

Preface to the Second Edition

Within one year, the book has already been published in a second edition, testifying to the broad interest in the important subjects covered. I have made some clarifications and also some corrections, while also adding a new chapter on Innovations and the Economics of Exhaustible Resources, an important field with respect to the link between modern Schumpeterian innovation analysis and macroeconomics. In chapter G, there are additional reflections on the ambiguity of the traditional approach of optimum growth theory as well with key insights drawing on my Kondratieff Prize Lecture in Moscow in 2007. I have also added some new ideas on the Macroeconomics of Microeconomics which basically argues that there should be a double consistency in Economics.

The basic perspective of this book is to emphasize the need to consider the innovation phenomenon in a broader perspective; it is not only relevant for certain cyclical dynamics but also – in a more traditional vein – for long term growth analysis as well as sustainable economic development.

I have particularly benefited from my visiting Alfred Grosser professorship 2007/08 at Sciences Po, Paris, and the interesting discussions with Antoine Leblois, Paris, and the suggestions of Gerhard Huhn, Mevlud Islami and Jens Perret, EIIW Wuppertal. Finally, I am grateful to discussions with my colleagues in the Jean Monnet Project Financial Market Integration, Structural Change, Foreign Direct Investment and Economic Growth in EU25. I am particularly grateful to Julius Horvath at the Central European University, Budapest.

My greatest gratitude goes to my wonderful family who has supported my research with so much patience over so many years.

Wuppertal and Paris, January 2008

Paul J.J. Welfens

Preface to the First Edition

This book deals with the role of innovations in macroeconomics, and it presents innovations in macroeconomic theory. Growth and structural change are key issues here, but we also touch upon links between exchange rate dynamics and innovations. The approaches and ideas presented are not integrated into a large comprehensive model. Rather, we present analytical building blocks in selected fields of Schumpeterian Macroeconomics, including new insights about trade, growth, exchange rate dynamics, innovations and policy options.

An important starting point in chapter A is a generalization of the Solow growth model and a long term analysis of the link between process innovations and the price level as well as the exchange rate, which is shown to critically depend on the income elasticity of the demand for money. Moreover, we discuss the long term Phillips curve in the context of a growth model and can thereby gain some new insights. The theoretical reflections presented suggest the need for new empirical work. We also consider the role of foreign direct investment flows. Chapter B is

an attempt to bridge the medium term analysis with the long run growth analysis. It is argued that individuals will partly base consumption – and thus savings – on current income and expected steady state income. While this approach is closely related to the permanent income hypothesis, its specific implications are quite interesting. Chapter C takes a closer look at some integration issues. Chapter D puts the focus on both growth in open economies and the real exchange rate. The analysis in chapter E is again devoted to open economy topics, where we present a Mundell-Fleming-Schumpeter model with product innovations. Chapter F focuses on the link between stock market dynamics and the exchange rate, and the framework presented is new and works rather satisfactorily from an empirical perspective. Chapter G starts with the traditional optimum growth framework and then proceeds by looking at the topic of endogenous growth (or quasi-endogenous growth). Chapter H involves trade, structural change and growth in open economies, while chapter I looks at the role of innovations in a digital market economy. Chapter J puts the focus on EU innovation policy and raises some critical questions about the EU economic policy. Finally, chapter K considers some aspects of monetary integration and growth including basic policy implications. In a rather simple approach, we explain why the integration of global financial markets has brought about a global fall of the interest rate along with a higher stock market price index. Essentially, there is an interplay between Asian capital inflows into the US and an increasing international bonds substitutability concerning Dollar-denominated and Euro-denominated assets (the start of the Euro has created a European bonds market which effectively offers better substitutes to the Dollar bonds than was the case for the previous DM-\$ comparison). We also look at some other monetary issues. As regards the link between economic policy measures and economic development, one should emphasize that policy makers rarely make the crucial distinction between changes in the level of the growth path and the growth rate itself. This distinction is quite important in the context of the basic and modified neoclassical growth model.

Possibly the most important shift of analytical emphasis is the idea that one should take a look at various modelling approaches whereby the choice of model depends on the time horizon and the specific initial situation. From a policy perspective medium term models could be quite useful, however there is no adequate model which bridges the short run and the long run. One of the new ideas presented here is to link the short term and long run aspects in a new medium term Keynes-Solow model. In this approach, it is emphasized that both aggregate demand and aggregate supply determine the dynamics of actual income. In a medium term perspective, this approach can also be applied to hybrid growth modelling; in reality there is rarely a case for which only the demand side or only the supply side is valid.

Some of the analytical elements presented are refinements or extensions of existing approaches; other contributions aim at clarifying apparent inconsistencies in the literature. An important aspect here is the inconsistency, implying for instance that Poland or China export mainly capital goods to the USA and EU15, while reality is characterized by trade flows of machinery and equipment in the opposite direction between neoclassical growth theory and neoclassical (Heckscher-Ohlin-

Samuelson) trade theory. Economics is a scientific field in which competition among researchers stimulates the specialization of scientists as well as the exploration of narrow islands. Little research is devoted to building intellectual bridges between islands in order to analyze the combined insights or to combine possible variants of models developed on each island. A few bridges are presented here.

In market economies, innovation dynamics have played a crucial role since the Industrial Revolution. Schumpeterian Economics has analyzed some of these developments on the basis of an evolutionary approach which is useful in many fields. At the other end of the spectrum, there are innovation researchers who pursue a rather narrow focus on invention and novel products or on new process technologies in certain sectors. This is unsatisfactory in the sense that innovation dynamics should be combined with macroeconomic analysis, including growth analysis and models of stabilization policy. The new growth theory has delivered some interesting results including aspects related to product differentiation and spillover effects. In a different context, real business cycle models have shown that technological changes are able to generate economic cycles in a quasi-Walrasian world with no frictions in markets. However, the latter is a contradiction in itself since every innovation automatically creates information asymmetries which, in turn, take us away from competitive market clearing.

From an input perspective, one can measure innovation dynamics to some extent using the ratio of expenditures on research and development (R&D) to Gross Domestic Product or R&D expenditures per capita, from an output perspective through the number of (international) patents or patent applications per capita. In the second half of the 20th century, the R&D-GDP ratio increased continuously in OECD countries as did the number of patent applications per capita. At the start of the 21st century the R&D-GDP ratio in the leading OECD country, Sweden, reached 4%, in Japan 3%, and in the US and the EU-15 it was close to 2.5%, up from about 1% in the early 1960s. It is not only impressive to observe how strongly R&D expenditures have increased, but one must also consider the R&D-GDP ratio in comparison with the investment-GDP ratio, which is around 20% in leading OECD countries. As much as investment in machinery and equipment is the basis for the accumulation of a physical capital stock, the stream of R&D expenditures amounts to the accumulation of an R&D stock, which obviously contributes to the output of individual firms and the overall economy. Patent applications also increased in OECD countries in the 1980s and 1990s. However, many innovations cannot easily be patented; software is a difficult field in this respect.

Patenting behaviour can also change considerably as market structures change. With respect to this, the case of liberalization in European fixed-line telecommunications is interesting. Apparently, privatized former state-owned monopolies have intensified patenting which is natural in an environment that has become more competitive and more internationalized. (At the same time it seems that innovation activities have shifted away from network operators to the equipment industry.) Changes in patenting behaviour make interpretation of growth in patent applications rather difficult.

The results of innovation efforts are not simply patents, but what matters most are two types of innovations:

- Process innovations which imply cutting costs and thus bringing about a higher equilibrium output in markets; even modelling the simple case of endogenous technological progress in the context of a macroeconomic production function is not easy. Special problems occur if the industry has static or dynamic scale economies, a field not analyzed much in this book.
- Product innovations increase the willingness to pay on the demand side. This is a field of particular interest here, specifically in the case of open economies. Schumpeterian competition – based on product innovations – in a two-country model no longer allows for the assumption that the law of one price will hold.

As discussed in Industrial Economics literature, existing innovation-related literature in economics is divided on the one hand into innovation analysis. On the other hand, there is a niche in macroeconomic analysis, with some strands in the new growth literature looking into process innovations including technology spillovers. This is done, for example, in models by ROMER and LUCAS. GROSSMAN/HELPMAN have emphasized the role of product differentiation and hence product innovation broadly defined. However, those are rare efforts which indeed concern only part of macroeconomic analysis. This book seeks to add some building blocks to the existing literature, offering a particular focus on open economies in which the role of foreign direct investment and network effects in telecommunications is emphasized.

Moreover, we are interested in integrating innovations into short-term financial market analysis and medium-term models of the Mundell Fleming type. By doing so, we wish to link product innovations with modified long-term growth modelling. It must be emphasized, however, that we will not present comprehensive macroeconomic foundations for the innovations in our analysis. We present new ideas and building blocks for more realistic macroeconomic modelling on issues such as real exchange rate dynamics, fiscal and monetary policies in economies with foreign direct investment, and issues related to the use of telecommunications and the internet.

At the bottom line, it certainly is desirable to combine the analytical blocks developed here to a more comprehensive two-sector growth model for an open economy, but this ambitious goal is beyond the scope of this book. Our more modest aim is to suggest consistent improvement in Macroeconomics including approaches valid for a situation with unemployment. (In this context, a theoretical basis for OKUN's Law is presented.) A key element in the approach presented is that the law of one price is not assumed to hold strictly. This, however, is not really surprising for a world economy in which many innovative firms in many countries contribute to imperfect competition in global markets. Moreover, in part of the analysis presented here we look into convergence dynamics and product upgrading. At the same time, we integrate unemployment into some of the models.

It would be a true surprise if this book is liked by very many, as the approaches presented are to some degree unorthodox and also bridge Real Economics and Monetary Economics, which in the standard literature are rather distinct fields. The book should, however, have a lasting impact by encouraging economists and policymakers to take a fresh look at important macroeconomic topics and issues.

I am quite grateful to have had the opportunity to present some of my ideas to seminars at the IMF and the AICGS/the Johns Hopkins University in 2004 as well as at the Research Committee on International Economics and Economic Policy (Ausschuss für Außenwirtschaftstheorie und -politik) of the Verein für Socialpolitik at the 2004 Paderborn meeting. Moreover, I would like to express my gratitude for the excellent research support of Dora Borbély, Jens Perret and Andre Jungmittag (EIIW at the University of Wuppertal) as well as Albrecht Kauffmann (EIIW Center at the University of Potsdam). I am also grateful for discussions with many colleagues during a conference at Chulalongkorn University in Bangkok in 2001 as well as within the scope of the 2005 workshop “The EU and Asean Facing Economic Globalization”, jointly organized by Jean Monnet Chairs at the University of Wuppertal and the University of Birmingham as well as the Center for European Studies, Bangkok. With respect to stimulus of research, I would also like to mention the intellectual support of my colleagues in the EU 5th framework project: “*Changes in Industrial Competitiveness as a Factor of Integration: Identifying Challenges of the Enlarged Single European Market*” (Contract No. HPSE-CT-2002-00148), with special gratitude going to Anna Wziatek-Kubiak (CASE, Warsaw) who offered valuable criticism during the project meetings at CEPS, Brussels in November 2004 and November 2005. Finally, I am grateful to Jackson Janes from AICGS/The John Hopkins University who organized a seminar in Washington with SAIS in January 2006. My basic policy perception for continental Europa is that weak growth in the Euro zone and in Germany in particular has reasons which can easily be identified. The usual caveat holds here: I am solely responsible for the analysis. The editorial support by Michael Agner, Stephanie Kullmann, and Christian Schröder is deeply appreciated.

Wuppertal and Washington, August 2006

Paul J.J. Welfens



<http://www.springer.com/978-3-540-79411-0>

Innovations in Macroeconomics

Welfens, P.J.J.

2008, XVI, 455 p. 106 illus., Hardcover

ISBN: 978-3-540-79411-0