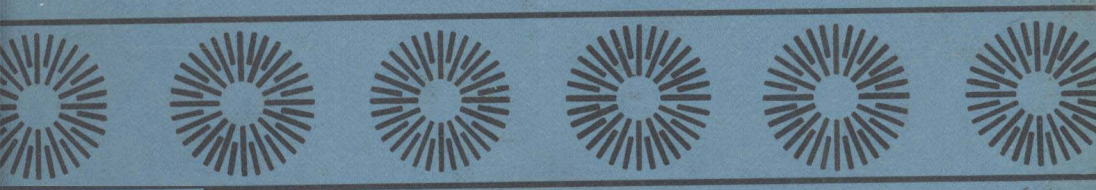
Inflation, Interest, and Growth

Hans Brems



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A Synthesis

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To Ulla in gratitude for her patience

Preface

The purpose of this book is to build models simulating simultaneous unemployment and inflation seen in their natural habitat, that of a growing economy. To simulate growth, models must be dynamic. To simulate anything, models must be solvable—and solved. Confining itself to steady-state growth the book solves for the growth rates of all its variables as well as for the levels of the nominal and real rates of interest. Solutions are examined to see if and how they depend upon the values of the employment fraction and the inflationary potential of the economy.

Early chapters restate separately Wicksellian, Keynesian, monetarist, and neoclassical doctrines to be synthesized in chapter 6—the core of the book. Chapter 6 uses a simple model of a noncorporate closed economy producing a single good from labor, an immortal capital stock of that good, and nothing else. Later chapters add complications like bonds and shares, mortal capital stock, exhaustible and nonexhaustible natural resources, two goods, and two countries.

Primarily this is a book on theory. But references to measurement are frequent and will help the reader decide how good—or bad—its first approximations are.

Over the past four years, chapters or passages of the book were read by colleagues, and most chapters were tried out in workshops and seminars. Particularly helpful were—positive or negative—comments by John S. Flemming, Jørgen Gelting, Ronald Harstad, Donald Hodgman, Wilhelm Krelle, Shlomo Maital, Peter Erling Nielsen, Don Patinkin, Paul A. Samuelson, and Franklin Shupp.

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Behüt uns, Herr, ... vor Seuchen und vor teurer Zeit.
Deliver us, O Lord, ... from pestilence and times of dearth.

Martin Luther, *"Vater unser im Himmelreich,"* "Our Father which art in Heaven" (1539).

Evangelisches Kirchengesangbuch, Ausgabe für die Evangelisch-lutherschen Landeskirchen Schleswig-Holstein-Lauenburg, Hamburg, Lübeck und Eutin.

Introduction on Method and Scope

Macroeconomics

Current macroeconomics—especially of the monetarist variety—is often impressionistic: models are not fully enough specified to be solvable, hence are not solved. As a result, current macroeconomics is more controversial than current microeconomics. This book is a modest attempt to remove some of the controversy by specification, rigor, and synthesis.

Macroeconomics is the branch of economics interested in the aggregate volume of output rather than its composition and in the price level rather than relative prices. The first nine chapters of the book do their macroeconomics by imagining an economy producing a single good. Here physical output as well as its price are well-defined variables expressible as single numbers.

Statics and Dynamics

A static system determines the level of its variables at a particular time. Technically a static system includes equations in which all variables refer to the same time and in which no derivatives with respect to time occur. Only chapter 2 is static.

This book wants to see unemployment and inflation in their natural habitat, that of a growing economy. Only a dynamic approach can do that. A dynamic system determines the time paths rather than the levels of its variables. Technically it does so by including either difference equations (relating a variable at one time to a variable at a different time) or differential equations (containing derivatives with respect to time). We much prefer differential equations. They are compact and neat. What is more, their operation is greatly facilitated by the use of Euler's number *e,* the base of the natural logarithms. We use them in chapter 3 and all later chapters.

Steady-State Growth

The dynamic approach adopted in this book is the simplest possible one assuming growth to be steady-state growth. As Hahn and Matthews (1964) did, we define steady-state growth as stationary proportionate rates of growth. Chapter 4 derives five familiar properties of the standard neoclas-

sical growth model, that is, (1) convergence to steady-state growth of output, (2) identical steady-state growth rates of output and capital stock, (3) stationary rate of return to capital, (4) identical steady-state growth rates of the real wage rate and labor productivity, and (5) stationary distributive shares. What is more, chapter 4 finds none of the five properties to be seriously at odds with historical reality. All following chapters confine themselves to steady-state growth.

Unbalanced Growth

As Solow and Samuelson (1953) did, we define balanced growth as identical proportionate rates of growth of physical output for all goods. Real-world growth may be steady-state but is typically unbalanced. Most growth models miss imbalance, for single-good models cannot accommodate it; only multigood models can do so.

In multigood models aggregate physical capital stock and its physical marginal productivity, among other things, cannot be expressed as meaningful and operational single numbers. Post-Keynesians consider this fact somehow very damaging to neoclassical theory. But it is easy to show that physical capital stock and its physical marginal productivity will remain meaningful and operational as matrices, and we show it in chapter 10 considering an economy producing two goods. Chapter 11 considers two countries, each producing its own good.

Solutions

We try to understand economic variables by building models which explain them in terms of something considered the province of other sciences. Technically a model is a system of equations containing variables related to one another through parameters. A parameter is a magnitude fixed by the investigator using information coming from outside the model, such as demographical, geological, psychological, technological, or public-policy information.

Models presented in this book are solvable—and are solved. Almost all solutions are explicit. By an explicit solution for a variable we mean an equation having that variable alone on one side and nothing but parameters on the other side. The book finds such explicit steady-state growth rate solutions for—the price of goods, the nominal rate of interest, the real rate of interest, the money wage rate, the exchange rate, physical consumption, physical investment, physical output, labor employed, physical capital stock, physical marginal productivity of capital stock, the demand for

money, the supply of money, and national money income—as well as for the levels of the two rates of interest.

Each chapter of this book begins with a list of symbols carefully distinguishing variables from parameters.

This book avoids the use of the word "constant." As used in the literature, that word sometimes means a parameter, sometimes a variable that happens not to be a function of time, that is, happens to be stationary. Whether or not a variable of ours will be stationary will appear from our growth-rate solutions: stationary variables have zero growth rates.

Reading the Book

The book proceeds gently from the familiar and simple to the less familar and less simple. The first few chapters introduce separately the Wicksellian, Keynesian, monetarist, and neoclassical ideas to be synthesized in chapter 6. Later chapters add complications to the simple model used in chapter 6.

All chapters except 7, 8, and 9 are self-contained and may be read without reading any other chapter. Some repetition will result from such an arrangement but may well be a price worth paying. Each of chapters 7, 8, and 9 has chapter 6 as a prerequisite.

The book uses mathematics all the time but never goes beyond elementary algebra and elementary differential and integral calculus.

References

F.H. Hahn and R.C.O. Matthews, "The Theory of Economic Growth: A Survey," *Econ. J.,* Dec. 1964, *74,* 779–902.

R.H. Solow and P.A. Samuelson, "Balanced Growth under Constant Returns to Scale," *Econometrica,* July 1953, *21,* 412–424.

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1 Wicksell: A Dynamic Model of Interest and Inflation

The applications to the bank for money, then, depend on the comparison between the rate of profits that may be made by the employment of it and the rate at which they are willing to lend it.

David Ricardo (1817, ch. 27)

David Hume (1752) described what would happen to prices if "all the money of Great Britain were multiplied fivefold in a night" but failed to describe *how* all that money would find its way into the economy. David Ricardo saw how: banks would be lending money at a rate of interest lower than the rate of profits that could be made by employing it.

Wicksell (1898) restated Ricardo's idea within a rigorously defined framework, three characteristics of which are worth remembering. First—as was inevitable once the rate of profits had been made part and parcel of the money-diffusing mechanism—Wicksell's framework was a lineal descendant of capital theory, specifically the classical "wage-fund" theory. Here, capital advanced wages over a period of production thought of as the harvest year. The money wage rate was found simply by dividing the money wage fund by employment. Second, Wicksell's framework employed such modern concepts as aggregate demand and supply. Third, it was explicitly dynamic—a step-by-step account of how the new money finds its way into the economy. The latter characteristic was lost in the Keynesian revolution.

All references to Wicksell (1898; 1906) use the two English translations, Wicksell (1936; 1935), respectively.

Notation

Variables

$g_P \equiv$ proportionate rate of growth of price

$L \equiv$ labor employed, man-years

$P \equiv$ price of consumers' goods

$r \equiv$ the money rate of interest

$w \equiv$ money wage rate, dollars per man-year