The Sustainability of Economic Growth in Abu Dhabi

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Abstract

Abu Dhabi has experienced an unprecedented development during the last half century, growing rapidly from a remote desert settlement to a thriving metropolitan. Today, the Emirate ranks among the countries with the highest GDP per capita in the world, and this impressive development is anticipated to continue in the decades to come.

However, there are several challenges to the sustainability of the current economic prosperity, and the environmental degradation that was caused by the rapid development is an important factor in this context. Today, the United Arab Emirates as a country has the highest ecological footprint per capita in the world and Abu Dhabi, hosting the major part of the heavy industries and oil extraction capacity in the country, has an even larger footprint. Key drivers of this poor environmental track-record are the high greenhouse gas emissions and water consumption levels.

This deterioration of environmental conditions has growing implications for the economic welfare and physical well-being of the population. So far, the government's environmental policy is mostly symbolic, and concrete policy measures are largely lacking today. On the contrary, there are crucial elements in the governmental policy that have strong negative impacts on environmental conditions and thus on the sustainability of Abu Dhabi's growth, such as generous implicit subsidies on energy commodities and water and an ambitious strategy for economic growth, depending on a strong expansion of heavy industry.

This poses the question how environmental conditions will develop, when the population boom and economic expansion are anticipated to continue. However, the academic literature on environmental sustainability issues in Abu Dhabi as well as in the wider Gulf region is limited. Moreover, applied policy studies on the topic are absent as well.

This dissertation intends to contribute to the academic literature as well as to insights from existing policy studies, by projecting the impact of sustained economic growth on environmental conditions in Abu Dhabi. It compares a baseline scenario of economic growth with the four most relevant policy options aimed at footprint reductions available to policy makers in the Emirate: i) The introduction of a nuclear power plant; ii) An abandonment

of utility price controls; iii) Shifts in the subsidization policy of water and energy markets; iv) Energy efficiency improvements in selected parts of the economy.

A recursively dynamic, multi-sectoral computable general equilibrium (CGE) model is used to generate the results in this dissertation, focusing on the two most important aspects of the ecological footprint in Abu Dhabi mentioned above. The CGE model is calibrated to a SAM for Abu Dhabi for 2009, and its specification is chosen to facilitate a focus on energy consumption and sustainability issues. Besides, it is extended by an environmental module and a fossil fuel module, and it incorporates several other modifications that are tailored to the Abu Dhabi economy.

Simulation results under a baseline scenario of economic growth show that carbon emissions will grow by 282% by 2030 compared to the base year 2009, and water consumption is anticipated to increase by 312%.

The introduction of nuclear plants, at the scale that is previewed today, will yield a reduction in emissions of 2.6% compared to the baseline scenario. The economic impact will be positive, with a 0.5% increase in GDP and small gains in employment levels.

Price liberalizations in the utility markets are a politically sensitive theme. When implemented, they can yield a 7.6% reduction in emissions and a 2.3% in water consumption by 2030 (vs. baseline). However, the economic cost involved amounts to 0.3% of GDP.

An abandonment of subsidies in the energy and water markets can lead to a 11.1% drop in carbon emissions, and a 28.8% decline in water consumption vs. baseline. The domestic economic impacts of this change are negative, but the GDP shows a modest 0.6% growth, due to improvements in the foreign trade balance.

Finally, efficiency improvements can lead to reductions in carbon emissions (13.8%) and water consumption (17.5%) compared to the baseline, and bring economic gains of 1.0% of GDP.

All four simulated policy scenarios in this dissertation bring about reductions in the ecological footprint, compared to the baseline as described above. Nonetheless, the consumption levels of energy and water as well as the related carbon emissions will be substantially higher in 2030 than they are today, under each of these scenarios. As a policy implication, the dissertation therefore finds that the previewed deterioration in environmental conditions requires active policy, if current welfare and prosperity are to be sustained. When assessed in the appropriate policy context, environmental conservation and improvements in the ecological footprint should be treated with a higher priority in the broad portfolio of development goals in Abu Dhabi.

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ADCCI	Abu Dhabi Chamber of Commerce and Industry
ADCED	Abu Dhabi Council of Economic Development
ADIA	Abu Dhabi Investment Authority
ADIC	Abu Dhabi Investment Company
ADNOC	Abu Dhabi National Oil Company
ADWEA	Abu Dhabi Water and Electricity Authority
ADWEC	Abu Dhabi Water and Electricity Company
AED	Arab Emirate Dirham
AEEI	Autonomous Energy Efficiency Improvements
AGE	Applied General Equilibrium
AGEDI	Abu Dhabi Global Environmental Data Initiative
CDM	Clean Development Mechanism
CES	Constant Elasticity of Substitution
CET	Constant Elasticity of Transformation
CGE	Computable General Equilibrium
DEDAD	Department of Economic Development Abu Dhabi
DICE	Dynamic Integrated model of Climate and the Economy
DoT	Department of Transport
DSGE	Dynamic Stochastic General Equilibrium
EAD	Environment agency Abu Dhabi
EEG	Emirates Environmental Group
EIA	Energy Information Agency
EMAL	Emirates Aluminium
ENEC	Emirates Nuclear Energy Corporation
EPPA	Emissions Prediction and Policy Analysis
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
FUND	Framework for Uncertainty, Negotiation and Distribution
GAMS	General Algebraic Modeling System
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GE	General Equilibrium

GFN	Global Footprint Network
GHG	Greenhouse Gas
GREEN	General Equilibrium Environment model
IAM	Integrated Assessment Model
IEA	International Energy Agency
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
LES	Linear Expenditure System
MED	Multiple-Effect Distillation
MENA	Middle East and North Africa
MSF	Multi-Stage Flashing
NBS	National Bureau of Statistics
NMC	National Media Council
NRC	National Resources Canada
OCA	Optimum Currency Area
OECD	Organization for Economic Co-operation and Development
OPEC	Organization of Petroleum Exporting Countries
PAGE	Policy Analysis for the Greenhouse Effect
PV	Photovoltaics
RBS	Regulation and Supervision Bureau
RO	Reverse Osmosis
SAM	Social Accounting Matrix
SCAD	Statistics Center Abu Dhabi
SWF	Sovereign Wealth Fund
TERC	Terrestrial Environment Research Centre
UAE	United Arab Emirates
UAE-MHESR	UAE Ministry of Higher Education and Scientific Research
UNFCCC	United Nations Framework Convention on Climate Change
VAT	Value Added Tax
WNA	World Nuclear Association
WRI	World Resource Institute
WTO	World Trade Organization