<i>Preface</i>	xix
<i>Acknowledgements</i>	xxvii
INTRODUCTION	1
1 Laspeyres	3
2 Paasche	6
3 Revealed preference	9
4 Utility	12
PART II	
LASPEYRES, PAASCHE AND FISHER	19
Introduction	
— theory and practice	21
1 Comparisons	21
2 Fleetwood's student	23
3 What is a price index?	29
I Three problems	39
1 The 'Index Number Problem'	41
2 Formulae and tests	43
3 Utility-cost	45
4 Cost-efficiency and efficacy	48
5 The price index	52
6 Problems	56
II The general problem of limits	59
1 Consistency of demands	63
2 Revealed choice and preference	69
3 Preference-non-preference contradiction	71

4	Cost-efficiency and non-satiation	74
5	Critical costs	76
6	Revealed bounds and classical limits	79

III The homogeneous problem

—Laspeyres and Paasche

87

1	Conical utility and expansion loci	94
2	Homogeneous consistency	98
3	Revealed homogeneous preference	101
4	Range of the price index	104
5	Revealed bounds	105
6	Classical limits	106

IV Fisher and quadratics

109

1	Byushgens on Fisher	117
2	Question about Byushgens	119
3	Gradients and quadratics	120
4	Conditions for compatibility	123
5	Theorem on quadratic consistency	127

Appendix

129

I	Total and incremental inflation rates and inflation bias	131
II	Computations: Statistics Canada data	135

FIGURES

1	Fleetwood's calculation (1707)	25
2	Utility-cost	46
3	Demand-utility compatibility	50
4	Partial compatibility	51
5	Income purchasing power	53
6	Purchasing power and the price index	55
7	Classical utility construction	68
8	Cost of living limits	83
9	Utility for upper limits	84
10	Utility for lower limits	85
11	The "Limits" argument	95
12	Keynes' "Method of limits"	96
13	The Paasche-Laspeyres cone	97
14	Critical points and the incremental price index	114
15	Inflation maps: income groups	134

TABLES

INFLATION RATES, INCREMENTAL RATES
AND INFLATION BIAS

Tables for the entire expenditure range
for the following income stratifications

I	Income stratification by approximate octiles	138
II	Income stratification by approximate quartiles	139
III	Approximate median income stratification	140
IV	Overall	141

PART II

THE COST OF LIVING 143

I Price and quantity levels 145

1	Price-quantity duality	146	•
2	Dual function examples	149	
3	Price and quantity levels	151	
4	Limits of indeterminacy	154	

II The True Index 157

1	The cost of living	157
2	The price index	158
3	Formulae and Fisher's tests	158
4	The Paasche-Laspeyres interval	159
5	Existence test	161
6	Theory and practice	162
7	Many periods	164
8	Price levels	168
9	Fisher's formulae	172

III Fisher and Byushgens 175

1	Byushgens' theorem	177
2	The existence question	178
3	Purchasing power correspondence	181
4	Many-period generalization	183

IV The Four-Point Formula 187

1	Median multipliers and levels	192
2	Centre locus	194
3	Linear purchasing power	197

- 4 Critical locations 200
- 5 Elliptical case 202
- 6 Hyperbolic case 204
- 7 Parabolic limits 206
- 8 Demonstration: Fisher's data 207

V Wald's "New Formula" 213

- 1 Linear expansions 214
- 2 Revealed purchasing power 215
- 3 The critical points 217
- 4 Marginal price indices and limits 220

APPENDICES 223

- 1 **The system of inequalities** $a_{rs} > x_s - x_r$. *Research Memorandum No. 18* (October 1960), Econometric Research Program, Princeton University. *Proc. Cambridge Phil. Soc.* 59 (1963), 125-33 225
- 2 **The construction of utility functions from expenditure data.** *Cowles Foundation Discussion Paper No. 144* (October 1964), Yale University. First World Congress of the Econometric Society, Rome, September 1965. *International Economic Review* 8, 1 (1967), 67-77 239
- 3 **The concept of a price index and its extension.** Second World Congress of the Econometric Society, Cambridge, September 1970 253
- 4 **The Theory of International Comparisons of Real Income and Prices.** In *International Comparisons of Prices and Output, Proceedings of the Conference at York University, Toronto, 1970*, edited by D. J. Daly. National Bureau of Economic Research, Studies in Income and Wealth Volume 37, New York, 1972 (Ch. I, 13-84) 261
- 5 **Measurement of the purchasing power of incomes with linear expansion data.** *Journal of Econometrics* 2, 3(1974), 343-64 313

6	On the constructability of consistent price indices between several periods simultaneously. In <i>Essays in Theory and Measurement of Demand: in honour of Sir Richard Stone</i> , edited by Angus Deaton. Cambridge University Press, 1981, 133-61	337
7	Index-number practice under conditions of hyperinflation—with particular reference to Peru. International Development Research Centre (IDRC), Ottawa, 1991	365
	<i>Notation</i>	395
	<i>Bibliography</i>	397
	<i>Index</i>	419