

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

This book examines alternative methods for achieving optimality without all the apparatus of economic planning (such as information retrieval, computation of solutions, and separate implementation systems), or a vain reliance on sufficiently “perfect” competition. All rely entirely on the self-interest of economic agents and voluntary contract. The author considers methods involving feed-back iterative controls which require the prior selection of a “criterion function,” but no prior calculation of optimal quantities. The target is adjusted as the results for each step become data for the criterion function. Implementation is built in by the incentive structure, and all controls rely on consistency with the self-interest of individuals. The applicability of all the methods is shown to be independent of the form of ownership of enterprises: examples are given for industries which are wholly privately owned, wholly nationalized, mixed, and labor-managed.

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

Information, incentives and the economics of
control

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

Information, incentives and the economics of control

G.C. ARCHIBALD

Department of Economics,
University of British Columbia



Cambridge University Press
978-0-521-33045-9 - Information, Incentives and the Economics of Control
G.C. Archibald
Frontmatter
[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Tokyo, Mexico City

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by
Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9780521330459

© Cambridge University Press 1992

This publication is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without the written
permission of Cambridge University Press.

First published 1992

A catalogue record for this publication is available from the British Library

Library of Congress cataloguing in publication data

Archibald, G.C., 1926–

Information, incentives, and the economics of control / G.C.

Archibald,

p. cm.

Includes index.

ISBN 0 521 33045 9 (hardback)

1. Mathematical optimization. 2. Economic man. 3. Consumers'
preferences. 4. Competition. I. Title.

HB143.7.A73 1992

330'.01'1-dc20 91-43850 CIP

ISBN 978-0-521-33045-9 Hardback

ISBN 978-0-521-02279-8 Paperback

Cambridge University Press has no responsibility for the persistence or
accuracy of URLs for external or third-party internet websites referred to in
this publication, and does not guarantee that any content on such websites is,
or will remain, accurate or appropriate. Information regarding prices, travel
timetables, and other factual information given in this work is correct at
the time of first printing but Cambridge University Press does not guarantee
the accuracy of such information thereafter.

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

To the memory of my father

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

Contents

<i>Preface</i>	xiii
Part I Introductory	1
1 Two preliminary matters	3
1.1 Individualism and holism	3
1.2 Incentive compatibility	5
2 Extended preferences	7
2.1 The axiom of selfishness and the Two Theorems of Welfare Economics	7
2.2 Edgeworth's treatment of extended preferences (1881)	8
2.3 Winter's treatment (1969)	12
2.4 Archibald and Donaldson's treatment (1976a)	13
2.5 Lemche's treatment (1986a)	17
2.6 The Second Theorem and public goods	18
2.7 Non-paternalism	20
2.8 Envy	21
2.9 "Models of the dog and his master"	23

x **Contents**

Part II	Iterative controls	25
3	Feed-back control processes	27
3.1	Iterative controls in real time	27
3.2	The Criterion Function	27
3.3	Requirements of a planning and of a control process	29
3.4	Other properties of control processes	31
3.5	Decentralization	33
3.6	Phillips' controls	34
4	First example: an externality problem	37
4.1	Information requirements	37
4.2	The example: an upstream–downstream externality	39
4.3	The behavior of firms	41
4.4	The control procedure	42
4.5	Some difficulties with profit	47
4.6	Technological difficulties	48
4.7	Faster control processes	51
4.8	Relation of the example to Second Best	52
4.9	Properties of the control process reviewed	53
5	Second application of the control process: Lerner's Problem	55
5.1	Planning, regulation, and agency	55
5.2	Iterative control	60
5.3	Uniqueness and convergence	61
5.4	Monotonicity and strategy-proofness	63
5.5	Uncertainty	65
5.6	Effort-aversion	68
6	Third example of the control process: implementation of a Second-Best solution	70
6.1	A Second-Best problem	70
6.2	The model: a three-commodity economy	72
6.3	Comment on the model	77

	Contents	xi
7 Two examples of the control process in a mixed economy		79
7.1 The class of problems considered		79
7.2 First example: the Harris–Wiens scheme (1980)		81
7.3 A solution: setting the incentive structure		82
7.4 Second example: TV programmes		84
 Part III Non-convexities		 89
 8 Non-convexities in the technology		 91
8.1 The Second Theorem reconsidered		91
8.2 A non-convex technology		92
 9 Non-convexity and optimal product choice		 95
9.1 Product choice		95
9.2 The characteristics approach		96
9.3 The technology and the ppf		99
9.4 Failure of the Second Theorem		101
9.5 What if economies of scale are exhausted?		104
9.6 Possible asymptotic properties of monopolistic competition		104
 Part IV Cooperatives		 107
 10 Pareto-improvements and cooperatives		 109
10.1 Pareto-improvements and the prisoners' dilemma		109
10.2 Labor-managed firms and the range of markets		110
10.3 Ownership in labor-managed firms		113
10.4 Innovation in labor-managed firms		114
10.5 Labor-managed firms and unions		115

xii	Contents	
11	Achieving Pareto-efficiency in the LMF	117
	11.1 Cooperative and free-rider solutions	117
	11.2 The model: members of the LMF	118
	11.3 Incentives and Holmstrom's scheme (1982)	120
	11.4 Trustworthy third parties	122
	11.5 An auction process	124
	11.6 Information problems	128
	11.7 Limits of partial equilibrium	129
12	Risk-sharing in Illyria (or the ELMF)	130
	12.1 Risk and moral hazard	130
	12.2 Risk-sharing	131
	12.3 The model: the LMF-bank contract	134
	12.4 A two-stage solution	137
	12.5 Existence and uniqueness	139
	12.6 Information and honesty	141
	12.7 General-equilibrium problems	143
	Appendix A: The <i>ex ante</i> case	144
	Appendix B: The <i>ex post</i> case	145
	Appendix: The taxation of economic rent	149
	A.1 The suggestions of Sun Yat Sen (1929) and Harberger (1965)	149
	A.2 The possibility of side-payments	150
	A.3 The difficulty of disentanglement	152
	A.4 Natural resources and man-made sources of rent	152
	<i>Notes</i>	155
	<i>Bibliography</i>	163
	<i>Index</i>	170

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

Preface

A preface is perhaps a place to offer some explanation, and certainly a place to make acknowledgements and offer thanks.

The only part of this book which may, I think, require some explanation is Part II, and the explanation is not independent of some debts I wish to acknowledge. When I was an undergraduate at the London School of Economics the works of Oscar Lange and Abba Lerner were on the reading list, and, true to the liberal and open tradition of the School, “socialist economics” was prominent on the agenda. Later, when I was on the teaching staff of the School, I encountered the work of Karl Popper and some of his colleagues, as well as that of the great, if misguided, Bill Phillips. It was not until I had been for some years at this University that I realized that a feed-back, or iterative, control system might be designed in such a fashion as to avoid some of the difficulties inherent both in Phillips’ control systems and in central planning. Such a system requires the prior selection of what I call a Criterion Function. Such a function must have the properties that it signals clearly, probably by reaching an extremum, that the target has been reached, and sufficient information to estimate its value must be generated during the iterative process itself. Given these properties, there would be no need for a planning procedure: no need, that is, to collect sufficient information to calculate optimal quantities, or prices, in advance. Clearly, the iterative control process has itself to be incentive-compatible at every step, and strategy-proof. If, then, it is properly designed, the means of implementation are not to be considered as a separate

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)xiv **Preface**

step, as they are when the target is the outcome of a planning procedure. Errors, of course, operate in real time, and impose costs, as do errors in a process of market adjustment. I do not know how to estimate the costs of these errors, nor how to compare them with the adjustment costs of other systems.

Lerner's *The Economics of Control* left the problems of information and incentives quite unresolved, and this work may be regarded as, in part, an attempt to fill up some of the gaps he left (my title is a deliberate echo of his). Nonetheless, the use of iterative control systems in no way supposes state ownership. Examples in Part II are deliberately chosen to illustrate their use in cases of pure private ownership, public ownership, and mixed cases. This book is thus not intended as a contribution only to the "economics of socialism."

With these considerations in mind, I have, in Part II, provided what amounts to a "DIY manual" for the construction of feed-back control systems with desirable properties. All depends, however, on the choice of Criterion Function. In a Second-Best world, the justification of a Criterion Function may not be at all easy. I have accordingly offered a Second-Best example, but this depends on a brutal aggregation of consumers' preferences. It is sadly possible that the DIY kit serves no useful purpose.

Parts III and IV of this book require, I think no particular explanation. They are variations of the theme "control," in the interests of efficiency (and perhaps equity) without planning, but requiring the construction of appropriate institutions that allow the solution to be reached by voluntary contract rather than by command.

My remaining debts are too heavy to be fully acknowledged. I hope the many individuals who have contributed to my knowledge and understanding will forgive me for not listing them. (One chapter, indeed, was first written as a partial reply to a question posed by a conspicuously intelligent and able graduate student; I shall not even name him.) I clearly must identify and thank former collaborators who have permitted me to use our joint work here, and even read and commented on my use of it: Russell Davidson, David Donaldson, and Hugh Neary.

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)

Preface xv

I take pleasure in thanking several cohorts of graduate students who have patiently permitted me to try my ideas on them.

I am much indebted to the Canada Council for a Killam Research Fellowship during my tenure of which I was able to make coherent some of the material offered here. This University has given me the sabbatical leaves I needed for the writing, and the Social Science and Humanities Research Council of Canada has been generous with research grants and leave fellowships. My greatest single debt must, however, be to the Economics Department of this University, which has invariably provided both the atmosphere of challenge and friendly criticism, and practical support.

Ms. Marissa Relova somehow deciphered my handwriting and typed the whole text, and dealt patiently with my innumerable corrections and revisions.

My wife has had to put up for several years with a degree of preoccupation and abstraction sadly beyond the licensed “absent mindedness” of professors.

G.C.A.
University of British Columbia
September 1991

Cambridge University Press

978-0-521-33045-9 - Information, Incentives and the Economics of Control

G.C. Archibald

Frontmatter

[More information](#)
