1. Introduction

1.1 WHY SUSTAINABLE GROWTH IS IMPORTANT

Over the last four decades, economic growth has increased strongly in most parts of the world except in the advanced world and parts of Latin America and the Caribbean. For example, Figure 1.1 shows that in East Asia and the Pacific (EAP) region, the average growth rate has increased from 6.6% per year in the 1970s to 9.0% in the 2000s. In South Asia economic growth in the last decade has doubled from the average of 3% per year in the 1970s, while growth in Sub-Saharan Africa (SSA) has been less spectacular in this period but has picked up in the last decade. It is only in the advanced countries (represented by the OECD) and Latin America and the Caribbean that growth has declined over this period.

This rapid transformation of economies has accelerated the rate of exploitation of natural and environmental resources. Figure 1.2 shows, for example, that in the EAP region the rate of per capita energy use saw a sharp rise in 2001−09, which is consistent with the high growth rates recorded in that period. In contrast, per capita energy use has trended downwards in the OECD within the same period. Beneath this rapid growth and acceleration of material and energy use lie concerns about unbridled growth in industrial emissions, emissions from deforestation, as well as the depletion and degradation of many types of natural and environmental resources. Of particular concern is the growth of greenhouse gases, especially carbon dioxide associated with the burning of fossil fuels which has been blamed for causing global warming. Figure 1.3 shows that per capita carbon dioxide (CO₂) emissions have historically been at high levels in the advanced countries but have declined slightly within the last four decades. With the exception of SSA, CO₂ emissions in the other three regions have increased. As can be expected, the fastest growth in emissions has occurred in the EAP region due to the high growth rates of the Asian tigers.

Many developing countries have taken a cue from the success stories of the Asian tigers and have moved towards liberalisation and the opening up of their economies to boost their exports. Policy changes that have occurred in most of the developing countries include reduction of import tariffs and
Managing macroeconomic policies for sustainable growth

removal of other protective instruments, as well as the relaxation of cross-border capital flows to encourage foreign investment.


Figure 1.1  GDP growth rates in regional groupings, 1971–2009


Figure 1.2  Per capita energy use, 1971–2009

Introduction

The evidence suggests that these policies have achieved their intended purposes to a large extent. For example, for developing countries in the EAP region, exports as a proportion of GDP have doubled from an average of 15% in 1979 to 35% in 2009. The annual growth of exports has averaged 10% over this period. At the same time, net inflows of foreign direct investment (FDI) as a proportion of GDP has grown at an average of 2.5% per annum (World Bank, 2011). The GDP growth rate of these countries has averaged 8% per annum from 1979 to 2009, in spite of the Global Financial Crisis (GFC).

For the developing countries in the EAP region, we found a statistically significant and positive relationship between CO₂ emissions per capita and economic growth, and between CO₂ emissions per capita and exports, regardless of the direction of causality. This leads us to conclude that trade and trade liberalisation can contribute to increases in some forms of environmental degradation. However, the relationship is a complex one and as such we cannot unambiguously conclude that economic growth or trade liberalisation in itself is bad for the environment. Central to this issue is the on going debate on the relationship between emissions growth and environmental pollution – the so-called ‘Environmental Kuznets Curve’


Figure 1.3 Per capita CO₂ emissions, 1971–2007

The evidence suggests that these policies have achieved their intended purposes to a large extent. For example, for developing countries in the EAP region, exports as a proportion of GDP have doubled from an average of 15% in 1979 to 35% in 2009. The annual growth of exports has averaged 10% over this period. At the same time, net inflows of foreign direct investment (FDI) as a proportion of GDP has grown at an average of 2.5% per annum (World Bank, 2011). The GDP growth rate of these countries has averaged 8% per annum from 1979 to 2009, in spite of the Global Financial Crisis (GFC).

For the developing countries in the EAP region, we found a statistically significant and positive relationship between CO₂ emissions per capita and economic growth, and between CO₂ emissions per capita and exports, regardless of the direction of causality. This leads us to conclude that trade and trade liberalisation can contribute to increases in some forms of environmental degradation. However, the relationship is a complex one and as such we cannot unambiguously conclude that economic growth or trade liberalisation in itself is bad for the environment. Central to this issue is the on going debate on the relationship between emissions growth and environmental pollution – the so-called ‘Environmental Kuznets Curve’
(EKC) hypothesis\(^1\) (Selden and Song, 1994). The basic premise of the EKC hypothesis is that there is an ‘inverted-U’ shaped relationship between a variety of indicators of environmental degradation and the level of income per capita. That is, as per capita income increases, the intensity of emissions will initially increase, but then will eventually decline once some threshold level has been reached. Some people have used the EKC as a basis to conclude that pollution is an inevitable consequence of growth and that a country can transition into a cleaner environment after it becomes rich.

A number of theories have been proposed to explain the inverted U relationship between economic growth and environmental quality.\(^2\) According to Grossman and Krueger (1995), the strongest link is an induced policy response, which is, in turn, induced by popular demand. To quote Grossman and Krueger,

As nations or regions experience greater prosperity, their citizens demand that more attention be paid to the non-economic aspects of their living conditions. The richer countries tend to have relatively cleaner urban air and relatively more stringent environmental standards and stricter enforcement of their environmental laws than middle-income and poorer countries (Grossman and Krueger, 1995, p. 372).

The EKC’s supposition that countries can simply ‘grow out’ of any limitations brought about by the depletion of natural resources and increased environmental degradation has come under attack from many scholars including Arrow et al. (1995), Stern et al. (1996), Stern (1998), Cole (2000), Stern and Common (2001). Although the EKC relationship appears to hold for some environmental indicators such as sulphur dioxide and deforestation, most studies show that it does not hold for CO\(_2\). Also, the EKC has been shown not to hold for biodiversity loss (Asafu-Adjaye, 2003). The general conclusion from this literature is that growth is a necessary condition, but not sufficient to address environmental problems. Some of the studies indicate that institutional factors do exert a significant influence on the relationship between income and environmental degradation. For example, Asafu-Adjaye (2003) found that improvement in economic freedoms (a proxy for the level of institutional development) is associated with improvement in biodiversity levels.

1.2 OBJECTIVES OF THIS BOOK

It has become quite clear, as we enter the next century, that the quality of our natural and environmental resources is a major constraint to future economic growth and development. For example, on the issue of emissions, the Intergovernmental Panel on Climate Change (IPCC) estimates the
aggregate average annual cost of climate change to lie in the range of 1–3% of global GDP in 2030 (IPCC, 2007). The Stern Review estimates average losses in global GDP in 2200 to be in the range of 5.3–13.8%, depending on the size of climate-system feedbacks and the estimates of ‘non-market’ impacts (Stern, 2006). Measures at both the national and international levels are therefore required to curb emissions. However, at the same time, it is acknowledged that developing countries need to be given a chance to grow their economies using appropriate policies.

In light of the above concerns, the broad objectives of this book are to analyse a range of economic and environmental issues and to propose policy recommendations that would enhance sustainable economic growth. The focus of our analytical work is to improve our understanding of the impacts of various policies on a range of variables related to economic growth and development. A strategy of sustainable economic growth needs to strike the right balance between economic, social and environmental goals. However, in some cases, the achievement of a given goal involves trade-offs because some of the goals can be competing rather than complementary. Therefore, there is a need for evidence-based analysis that would assist policymakers to choose ‘optimal’ policies from a range of options, or to choose policies which have the least deleterious effects on the economy and the environment.

Given the complexity of the relationships amongst the many variables affecting the economy and the environment, we have adopted a general equilibrium rather than a partial equilibrium framework for our analysis. Specifically, we apply the computable general equilibrium (CGE) approach. This approach has sufficient flexibility to capture complicated relationships in the economy–environment system. Computable general equilibrium models are designed to be consistent with economic theory. The main strength of CGE analysis is that it models the whole economy explicitly, captures market mechanisms, accounts for the interlinkages between sectors, as well as transactions between economic agents. The book covers a variety of issues related to economic growth, trade, energy and climate change. We focus mainly on countries in the Asia-Pacific region including Australia, Thailand, Papua New Guinea and Fiji, while one chapter conducts a comparative analysis of the impacts of climate change on SSA and the rest of the world.

1.3 OVERVIEW OF THE CHAPTERS

The remainder of the book is organised as follows. Chapter 2 provides the context for the analysis by describing the features of general equilibrium models, in general, and CGE models, in particular. The discussion focuses on the features of different types of CGE models, giving particular attention to
the Johansen–style modelling approach which is the one used in the book. This is followed by a short discussion of the strengths and limitations of the CGE approach, including some ways in which the inherent errors can be minimised.

Chapter 3 presents the first set of analyses, which deals with the issue of resource expansion in Papua New Guinea (PNG). Papua New Guinea is somewhat of a paradox because it is the largest and wealthiest Pacific Island country (PIC) in terms of natural resource endowment and human capital. Yet, its growth performance has been amongst the poorest in the Pacific region. Apart from being blessed with abundant minerals (copper, gold, oil and natural gas) and an extensive coastline, PNG has fertile soils with rich agricultural potential. However, less than 1% of the cultivable land is under production. In this chapter, we consider the effect of expansion in the agriculture and fisheries sector, which is in line with the government’s medium term development strategy. We also analyse how sustained rises in the world prices of commodities such as coffee, cocoa, palm oil, timber, copper, gold and crude oil have affected the PNG economy. Finally, we consider the impacts on the economy of the recently approved PNG Liquefied Natural Gas project, construction of which is scheduled to start in 2012. This is a massive project which is estimated to more than double PNG’s gross domestic product (GDP) at the height of production. These developments in the natural resource sector pose serious macroeconomic management challenges to the government. On the basis of our results, we propose ways in which some of these challenges could be dealt with in other to attain sustainable economic growth.

The focus of Chapter 4 is Fiji, the second largest PIC. While Fiji has fared better than PNG in terms of its growth performance, it has been saddled with problems of political instability due to frequent coups d’état. Since 1970, there have been four military takeovers of government. Fiji has an export-oriented economy with tourism and sugar being the leading exports. The tourism sector was hard hit by the GFC and preferential sugar prices in the European Union (EU) market is already being phased out. In this chapter, we analyse the impacts of the GFC on the Fiji economy. In light of the loss of the EU sugar preferences, we analyse a policy–targeting industrial development strategy versus a more broad–based (integrated) strategy, given calls for Fiji to broaden her narrow export base. We analyse the implications of these policies and recommend the way forward for Fiji in her quest to achieve sustainable economic growth.

Due to lack of progress on reaching a global multilateral trade agreement, numerous regional and bilateral agreements have sprung up within the last decade. The desire to enter such agreements is driven by the view that trade liberalisation is good for economic growth. In line with this view, the PICs
have agreed to a free trade deal amongst themselves (Pacific Island Countries Agreement (PICTA)), with an option to include Australia and New Zealand (the Pacific Agreement for Closer Economic Relations (PACER) Plus). In addition, PNG and Fiji are negotiating an Economic Partnership Agreement (EPA) with the EU. Past research shows that the impacts of various trade liberalisation measures and trade arrangements vary for different countries and regions. The issue of which form of trade liberalisation or agreement is most beneficial remains an empirical one and is something which has not been sufficiently addressed for the PICs. In Chapter 5, we use PNG and Fiji as case studies to analyse the effects of these trade policies. For each country, we compare and contrast the following scenarios: the effects of unilateral tariff reduction, the effects of PICTA, and the effects of the EPA and PACER Plus. Our results show that all three forms of trade policies increase overall economic growth but the regional trade agreements perform better than unilateral tariff liberalisation. We discuss the challenges that lie ahead for PICs and ways in which the research could be extended.

The final three chapters of the book are devoted to energy and climate change related issues. Given concerns about greenhouse gas (GHG) emissions, many countries are looking to develop renewable sources of energy not only to reduce emissions, but also to enhance their energy security. However, many types of renewable energy are currently not viable (in comparison to traditional fossil fuels) and require substantial government subsidies.

Chapter 6 analyses the impacts of biofuel-promoting measures contained in the Thailand government’s 15-year renewable energy development plan. In the simulation scenarios, we consider a number of biomass-promotion strategies involving biomass-based electricity produced by small power producers (SPPs) and very small power producers (VSPPs). We show that, in general, purchasing biomass-based electricity from SPPs has a positive impact on real GDP via an increase in aggregate investment that offsets a decline in real consumption. However, purchasing electricity from VSPPs is likely to have a relatively smaller positive impact on real output due to a smaller increase in aggregate investment and a larger decline in real consumption.

Chapter 7 analyses the impacts of the Australian government’s policy to impose a carbon tax starting from 1 July, 2012 in an effort to meet its commitments under the Copenhagen Accord. The fixed price on carbon will be followed by a domestic emissions trading scheme three to five years later. This issue has been a controversial one, with the Liberal/National coalition firmly set against it, backed by some of the mining companies and a fair proportion of the general public. Hon. Tony Abbott, the leader of the opposition, has consistently said that his party will revoke the tax if it wins
government. The main argument used against the tax is that it will give an unfair advantage to Australia’s competitors and will lead to massive job losses and price increases. Our simulation results indicate that the proposed GHG policy is likely to achieve Australia’s 5% emissions reduction target from the 2000 level for a carbon price of $20 per tonne of carbon dioxide equivalent (CO$_2$-e) emissions. The results also indicate that real GDP declines by an average of 0.5% per annum and consumer prices decline by even less. We discuss ways in which the government could mitigate the adverse impacts on households and firms.

Chapter 8 examines the economic impacts of climate change, with a focus on the loss of agricultural productivity. The analysis centres on a comparison of the climate change impacts on agriculture in Africa vis-à-vis the rest of the world. Africa is singled out for a number of reasons, including the fact that the African continent is already among the hottest parts of the Earth and therefore will suffer more adverse consequences as a result of climate change. The chapter reviews economic impacts projected by the IPCC and the Stern Review and then uses a global CGE model, in which African regions are more disaggregated, to estimate the impacts of global warming. Our results indicate that the impacts of climate change on particular regions of Africa are more severe than the aggregate impacts suggested by the Stern Review and the IPCC. We discuss policy responses, including adaptation and mitigation, as well as the challenges which developing countries face.

It is our hope that this book will become a valuable resource on the use of CGE models for policy analysis by researchers, students, policy analysts and policymakers. In particular, it is our wish that the work in this book will lead to the further development and application of models to address issues we have identified as requiring further investigation.

NOTES
1. The name is derived from a similar relationship proposed by Simon Kuznets, the Nobel laureate, for income inequality in relation to development, namely an ‘inverted U’ shape (Kuznets, 1955).
2. See Asafu-Adjaye (2005) for a discussion of some of these theories.
3. Partial equilibrium analysis considers some specific markets of goods and services. Examples of partial equilibrium analysis include micro-econometric modelling and macro-econometric modelling. On the other hand, general equilibrium analysis captures all markets of goods and services.
REFERENCES


