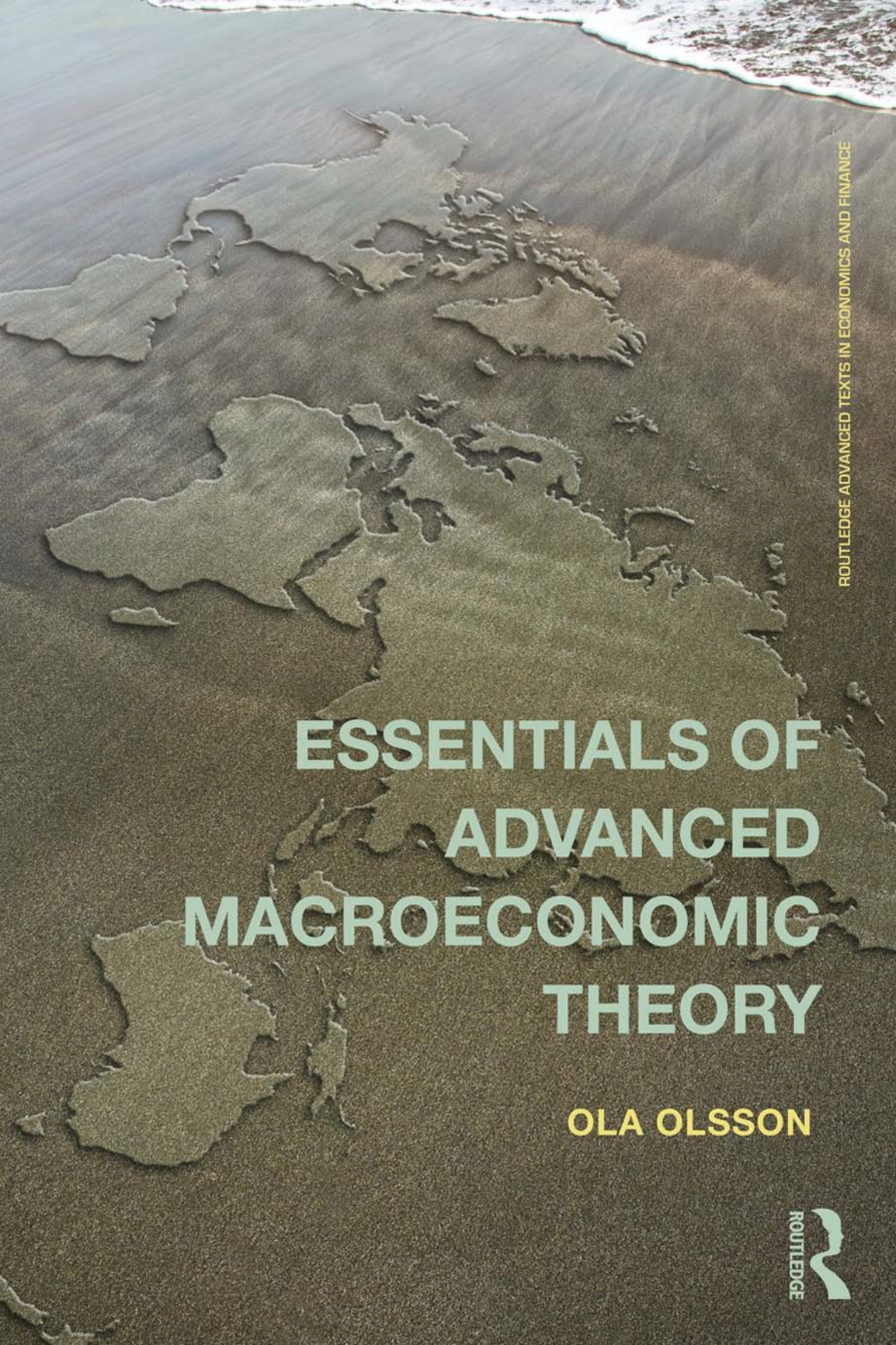
ROUTLEDGE ADVANCED TEXTS IN ECONOMICS AND FINANCE
ESSENTIALS OF ADVANCED MACROECONOMIC THEORY
OLA OLSSON
ROUTLEDGE

Essentials of Advanced Macroeconomic Theory

Trying to summarize the essentials of macroeconomic theory, in the wake of the financial crisis that has shaken not only Western economies but also the macroeconomic profession, is no easy task. In particular, the notion that markets are self-correcting and always in equilibrium appears to have taken a heavy blow. However, the jury is still out on which areas should be considered as failures and which constitute the future of research.

The overall aim of this text is to provide a compact overview of the contributions that are currently regarded as the most important for macroeconomic analysis and to equip the reader with the essential theoretical knowledge that all master's degree students in macroeconomics should be acquainted with.

The result is a compact text that should act as the perfect complement to further study of macroeconomics: an introduction to the key concepts discussed in the journal literature, and suitable for students from upper undergraduate level through to PhD courses.

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Preface

Trying to summarize the essentials of macroeconomic theory in 2011 is no easy task. The financial crisis has shaken not only Western economies but also the macroeconomic profession, and the field has recently been the object of strong criticism. In particular, the notion that markets are self-correcting and always in equilibrium, as emphasized by the dominant dynamic general equilibrium (DGE) tradition, appears to have taken a heavy blow. However, the jury is still out on the areas that should be considered as failures and the areas that constitute the future of research.

The overall aim of this text is to provide a compact overview of what are currently regarded as the most important theoretical contributions to macroeconomic analysis. It is intended to present the core of advanced macroeconomic theory, the essential knowledge that all master's degree students in macroeconomics should be equipped with. As alluded to above, any such compilation of relevant knowledge inevitably has to make difficult judgments on what should be included and what should not. Views on the proper priority of relevant macroeconomic theory will very much depend on the orientation of the individual scholar and it is quite likely that such priority lists vary widely among macro teachers in the profession. Although I choose to include some theoretical contributions that are not usually included in macro textbooks and exclude others, I would certainly not claim that my choices are necessarily the most "appropriate" ones. Rather, they reflect to a large degree my own orientation and interests.

In this book, I have made the following basic priorities. Compared with many existing texts, I have emphasized the long run rather than the short run. The reason is partly that an increasing share of the most recent research in the leading journals is focused on long-run issues and partly that it appears to me that the theory of short-run (business cycle) fluctuations in the economy is not in good shape at the moment. Unlike any other macro textbook that I know of, this text includes a presentation of the Malthusian growth model. In order to understand the pattern of macro developments in countries like India and China and the historical pattern in Europe, it seems essential to include a discussion about the interaction between population and economic growth in economic development as discussed by Malthusian theory.

Sections on long-run growth are included mainly at the expense of short-run analysis such as business cycle theory. This text includes one chapter on the key features of DGE modeling, but I do not delve deeply into this type of framework. A more extensive section is devoted to a model of financial crises and bank runs. In the chapters on monetary and fiscal policy, I have further chosen to focus on models emphasizing political economy and institutional features. The political economy of market failures and imperfect institutions is currently a very active research agenda in economics and this text taps into some of that recent literature. In the chapter on consumption, I have further tried to include some of the most recent insights gained from research in behavioral economics.

Unlike the standard advanced textbooks in microeconomics, the models that are surveyed below do not emerge from a core set of assumptions that are then extended and applied in different directions, neither is the analysis based on a small number of key equations as in certain macro textbooks. Despite recent efforts, macroeconomic theory is still not a coherent body of theory in the same way as microeconomics or econometrics is. The DGE program was clearly an attempt to provide such a coherent framework, but recent events have put that effort into a less favorable light.[1]

The "workhorse" model for most chapters is, however, the well-known two-period, representative agent model of consumer optimization with a utility function given by $U = u(c_1) + \beta u(c_2)$ that is maximized subject to varying constraints. The majority of all models presented are thus "micro-founded", which should make the links to microeconomic theory more easily recognizable. Several of the chapters start off with a typical Keynesian model, which is then contrasted to models founded in individual household behavior and characterized by rational expectations and intertemporal optimization.

A key motivation of this text in comparison with the literature in the field is its condensed form. As a rule, most advanced textbooks in macroeconomics are about 500–600 pages long, mixing theory with somewhat randomly chosen empirical applications. This text is intended to be less than half as long as a standard textbook and to serve more or less as a reference source on modern macro theory. It is my hope that it will direct impatient readers (like myself) quickly to the main results. Admittedly, this writing approach might run the risk of alienating readers who rely more on texts focusing on the intuition behind models. Such readers might want to gather deeper intuitive insights from other sources, for instance from articles or more comprehensive macroeconomic textbooks.

A further and important delimitation of this work is that it will *not* discuss empirical tests of the theories surveyed. The reason is partly that I want to keep the text compact, but also that it is my impression that researchers seem to be somewhat more in agreement about what they think are the most relevant models, as compared with what they consider to be the most successful empirical tests of those models. Theory also changes more slowly than the stock of empirical results. This text should ideally be complemented with selected readings on empirical motivations and applications of the theories presented.

The book is intended to be suitable for a master's course in macro theory, lasting for about half a semester. Certain sections or chapters might also serve as an introduction to macroeconomics for nonspecialized graduate students. Readers are presumed to be relatively well equipped with calculus and algebra. A fairly strong background knowledge of both micro and macro theory is taken for granted.

The text has emerged from my experience of teaching advanced macro theory at the University of Gothenburg. Special thanks are due to my former teacher and most ardent reviewer Wlodek Bursztyn for having provided extensive comments on several previous versions (we still do not agree on certain aspects ...). I have also benefited from many valuable discussions with Heather Congdon Fors and Per Krusell regarding macro theory in general. Oded Galor, Halvor Mehlum, Bo Sandelin, Joachim Smend, Olof Johansson-Stenman, David Weil, and three anonymous referees have commented on certain sections and provided valuable input. I am also indebted to several students who have commented on parts of the manuscript and pointed out errors. The mathematical appendix is a modified variant of a section prepared by Elias Tsakas. Lastly, I have very much appreciated my ongoing discussions with Rob Langham at Routledge, who encouraged me to write this book. All comments and suggestions for improvements are much appreciated.

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1 Introduction

1.1 The issues

Macroeconomics is the study of the aggregate economy of a country. It seeks to understand how the economic decisions of individual persons and firms are translated through markets into aggregate economic outcomes. Variables of interest in macroeconomic analysis are, for instance, the level and change of gross domestic product, the aggregate level of investment, government debt, inflation, and unemployment.

The macro economy affects individuals both directly and indirectly. More or less all individuals in modern economies are, for instance, subject to income taxation, are affected by bank interest rates, receive some kind of government subsidy, and control household budgets whose real value depends on the aggregate price level.

Macroeconomics is distinguished from microeconomics primarily in the sense that the ultimate dependent variables are different. Microeconomics studies the behavior of individuals or firms in order to understand individual choices. Macroeconomics also increasingly starts off with the modeling of a "representative" individual or firm that maximizes utility or profits, but the dependent variable is aggregate outcomes on a national level.

Macroeconomic outcomes are central to politics within countries. Questions like those below are discussed at more or less every general election (as well as in between elections) in the Western world:

- What policies are most effective against unemployment, and how should the government or the central bank fight inflation?
- How can economic growth be increased?
- How should governments stabilize short-run fluctuations and business cycles?
- What is a sustainable level of government debt?

In an international economy with interwoven markets, macroeconomics is also a central theme in international politics. A recurrent issue in international economic policy-making has been the determination of exchange rates between currencies. Another topic which has an important impact on international relations is current

account levels and deficits or surpluses in the balance of trade. In summary, macroeconomics is a central field for anyone with an interest in economic policy or economic development.

1.2 The national accounts identity

The main building block of macroeconomic theory is the national accounts identity, which shows the gross domestic product (GDP) of a country. Total GDP, denoted by Y_t, measures the total value of all final goods and services that have been produced in a country during one year.[1] GDP is an example of a *flow* variable, one that is measured per unit of time. The other major type of variables are *stock* variables, such as the level of the capital stock or of accumulated public debt, which measure the level at a given point in time. We will return to this latter type of variables later.

Total GDP can be calculated in three ways, which all should yield the same result. The most common characterization of GDP is to study it from the *user side*, i.e. what total GDP is spent on. This is the *expenditure approach* to measuring total GDP and can be described by the equation

$$Y_t = C_t + I_t + G_t + X_t - M_t \tag{1.1}$$

In this key equation of macroeconomics, Y_t is total GDP as before at time t, C_t is aggregate private consumption, I_t is aggregate investment, G_t is government spending on goods and services, X_t is total exports from the country, and M_t is total imports. All these variables are flow variables.

Let us briefly take a closer look at these components of GDP. Aggregate private consumption C_t is typically the biggest item on the expenditure side and usually amounts to about half of total GDP. It includes personal spending on durable and nondurable goods and services during a year.[2] I_t is more specifically "gross domestic private investment" during one year. Investment is the acquisition of durable goods (with an expected life of more than one year) to be used as factors of production in the future, typically including machines and factories. Aggregate investment can in turn be split up into nonresidential investment, residential investment, and change in business inventories.

Government spending on goods and services G_t includes both government consumption (such as on salaries for teachers and judges) and investment (for instance, in government buildings). It also includes spending at all levels of government: state, regional, and local. Exports X_t is the value of goods and services produced within the country that are sold to people in foreign countries. Likewise, total imports M_t shows the value of goods and services produced outside the country that are bought by people inside the country.

This expenditure accounting of total GDP must be matched by the total income that all factors of production in the country earn during a given year. The *income side* of GDP is therefore

$$Y_t = \text{wages} + \text{rental incomes} + \text{profits} + \text{interest} \ \ldots \tag{1.2}$$

These incomes are eventually controlled by households in one way or another and are used for the expenditures above.

Furthermore, the total value of expenditures and incomes must be matched by the value added of aggregate production during a year. This is shown in the *production side* of the national accounts:

$$\begin{aligned} Y_t = {} & \text{agriculture} + \cdots + \text{manufacturing} + \cdots \\ & + \text{professional and business services} \ \ldots \end{aligned} \tag{1.3}$$

where the total values of production from all sectors of society are added.

The equation for the user side of GDP in (1.1) is the backbone of macroeconomic theory from which the subsequent analysis is derived and extended in numerous ways. It also serves as a introduction to an outline of the exposition below.

1.3 Outline

The following chapters are organized as follows. We start off by analyzing the long-run determinants of total GDP, i.e. growth theory. Chapter 2 is devoted to the Malthusian model of growth, Chapter 3 presents the neoclassical (or Solow) growth model and its extensions, and Chapter 4 deals with endogenous growth models where technological progress plays a prominent role. In Chapter 5, we develop the overlapping generations model, which is long-run in nature and which is used also in the chapters ahead.

After the long run, we take a look at macroeconomic theory in the short and medium run. In Chapter 6, we study models on the behavior of total GDP and its components over the business cycle, i.e. a period of roughly five years. Chapter 7 discusses a recurrent phenomenon in capitalist economies: financial crises and bank runs. We then move on to analyze specifically the constituent parts of the expenditure side: consumption (and saving) in Chapter 8, investment and asset markets in Chapter 9, and one of the key markets for understanding the macro economy, the labor market, in Chapter 10.

In the third main section of the book, we analyze a broad range of topics related to macroeconomic policy. We begin by presenting the traditional IS–MP, aggregate supply and aggregate demand frameworks and the refinements suggested by the rational expectations view and the new Keynesian view in Chapter 11. We then go on to public finance and fiscal policy (Chapter 12), and inflation and monetary policy (Chapter 13). Lastly, we discuss international aspects of economic policy in Chapter 14.

Some basic mathematical results that are used throughout the text are provided in an appendix.

Part I

The Long Run

2 The Malthusian World

2.1 Introduction

In this chapter, we will describe a model of long-run economic growth that was applicable to all countries in the world up until the industrial revolution and which still is a highly relevant model for some developing countries. In this "Malthusian world" there is a strong link between income per capita and population growth, so that anything that increases aggregate income in a society will soon be neutralized by an increase in the size of the population. Hence, even despite periods of rapid technological progress, income per capita will remain at a fairly constant level. Recent empirical work on historical data has shown that standards of living indeed appear to have been roughly similar in Assyria around 1500 BC, in Egypt during Roman times, and in late eighteenth-century England (Clark 2007). This section is motivated by this stylized fact from economic history.

The main insights behind this model were proposed by Thomas Malthus (1798) but also critically hinge on the principle of diminishing returns to factors of production, and on theory that was further developed by David Ricardo. In the sections below, we will briefly discuss the theory of diminishing returns, the Malthusian model of long-run stagnation, and reasons for the eventual collapse of the Malthusian link. We will also show how fertility can be endogenously determined within a representative household.

2.2 The law of diminishing returns

One of the most fundamental building blocks of economics is the principle of diminishing returns. In production theory, diminishing returns means that if we produce a good, for instance shirts, by using two factors of production – say, workers and knitting machines – then if we keep the stock of machines fixed, each additional extra working hour will result in a smaller and smaller addition of new shirts on the margin. The reason is that workers need knitting machines to produce shirts and there will eventually be crowding effects if more and more workers have to share the same machines. This type of diminishing returns to labor or any other factor of production will be present in a single factory as well as in the economy as a whole, aggregated on a national level.

In order to illustrate this principle more rigorously, let us consider its mathematical properties. The fundamental assumption that all growth models share is