

1. Introduction

THE AIM OF THE BOOK

Ecological economics is a transdisciplinary paradigm that extends and integrates the study and management of nature's household (the ecosphere) and humankind's household (the macroeconomy). As a relatively new paradigm, ecological economics has largely emerged in response to the failure of mainstream economic paradigms to deal adequately with the coevolutionary interdependence of social, economic and ecological systems. Thus, in many ways, the development of an ecological economic paradigm can best be described as a concerted attempt to overhaul the standard neoclassical approach by bringing the false pre-analytical visions underpinning its assumptions into line with biophysical and existential realities (Lawn, 2002).

Because of its broad, transdisciplinary nature, ecological economics has brought to many people's attention a large number of critical issues, most of which centre on how human beings can live more sustainably, peacefully and less wastefully. The aim of this book is to deal with these matters, in particular, the frontier issues that have emerged in recent years and those that have long been a source of disagreement and debate.

Not for one moment am I pretending that this book serves as a definitive and comprehensive treatment of all major ecological economic issues and the theory that underpins them. Furthermore, the book is not pitched as a text in ecological economics. For that, I urge all readers to consult the brilliantly constructed works of Common and Stagl (2005) and Daly and Farley (2004). But I do believe the book covers the key areas that reflect the character of ecological economics and which set it so distinctly apart from other economic disciplines. More importantly, I'm modestly confident that this book will broaden people's knowledge and understanding of ecological economics and contribute, if only in a very small way, to a more sustainable, just and efficient future for all.

THE STRUCTURE OF THE BOOK

To achieve its aims, this book is divided into six sections of which the chapters contained in Parts II, III, IV, and V share a common theme. Part I, as

the introductory section, begins with the current chapter. In Chapter 2, the concept of sustainable development is discussed and eventually defined. This leads to some very important questions concerning economic growth, the desirable size of macroeconomic systems, and the steady-state economy. Chapter 2 concludes by describing the characteristic features of the steady-state economy, the purpose of which is to provide a macroeconomic template for the remainder of the book.

Part II, containing three chapters, focuses on the role of natural capital in achieving sustainable development. In Chapter 3, the long-running debate as to whether human-made capital can adequately substitute for declining natural capital is revisited. Upon demonstrating that mainstream production functions cannot be used to make substitutability assessments, a Bergstrom production function is put forward and manipulated to unveil the range and direction of change in the elasticity of substitution between the two forms of capital. The manipulation exercise reveals the existence of a complementarity relationship which, it is argued, has far-reaching implications for resource policy and national income accounting.

The following chapter (Chapter 4) incorporates a time dimension into the Bergstrom production function to better appreciate the long-run production possibilities of an economic system. The revised function is then used to conduct a range of simulation exercises, including one revealing a potential conflict between present value welfare maximisation and the need to keep natural capital intact to achieve ecological sustainability. It is then shown that the prevailing social discount rate may influence a society's choice of a sustainable or unsustainable pathway.

Given the possibility that the conditions of ecological sustainability and intertemporal efficiency may fail to coincide, Chapter 5 involves an investigation into the relationship between natural resource prices and natural resource scarcity. Following an extension of a typology of resource scarcity originally outlined by Hall and Hall (1984), it is shown that resource prices generated by conventional resource markets are unable to reflect the absolute scarcity of the total resource stock and its constituent types. This leads to the conclusion that caution should be taken when using natural resource prices to ascertain whether the stocks of particular resources are in decline and/or as a basis for determining the sustainable rate of resource use. Furthermore, it suggests that ecological sustainability will require quantitative restrictions on the rate of resource throughput that must be determined on the basis of ecological rather than economic criteria.

Part III moves onto sustainable development indicators and begins, in Chapter 6, with a survey of some of the popular indicators employed by ecological economists to measure sustainable income and sustainable economic welfare at the national level. In Chapter 7, three perceived weaknesses of

recently devised indicators of sustainable economic welfare, such as the Genuine Progress Indicator (GPI), are addressed. They include: (a) the supposed lack of a theoretical foundation to support them; (b) the shortcomings associated with the valuation methods used in their construction; and (c) the questionable interpretation of the final results.

By focusing on the individual items which make up these indicators, it is shown that they are soundly based on Fisher's (1906) distinction between income and capital. In addition, whilst the criticisms relating to (b) and (c) are in some sense valid, it is argued that these alternative indicators are more reliable measures of sustainable economic welfare than mainstream macroeconomic indicators, such as Gross Domestic Product (GDP). Finally, it is stressed that a more consistent and robust set of valuation methods must be established. Without them, alternative indicators of sustainable economic welfare, such as the GPI, are unlikely to enjoy mainstream acceptance.

With the conclusions of Chapter 7 in mind, Chapter 8 involves the use of a Fisherian-based measure of income to assist a nation in its transition to a steady-state economy. After explaining the distinction between Fisherian and Hicksian income, Australia's Fisherian national income is calculated for the period 1967–97. The empirical evidence suggests that Australia surpassed its optimal macroeconomic scale in the mid-1970s. Despite a deceleration in Australia's rate of macroeconomic growth between the mid-1970s and mid-1990s, it is shown that Australia chose not to make the full transition to a steady-state economy thereafter. Instead, Australia appears to have reverted to a high-growth policy. The chapter concludes with some suggestions regarding the likely impact of this policy stance on the future trend in Australia's sustainable economic welfare.

As useful as indicators of sustainable economic welfare might be, they do not reveal the fundamental cause for any decline in a nation's genuine progress. For example, it is impossible to know, from these indicators alone, whether a fall in sustainable economic welfare is the result of decreasing efficiency or, if efficiency is rising, whether its rate of increase is being exceeded by the rate of macroeconomic expansion (the Jevons' Paradox).

To deal with this dilemma, a number of eco-efficiency indicators are established in Chapter 9 on the basis of various coevolutionary principles and understandings. The eco-efficiency indicators are then calculated for Australia for the period 1966–67 to 1994–95. The results suggest that much of Australia's technological progress in recent times has been of the throughput-increasing rather than efficiency-increasing variety. Indeed, it is argued that more should be done to reduce Australia's reliance on non-renewable resources, to reinvest non-renewable resource depletion profits into renewable resource substitutes, and to reduce the rate of native

vegetation clearance. Given the recent rapid rise in psychic costs, it is also suggested that a greater proportion of Australia's incoming resource should be allocated to satisfy emerging higher-order needs.

In view of the stark messages presented in Part III, Part IV of the book deals with a range of emerging theoretical and policy issues. In Chapter 10, the issue of sustainability versus efficiency is broadened to include the goal of distributional equity. Support is then given to Herman Daly's decade-old thesis that the three policy goals of allocative efficiency, distributional equity and ecological sustainability require the imposition of a separate policy instrument (Daly, 1992). Furthermore, since markets are unable to sense a sustainable rate of resource throughput and a just distribution of income and wealth, it is argued that the policy goals of ecological sustainability and distributional equity must be resolved prior to the efficiency goal.

Chapter 11 builds on the conclusions drawn in Chapter 10 to design an ecological tax reform (ETR) package to facilitate the sustainable development process. To assist in this regard, five key organisation modes are put forward. It is then explained why conventional ETR prescriptions – which rely erroneously on the manipulation of market prices to achieve ecological sustainability – lead to just two of the five organisational modes being attained. Following an outline and justification of an ETR package incorporating assurance bonds and tradeable resource use permits, the final section of the chapter deals with some of the criticisms levelled at this alternative ETR approach.

In the early 1990s, a number of economists believed they discovered sufficient empirical evidence to support the view that environmental quality would at first deteriorate but later improve as a nation's per capita real GDP rose over time. Given a similar posited relationship between per capita real GDP and income inequality in the 1950s (Kuznets, 1955), this theory soon became known as the 'Environmental Kuznets Curve' (EKC) hypothesis. The policy implications of this hypothesis cannot be overstated since, if shown to be correct, the solution to environmental degradation is the continued growth of a nation's real GDP, not its curtailment.

In Chapter 12, a theoretical model developed by Munasinghe (1999) is extended and employed to determine if the EKC curve exists. It is shown that the EKC does not resemble the purported concave relationship between environmental degradation and per capita real GDP, but a third-degree polynomial where, eventually, environmental degradation must increase in the presence of continued macroeconomic growth. This conclusion raises a number of policy-related issues, in particular, whether a so-called 'pollution haven hypothesis' serves as a possible explanation for the favourable circumstances empirically evident in wealthy Northern nations. These issues are discussed in the closing sections of the chapter.

Chapter 13 involves the incorporation of an ‘environmental equilibrium’ or EE curve into the IS-LM model that has long served as the foundation of modern macroeconomics (Heyes, 2000). The EE curve represents an explicit environmental constraint on macroeconomic systems that might, for example, follow the introduction of assurance bonds and tradeable resource use permits of the type revealed in Chapter 11. Although little more than a pedagogical device, it is shown how the IS-LM-EE framework can be used to examine the potential impact of expansionary fiscal and monetary policies on both national income and sustainable economic welfare. It is also revealed that the impacts can be quite marked with significant implications for future macroeconomic policy.

Much of this book concerns the ecological economic position that the growth of macroeconomies must eventually cease in order to achieve ecological sustainability. Since many observers believe that a growth rate of two to three per cent is necessary to negate steep rises in unemployment, Chapter 14 deals with a seemingly obvious question: how can full employment be generated in the presence of a low-growth or steady-state economy? A number of suitable policies are surveyed and discussed, including measures to sever the GDP-employment link, changes in industrial relations to augment labour productivity, ecological tax reform, and expansionary demand-side policies.

To assess the possible impact of these policy initiatives the IS-LM-EE model from Chapter 13 is invoked. As it turns out, the model suggests there are severe restrictions on the capacity of central governments to employ demand-side policies to reconcile the full employment and ecological sustainability objectives. Consequently, a combined employer-of-last-resort program (Job Guarantee) and universal Basic Income is recommended to complement the above suggested measures. While the former ensures a ‘loose’ form of full employment, it is argued that the latter can trigger a real labour supply withdrawal to reduce the full employment level of income to an ecologically sustainable level.

Part V of the book addresses the international dimension of sustainable development, perhaps the most crucial of all areas of concern. In the first of three chapters in this section, Chapter 15 begins by distinguishing between globalisation and internationalisation. It is then argued that the eventual demise of the Bretton Woods system created a vacuum that allowed the globalisation phenomenon to thrive. Following an hypothesised link between the rise of globalisation and the fall in sustainable economic welfare (as measured by the GPI), an IMPEX (Import-Export) system of foreign exchange management is put forward as a way of restoring comparative advantage as the principle governing international trade. Combined with modifications in the way the World Bank, International Monetary Fund (IMF), and World Trade Organization (WTO) operate, it

is explained how economic entanglement of the internationalist kind can be installed and the rising tide of globalisation overturned.

In Chapter 16, the IMPEX system of foreign exchange management is theoretically supported by way of an extension of the IS-LM-EE model revealed in Chapter 13. The chapter begins with the inclusion of a 'balance of payments' or BP curve into the IS-LM-EE framework. The extended model is then used to analyse the relationship between international trade and sustainable national income where: (a) international capital flows are highly mobile (the status quo position), and (b) where the international mobility of capital is restricted by an IMPEX system of foreign exchange management (the Lawn position). With the use of two hypothetical policy examples, it is shown that sustainable income is higher with an IMPEX system in place (the Lawn position).

Finally, in Chapter 17, an assessment is made of the 2002 World Summit on Sustainable Development held in Johannesburg. Whilst recognising that a number of positive initiatives emerged from the Summit, it is argued that it failed to address two critical areas of concern – namely, the scale and globalisation issues. The chapter begins by emphasising the need for developed nations to reduce the scale of per capita resource consumption and for poorer countries to reduce the scale of population growth. By highlighting the problem areas raised during the Summit and the policy measures recommended to alleviate them, it is shown that the scale issue was virtually ignored. Stressed instead was the need for continued growth but with improved environmental management, changing consumption patterns, and a fallacious decoupling of macroeconomic growth and environmental damage. Whilst globalisation received some attention, it was regarded at the Summit as an irreversible force that ought to be accelerated. The chapter concludes with a pleading message for all future summits to deal appropriately with the scale and globalisation issues if sustainable development is to in any way be achieved.

The aim of the final chapter of the book, Chapter 18, is to convince the reader that a steady-state economy is compatible with a democratic-capitalist system. To achieve its aims, the chapter starts with an investigative look at the likely impact of a steady-state economy on profits, incentive and investment. It is argued that these capitalist imperatives would not be stifled by the presence of a non-growing but qualitatively improving macroeconomy. It is then explained how, from a political economic perspective, a would-be government wishing to introduce a steady-state economy is potentially electable in a representative democracy. Overall, it appears there is no reason why a steady-state economy could not be gradually installed in a manner consistent with the principles of sustainable development and with a minimum amount of institutional disruption.

In view of the empirical evidence that will be revealed in Part III of the book, let us hope that the transition to a steady-state economy begins sooner rather than later. Let us also hope that there is enough 'ecological' space for impoverished countries to enjoy a short spurt of clean, equitable and efficient growth and that they too make the transition to a steady-state economy when the time is appropriate. For there is probably little time left to begin the transition before the impacts of ecological and existential limits impose themselves in rather catastrophic and irrecoverable ways.