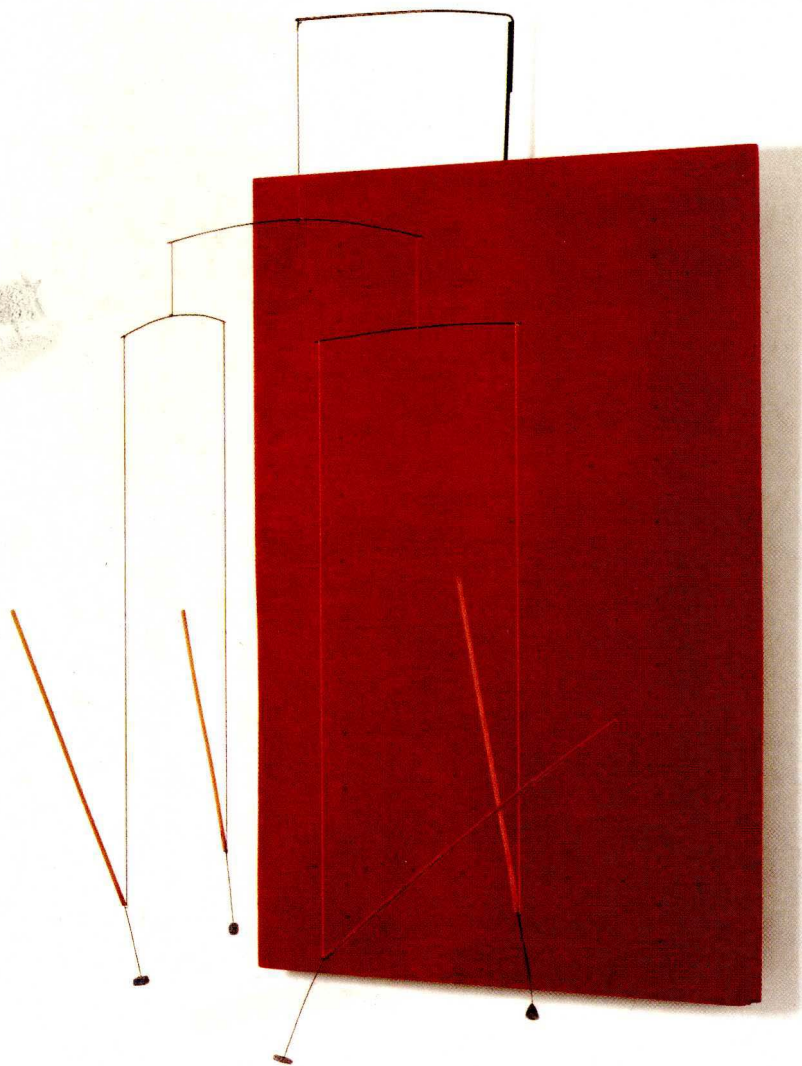# MACROECONOMICS

Imperfections, Institutions & Policies

Wendy Carlin | David Soskice

Macroeconomics: Imperfections, Institutions, and Policies

Wendy Carlin and David Soskice

■ PREFACE

1 Audience

This book provides a wide audience with access to modern macroeconomics. The core audience is undergraduates who already have some background in macroeconomics. It is also designed for graduate students, academic economists, and economists working in policy making and the private sector who want an introduction to major changes that have taken place in modern macroeconomics. Knowledge of economics has become increasingly central to courses in political science and public policy and this book will be used there as well.

Throughout the book, we emphasize the role that *imperfections* play in labour, product, and financial markets in short-, medium-, and long-run macroeconomics. *Institutions* and *policies* feature heavily in the book. By institutions we mean both the broad rules of the game within which the players in the economy operate and the key organizations. Central banks function according to the prevailing monetary policy framework and set monetary policy taking into account the behaviour of the private sector. Employers and employees operate within a set of labour market institutions in which unions may bargain over wages and where there are rules governing hiring and firing. Financial market institutions impinge on investment decisions by firms and on the behaviour of households. Governments implement fiscal policy within a fiscal policy framework. They also design and implement labour market, education, innovation, and competition policies. The large players in the economy may act strategically in their own interest and we analyse the macroeconomic impact of this.

2 What this book offers

• **to undergraduates studying economics**

It is likely that you were attracted to economics because it offers the prospect of understanding big questions about how the world works. Why has inflation been such a major problem in some countries at some times but now seems very low and stable in many countries? Do exchange rates matter for unemployment? Why is a country like the UK that had poor macroeconomic performance twenty years ago performing much better in recent years? Why are Germany and Japan performing so poorly? What are the likely consequences for other countries of a major hike in commodity and oil prices as a consequence of China's rapid growth? How did some countries get to be rich while others remain poor? Will the transition economies catch up with the rest of the European Union?

Just as when studying industrial economics you expect to be able to discuss competition policy debates, or, in labour economics, to participate in debates about the minimum wage or migration, in macroeconomics you should be able to discuss the following: deflation in Japan, the merits of euro membership for the recent accession countries of

the EU, the causes and consequences of the USA's widening current account deficit, the likely consequences for unemployment of an acceleration of productivity growth, the role of education in economic growth, and so on.

This book gives you a systematic way of thinking about questions like these. You will end up with a model that you can use yourself to understand macroeconomic behaviour and policy issues in the real world. In whatever job you get, whether working in a start-up high tech company or in a family business, in a voluntary sector organization, for an investment bank, or for the ministry of foreign trade, you want the confidence to be able to interpret national and international economic trends and the policy debate. Such confidence is built in this book because it integrates the different components of macroeconomics and then shows in Chapters 17 and 18 how the model can be used to understand a whole range of performance and policy issues in Europe, Japan, and the USA in the last thirty years. You may want to take a look at these chapters before starting on the rest of the book.

Going beyond courses in macroeconomics, the book has core material for courses in the economics of growth, money and banking, labour economics, the economics of unemployment, international monetary economics, and the economics of monetary integration.

- **to graduate students in economics**

This book is based on the mainstream monetary macro model used in current research in universities and central banks. Modern monetary macroeconomics uses what is often called the 3-equation New Keynesian model, where the three equations are

- the *IS* curve
- the Phillips curve (*PC*) and
- an optimizing monetary policy rule (*MR*).

Built around this core, the book provides you with a reference back to intuitive and less formal explanations of the 3-equation model and of each of its components. To facilitate the forward linkage to more advanced treatments, we show in Chapter 15 how the model can be built up from microfoundations with forward-looking optimizing economic agents who have rational expectations.

The book also provides a rigorous coverage of growth theory—both exogenous and endogenous. There is a comprehensive chapter on the Solow–Swan model with an appendix that introduces Ramsey savings. We emphasize the characteristics of steady states, how the economy moves from one steady state to another, and how the model can be used to test empirically for whether economies are converging. Diagrams and intuitive explanations complement the formal derivations of the key results. We provide a unified treatment of endogenous growth models and explain how a simplified version of the Schumpeterian growth model works. We illustrate the rich variety of questions about growth and institutions that Schumpeterian models address. These chapters serve as a springboard for going on to more technical analysis and provide a stimulus for thinking about many applied questions.

- **to graduate students in political science and public policy**

This book provides a self-contained treatment of modern macroeconomics that is accessible to graduate students of political science and public policy who have the basic mathematical competences described below. The approach incorporates the presence of market imperfections and includes coverage of a wide range of policy instruments. It is designed to highlight the role in macroeconomics of differences across countries in institutions—from the labour market to the financial system—and is well suited for the study of economic performance and policy within specific political contexts. In the chapter on Political Economy, we explain in detail the standard tools of analysis that are used in political economy and their application to well-known problems including the credibility of central banks, political business cycles, the role of union coordination on wage bargaining to solve collective action problems, and voting models. This chapter includes a self-contained introduction to much of the game theory that is needed in macro political economy.

- **to professional economists**

The applied chapters on performance and policy in Europe, Japan, and the USA and on unemployment provide overviews of recent developments and empirical analyses within the framework of contemporary monetary macroeconomics. With its emphasis on how central banks behave and, more broadly, on institutions and policies, the book can be used as a refresher for those parts of macroeconomic theory that are most relevant for economists working on real-world problems. Although we develop the 3-equation New Keynesian model as the new core of the short- to medium-run model, we show how it links to the traditional macro workhorses such as *IS/LM* and the Mundell–Fleming model.

3 Approach

We begin from the assumption that our first task is to provide a model that can be used to understand macroeconomic behaviour and policy issues. As well as being plugged into the real world, the book is firmly connected to contemporary developments in macroeconomics so it opens up access to more advanced literature and courses.

3.1 The current consensus

Consensus in macroeconomics has often been elusive but the common ground is much wider now than has been the case in previous decades. A striking illustration of this can be found in the titles of two influential articles published in the late 1990s, which argue for a similar mainstream monetary macro model: 'The New Neoclassical Synthesis and the Role of Monetary Policy' and 'The Science of Monetary Policy: A New Keynesian Perspective'.[1] We like the New Keynesian label because whereas the neoclassical aspects of the model are standard methodological features of contemporary economic modelling, the term 'Keynesian' refers to the fact that such models allow for 'prolonged departures of economic activity from its optimal level as a consequence of instability in aggregate spending'.[2]

[1] Goodfriend and King (1997) and Clarida, Gali, and Gertler (1999). Also Woodford (2003).
[2] Woodford (1999).

There is broad agreement that a fully satisfactory macroeconomic model should be based on optimizing behaviour by micro agents, that individual behaviour should satisfy rational expectations, and that the model should allow for wage and price rigidities. The 3-equation (*IS-PC-MR*) model is the basic analytical structure in much of contemporary macroeconomics. The three equations are derived from explicit optimizing behaviour on the part of the monetary authority, price setters, and households in imperfect product and labour markets and in the presence of some nominal rigidities.

In the mainstream macro model that we present in this book:

- Business cycles are driven by shifts in aggregate demand (and we contrast this with the Real Business Cycle model in which supply shocks drive the cycle).

- Output and employment are affected by fluctuations in aggregate demand because of nominal rigidities that prevent wages and prices adjusting rapidly.

- The central bank is modelled as actively adjusting the interest rate in response to shocks to the economy so as to achieve its inflation target.

- Aggregate demand fluctuations shift the economy away from the equilibrium rate of unemployment.

- The equilibrium rate of unemployment (ERU) is the outcome of imperfectly competitive labour and product markets—there is involuntary unemployment at the ERU.

- Supply shocks shift the equilibrium rate of unemployment (ERU) and institutional and policy differences across countries imply different ERUs.

Although the 3-equation New Keynesian model is the basis for our short- and medium-run model, we aim to analyse real-life economic performance so we include a richer treatment of macroeconomic processes than is often the case in the formal microfounded New Keynesian models. Examples include the following:

- how institutional differences in wage setting affect macroeconomic outcomes

- a number of mechanisms through which multiple equilibria can emerge and hysteresis can operate, including coordination failures and capacity utilization effects

- how the flow approach to the labour market can be integrated with the wage- and price-setting model

- explanations for acyclical or weakly procyclical real wages

- problems with using an interest rate based monetary rule

- the role of the credit channel for monetary policy

- how imperfect information produces liquidity constraints in consumption and enhances the importance of retained profits for investment behaviour

- short- and long-run effects of fiscal policy and the logic of fiscal policy rules

- the interaction of rational expectations in financial markets with slow adjustment in goods markets to produce exchange rate overshooting

- causes and consequences of segmentation in international goods markets

- short- and medium-run analysis of interdependent economies, i.e. beyond the small open economy model
- the strategic interaction between the central bank and large wage setters and the consequences for equilibrium unemployment.

In the case of each variation in institutions, policy, or behaviour, we show how the basic *IS-PC-MR* model can be modified to include it.

3.2 How to study and teach the 3-equation model

This book introduces a new graphical 'baseline' version of the 3-equation (*IS-PC-MR*) model, as its core element. In the graphical presentation of the *IS-PC-MR* model, the *IS* diagram is placed vertically above the Phillips diagram, with the monetary rule represented in the latter along with the Phillips curves. The aggregate supply side is modelled using imperfect competition and the Phillips curves are derived explicitly from the behaviour of wage and price setters. The Phillips curves are the constraint that the central bank faces when deciding how best to set policy in response to a shock to the economy. The central bank chooses its preferred combination of output and inflation along the Phillips curve that it faces. It then uses the *IS* curve to calculate what interest rate it must set so that aggregate demand moves to the desired level.

The *IS-PC-MR* graphical analysis is particularly useful for explaining the optimizing behaviour of the central bank and for analysing its reactions to a wide variety of disturbances to the economy. Users can see and remember readily where the key relationships come from and are therefore able to vary the assumptions about the private sector or the behaviour of the policy maker. For example, we can see what happens if the central bank is made independent and is more averse to inflation than the government or if wages are more responsive to unemployment (e.g. if we want to compare two countries, in one of which unions are important and in the other they are not).

In order to use the graphical model, it is necessary to think about the economics behind the three key relationships and the processes of adjustment. One of the reasons *IS-LM* got a bad name is that it too frequently became an exercise in mechanical curve shifting. In the framework presented here, in order to work through the adjustment process, you have to engage in the same forward-looking thinking as the policy maker. We also encourage the sketching of the time paths of key variables as the economy moves from one equilibrium to another.

3.2.1 Why diagrams are essential

Despite the development of the 3-equation (*IS-PC-MR*) model, Hicks's famous *IS-LM* model of 1937 supplemented by Friedman's expectations-augmented Phillips curve is often the basic model taught to undergraduates (often referred to as *IS-LM-AS* or *IS-LM-PC*). But while it provides a basic general equilibrium macro model, key components have been sidelined by developments in economic theory and practice, and the 3-equation model has superceded it in graduate teaching. Undoubtedly the longevity of *IS-LM* has been due to the fact that its graphical method provides students with an integrated model that they can manipulate. Although the use of equations in intermediate macroeconomics texts has increased, diagrams retain a central place. In our view, this is for good reason. When developing an understanding of economics, it is very important

not only to understand about equilibria and comparative statics but also to discuss how the economy might adjust from one equilibrium to another. To do this mathematically diverts attention from economics to mathematical methods. Diagrams help to develop economic intuition, i.e. they help you to get a feel for how the economy will respond to different shocks and policies within a systematic framework.

The book is based on the assumption that different readers gain different insights from mathematical, verbal, and graphical reasoning. So the book makes use of them all. Our view is that they reinforce each other, but it is quite possible, for example, to use the book with little emphasis on the equations.

3.3   Dealing with the open economy

An important characteristic of the book is that it offers a comprehensive and coherent treatment of the open economy. We move from the Mundell–Fleming model with fixed prices in the small open economy to an integrated approach to medium term inflation adjustments and then to interdependent economies. Again, we make use of a core diagram to provide a unified organizing framework for dealing with both theoretical and applied questions.

3.4   How to use the model to answer new questions

Once the open economy model has been covered, you will be able to use it to answer questions like this one: what is the likely effect of a country's involvement in a war abroad? The first step is to identify the nature of the shock and then to work out the new short-run equilibrium and the likely path of adjustment to it. How will the private sector respond and should policy be adjusted in the light of the shock? This is an aggregate demand shock: government purchases rise and this will push employment and output up. The consequences for inflation will depend on where unemployment is relative to the equilibrium rate. This will also feed into the central bank's decision about whether monetary policy should be adjusted (Chapter 5). The parallel development of the short- and medium-run model for the open economy in Chapters 9 and 10 allows the open economy aspects to be incorporated: e.g. what is the import content of government war-related purchases? The exchange rate regime in place will affect the analysis of the short-run impact (how will the exchange rate react under flexible rates?), whether consideration of central bank behaviour is relevant, and how inflation will respond. Different methods of financing the war-related expenditure may affect its impact on the economy and the discussion of tax versus bond based deficit financing in Chapter 6 is relevant. Next, we should consider whether involvement in the war could have medium-run consequences, i.e. for the supply-side of the economy (Chapter 4). One line of argument would follow from the assessment that the war may affect international commodities' prices, e.g. by interrupting the supply of oil. This would produce a negative external supply shock as analysed in Chapter 11.

4   Prerequisites and technical level

We assume readers have a familiarity with macroeconomics such as provided by a principles course. We use algebra and some simple calculus but explain the methods and the

results verbally and graphically as well. We introduce the use of logs and exponential functions at the beginning of Chapter 13, because they are used in the theory of growth. Chapters 15 and 16 are designed more for a graduate audience and more maths is used. However, verbal and graphical explanations are still provided.

5 Chapter by chapter structure

CHAPTER 1 provides motivation for the main models presented in the book by identifying a set of key questions in macroeconomics. Since the book aims to show how the models can be brought to bear on contemporary performance and policy issues, cross-country data is presented—both in relation to the short- and medium-run issues and in terms of growth and the world distribution of income.

PART 1 consists of five chapters, which present the short- and medium-run macro model. CHAPTERS 2 and 3 set out the building blocks of the macro models beginning with aggregate demand and supply and then incorporating inflation, the Phillips curve, and the monetary rule. By the end of CHAPTER 3, the *IS-PC-MR* model is in place. The mainstream model of business cycles as fluctuations around the equilibrium rate of unemployment driven by aggregate demand shocks is contrasted with the real business cycle model. In the real business cycle model, supply shocks produce business cycles and over the course of the cycle, the fluctuations in employment reflect the choices made by workers responding to changing opportunities in the labour market.

The major institutional and policy determinants of equilibrium unemployment are analysed in CHAPTER 4. These include how wages and prices are set under imperfect competition, the influence on equilibrium unemployment of government policies, the role of different institutional arrangements for wage setting, explanations for hysteresis, and how the flow approach to the labour market can be integrated with the model of wage and price setting to enrich the analysis of equilibrium unemployment. The central bank's monetary policy rule is derived as an optimal policy rule in CHAPTER 5 and the problems of inflation bias and time inconsistency are explained. In CHAPTER 6, the macroeconomic roles of fiscal policy are presented: the provision of automatic stabilizers, the use of discretionary policy to complement monetary policy in stabilization, and the requirement to maintain a sustainable burden of public debt.

PART 2 has two chapters that deal with consumption, investment, money, and finance. The aim is to show how standard microfounded models influence the interpretation of the *IS*, the *LM*, and the *MR*. In CHAPTER 7, there is a more detailed analysis of consumption and investment behaviour. In each case the optimizing behaviour of forward-looking households or firms is used to derive respectively a consumption and an investment function, which are compared with the simple macroeconomic functions used in PART 1. In CHAPTER 8, there is a more detailed analysis of the different kinds of assets in the economy and the role of information problems in explaining the existence and role of financial institutions.

In PART 3, an integrated model for the analysis of the open economy is developed. CHAPTER 9 is concerned with the short-run analysis of a small open economy. It presents the traditional Mundell–Fleming model and incorporates financial openness by assuming perfect capital mobility and asset substitutability in the form of the uncovered interest

parity condition. Price setting in the open economy, exchange rate overshooting, and the implications of dropping the assumptions of a small economy, perfect capital mobility, and perfect asset substitutability are examined. CHAPTER 10 extends the model from the short to the medium run by introducing the analysis of inflation. We use a core open economy diagram to show the goods market equilibrium (i.e. the open economy *IS*), the supply side (i.e. the equilibrium rate of unemployment in the open economy), and the trade balance. This graphical approach allows us:

(1) to analyse the contrasting short-run responses of the small open economy under fixed and flexible exchange rates to a given fiscal or monetary policy change or aggregate demand shock;

(2) to show that the medium-run equilibrium with constant inflation following a given shock is independent of the exchange rate regime.

CHAPTER 11 shows the versatility of the graphical approach by looking at aggregate demand, external trade and external supply shocks in the open economy. It also extends the *IS-PC-MR* model to the open economy showing how an inflation-targeting central bank responds to an aggregate demand shock. CHAPTER 12 goes beyond the typical scope of a macro course by looking at the analysis of interdependent economies.

In PART 4, there are two chapters on growth that provide a thorough treatment of both exogenous and endogenous growth models. CHAPTER 13 concentrates on the theory and empirics of the Solow–Swan model of exogenous growth and the issues surrounding convergence. CHAPTER 14 provides an introduction to a range of endogenous and Schumpeterian models of growth. We compare different channels through which endogenous growth may operate—knowledge spillovers from the accumulation of physical capital, investment in human capital, and investment in R&D. We show how the Schumpeterian model can help us to understand how institutions affect growth, both in countries at the world technology frontier and in poor countries.

PART 5 consists of two chapters: the microfoundations of the New Keynesian model in CHAPTER 15 and a chapter on political economy. CHAPTER 15 provides a systematic microfounded treatment of the key features of the New Keynesian model. Within the same framework, we investigate several models that produce multiple medium-run unemployment equilibria. These include models of hysteresis processes, and models in which workers value not only consumption and leisure but also fairness, which results in the existence of a range of equilibrium employment rates. CHAPTER 16 is on Political Economy. This focuses on the use of game theory to analyse government and central bank behaviour. Both chapters are self-contained in the sense that they do not assume prior knowledge of specific models or techniques, other than simple calculus. All of the game theory needed for CHAPTER 16 is provided in the chapter.

The book finishes up in PART 6 with two applied chapters. Although reference is made throughout the book to examples of particular historical episodes and to empirical evidence, the aim of PART 6 is to show how the models in the book can be used in a sustained exploration of performance and policy. CHAPTER 17 takes the period from 1990 and uses the models to provide an interpretation of major performance and policy issues in a set of OECD economies: from German unification, through the creation of EMU, to British

economic performance, the US boom, and the Japanese doldrums. CHAPTER 18 focuses on a key performance problem—that of unemployment—and shows the usefulness of the models in helping to understand the empirical patterns and widely cited empirical studies. The applied chapters do not rely on the more advanced material in PART 5.

On a few occasions more difficult material is presented that may be skipped without loss of continuity. These sections are indicated by an asterisk.

Two kinds of exercises are provided at the end of each chapter—a set of so-called checklist questions that test for understanding of the key concepts in the chapter by focusing on common confusions and misunderstandings and a second set of exercises, some of which are open-ended questions for discussion and others are problems. Further material is available on the book's website and we encourage other instructors to provide teaching material related to the book that can be made available to all on the website. This book can be used as a core text in a number of different courses and some illustrative examples are provided below.

Chapters

1   Motivation for Macroeconomic Models
2   Aggregate Demand, Aggregate Supply, and Business Cycles
3   Inflation, Unemployment, and Monetary Rules
4   Labour Markets and Supply-Side Policies
5   Monetary Policy
6   Fiscal Policy
7   Consumption and Investment
8   Money and Finance
9   The Open Economy in the Short Run
10   Inflation and Unemployment in the Open Economy
11   Shocks and Policy Responses in the Open Economy
12   Interdependent Economies
13   Exogenous Growth Theory
14   Endogenous and Schumpeterian Growth
15   New Keynesian Microfoundations
16   Political Economy
17   Performance and Policy in Europe, the USA, and Japan
18   Unemployment: Institutions, Shocks, and Policies

Possible course structures

Intermediate macroeconomics
Core macroeconomic model: *Chapters 1–4*
Monetary and fiscal policy: *Chapters 5, 6*
Consumption, investment and money: *Selective use of Chapters 7, 8*
Open economy: *Chapters 9 (except section 6), 10, 11*
Reference to applications: *Chapters 17, 18*
Introduction to growth theory and facts: *Chapter 1 section 2 and selective use of Chapter 13*

Economics of OECD

Introduction: *Chapter 1*
Review of core model: *Chapters 3–6*
Review of open economy macroeconomics: *Chapters 9–11*
Europe: *Chapter 17 sections 1–3; Chapter 18*
USA: *Chapter 17 section 4; Chapter 18*
Japan: *Chapter 17 section 5*

Macroeconomics of EMU

Introduction to the analysis of a currency union: *Chapter 11 section 6*
Historical background: *Chapter 17 section 2*
Monetary policy: *Chapters 3, 5; Chapter 17 section 3*
Fiscal rules: *Chapter 6 section 5*
Deeper analysis: *Chapter 12 section 4*

Political economy

Self-contained introduction to game theory methods used in political economy:
Chapter 16
Monetary policy and time-inconsistency: *Chapter 16 section 1*
Fiscal and monetary policy conflicts: *Chapter 16 section 2*
Reputation: *Chapter 16 section 3*
Voting games and political business cycle models: *Chapter 16 section 4*
Games between interdependent economies: *Chapter 16 section 5*

■ MACROECONOMICS

"At last, an advanced undergraduate book which maps theory to facts. The theory, from the new Keynesian model of fluctuations to Schumpeterian models of growth, is sound. The applications, from European unemployment to the Japanese slump, highly revealing. You will enjoy every chapter, and become a good macroeconomist in the process."

Olivier Blanchard, Class of 1941 Professor, Massachusetts Institute of Technology

"The best way to learn economics is to have a textbook which develops a theoretical framework interactively with practical questions. *Macroeconomics: Imperfections, Institutions and Policies* does just this. The book is based on the mainstream monetary macro model which is now widely used by both academics and policy-makers. In a straightforward manner, it shows how this model can be used to address an enormous variety of practical questions without heavy use of mathematical technique. This is modern macroeconomics for undergraduates, post-graduates and business economists alike."

Stephen Nickell, School Professor of Economics, LSE;
Member of the Monetary Policy Committee, Bank of England

"When teaching intermediate macroeconomics in Harvard during the past years, I deeply felt that existing textbooks were all lacking: 1) proper microeconomic foundations linking important notions such as the Keynesian consumption function, the investment accelerator, the Phillips curve, the possibility of persistent (involuntary) unemployment, to precise sources of imperfections in the product, labor, or financial markets; 2) a suitable treatment of growth theory that can shed light on observed convergence and divergence patterns across countries and also on how growth policies should be designed—or what they can achieve—in various countries at different stages of development. Being the first comprehensive attempt at filling these gaps, the Carlin–Soskice macroeconomics textbook should be used by any instructor who wants to bring her students to the frontier of modern macroeconomics while at the same time remaining fully accessible to a broad undergraduate audience."

Philippe Aghion, Robert C. Waggoner Professor of Economics, Harvard University

"Imperfect competition, knowledge-based growth, inflation-targeting central banks and many other central features of modern economic systems have recently been integrated into the heart of macroeconomic theory. Carlin and Soskice do the profession a great service by writing a textbook that makes these developments accessible to undergraduates. The book presents macroeconomics at its best—as a useful framework for analyzing important questions."

Peter Howitt, Lyn Crost Professor of Social Sciences, Brown University

"What makes Carlin and Soskice invaluable is both their clarity and their commitment to helping the reader understand the intuitions that lie behind the models. Furthermore, there is constantly an attempt to make the work relevant to practical questions of public policy. . . .They tackle the impact of German Reunification, EMU, British economic performance, the 1990s US boom, and the long-standing Japanese recession. There is a major final chapter addressing the issues of unemployment, especially among the larger nations of Continental Europe. The authors approach these questions through the penetrating analytical lens of their framework, critically address the empirical evidence and come up with sometimes novel conclusions to the conventional wisdom."

Professor John Van Reenen, Director, Centre for Economic Performance,
London School of Economics

"Macroeconomics needs to be exciting and contemporary. Too often it becomes an area of difficulty and confusion for students. This book is to be welcomed for its very clear vision of what contemporary macroeconomics is about and its careful exposition leading the student to this."

Dr Mary Gregory, Oxford University

ACKNOWLEDGEMENTS

▓ ABBREVIATIONS

AGR   annual growth rate

ALMP   active labour market policies

APK   average product of capital

APL   average product of labour

APR   annual percentage rate

BP   balance of payments

BR   best response

CB   central bank

CCA   common currency area

CRS   constant returns to scale

DRS   decreasing returns to scale

DSGE   Dynamic Stochastic General Equilibrium

EAPC   expectations augmented Phillips curve

ECB   European Central Bank

EMU   European Monetary Union

ERM   Exchange Rate Mechanism

ERU   equilibrium rate of unemployment

EU   European Union

GDP   gross domestic product

GEMU   German Economic and Monetary Union

GNP   gross national product

GSP   gross state product

ICT   information and communications technology

IMF   International Monetary Fund

IRS   increasing returns to scale

LERU   long-run equilibrium rate of unemployment

LOP   law of one price

LTU   long-term unemployment

MIT   Massachusetts Institute of Technology

MPK   marginal product of capital

MPL   marginal product of labour

MR   monetary rule

MRW	Mankiw, Romer, and Weil
MV	market value
NAIRU	non-accelerating inflation rate of unemployment
nbfi	non-bank financial institution
NCBM	neoclassical benchmark model
NHW	non-human wealth
NKPC	New Keynesian Phillips curve
NMM	new macro model
OCA	optimal currency area
OECD	Organization for Economic Cooperation and Development
PBE	Perfect Bayesian Equilibrium
PC	Phillips curve
p.a.	per annum
p.c.	per capita
PFPR	prudent fiscal policy rule
PIH	permanent income hypothesis
PPP	purchasing power parity
PS	price setting
PSD	public sector deficit
PWT	Penn World Tables
R&D	research and development
RBC	real business cycle
RULC	relative unit labour cost
RWR	real wage rigidity
SAS	short-run aggregate supply
SBTP	skill-biased technical progress
SGP	Stability and Growth Pact
SGPE	subgame perfect equilibrium
SIPC	Sticky Information Phillips curve
TFP	total factor productivity
UCL	University College London
UIP	uncovered interest parity
VAT	value added tax
WS	wage setting
ZIRP	zero interest rate policy