WHERE IS THE WEALTH OF NATIONS?

WHERE IS THE WEALTH OF NATIONS?

Measuring Capital for the 21st Century

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Foreword

This volume asks a key question: Where is the Wealth of Nations? Answering this question yields important insights into the prospects for sustainable development in countries around the world. The estimates of total wealth–including produced, natural, and human and institutional capital–suggest that human capital and the value of institutions (as measured by rule of law) constitute the largest share of wealth in virtually all countries.

It is striking that natural capital constitutes a quarter of total wealth in low-income countries, greater than the share of produced capital. This suggests that better management of ecosystems and natural resources will be key to sustaining development while these countries build their infrastructure and human and institutional capital. Particularly noteworthy is the share of cropland and pastureland in the natural wealth of poor countries–at nearly 70 percent, this argues for a strong focus on efforts to sustain soil quality.

This new approach to capital also provides a comprehensive measure of changes in wealth, a key indicator of sustainability. There are important examples of resource-dependent countries, such as Botswana, that have used their natural resources to underpin impressive rates of growth. In addition, the research finds that the value of natural capital per person actually tends to rise with income when we look across countries–this contradicts the received wisdom that development necessarily entails the depletion of the environment.

However, the figures suggest that, per capita, most low-income countries have experienced declines in both total and natural capital. This is bad news not only from an environmental point of view, but also from a broader development perspective.

Growth is essential if developing countries are to meet the Millennium Development Goals by 2015. Growth, however, will be illusory if it is based on mining soils and depleting fisheries and forests. This report provides the indicators needed to manage the total portfolio of assets upon which development depends. Armed with this information, decision makers can direct the development process toward sustainable outcomes.

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Vice President, Sustainable Development	Senior Vice President and Chief Economist

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This book is dedicated to the memory of David Pearce–professor, mentor, friend, and intellectual father of the work presented here.

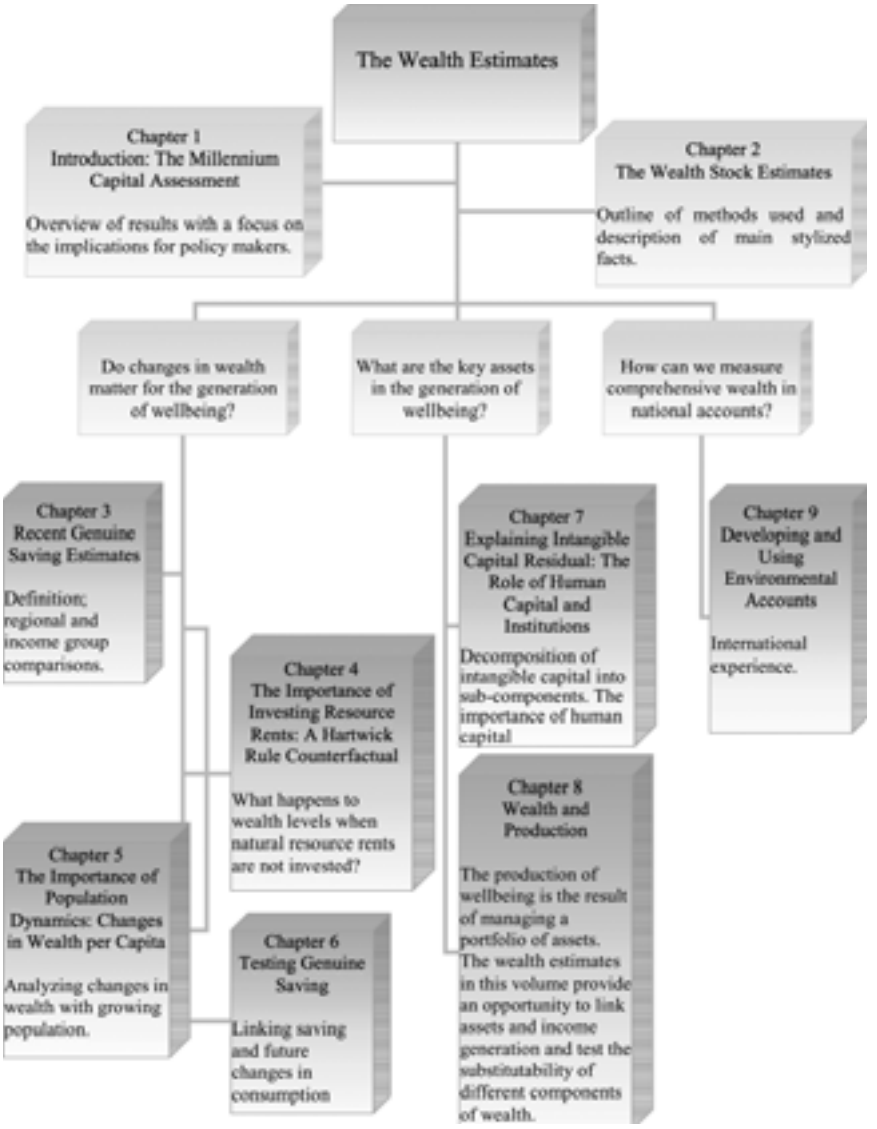
Acronyms and Abbreviations

CES	constant elasticity of substitution
EA	environment accounts
eaNDP	environmentally adjusted net domestic product
ENRAP	Environment and Natural Resource Accounting Project
EPE	environmental protection expenditure
EU	European Union
Eurostat	European Commission's official statistical agency
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
geNDP	greened economy net domestic product
GNI	gross national income
GNIPC	gross national income per capita
IO	input-output
IUCN	The World Conservation Union
MFA	material flow accounts
NAMEA	national accounting matrix including environmental accounts
NDP	net domestic product
NPV	net present value
PIM	perpetual inventory model
PPP	Purchasing Power Parities
PVC	Present Value of Change
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
SAM	social accounting matrix
SEEA	system of integrated environmental and economic accounting
SNA	system of national accounts
SNI	sustainable national income

SOEs	state-owned enterprises
SRRI	Social Rate of Return on Investment
TMR	total material requirements
UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre
WDI	World Development Indicators
WDPA	World Database of Protected Areas

Note: All dollar amounts are U.S. dollars unless otherwise indicated.

Looking for the Wealth of Nations—A Logical Map



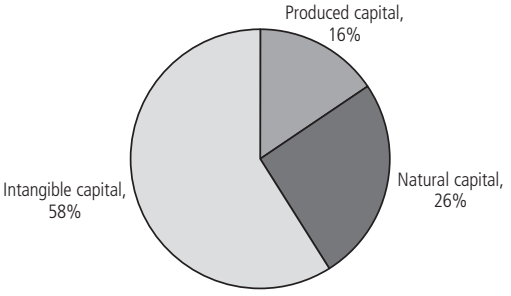
Executive Summary

With this volume, *Where Is the Wealth of Nations?* the World Bank publishes what could be termed the *millennium capital assessment:* monetary estimates of the range of assets—produced, natural, and intangible—upon which development depends. While important gaps remain, this comprehensive snapshot of wealth for 120 countries at the turn of the millennium aims to deepen our understanding of the linkages between development outcomes and the level and composition of wealth.

Figures 1 and 2 provide important insights into the role of natural resources in low-income countries (excluding *oil states* where resource rents exceed 20 percent of gross domestic product [GDP]). The first key message is that natural capital is an important share of total wealth, greater than the share of produced capital.[1] This suggests that managing natural resources must be a key part of development strategies. The composition of natural wealth in poor countries emphasizes the major role of agricultural land, but subsoil assets and timber and nontimber forest resources make up another quarter of total natural wealth.

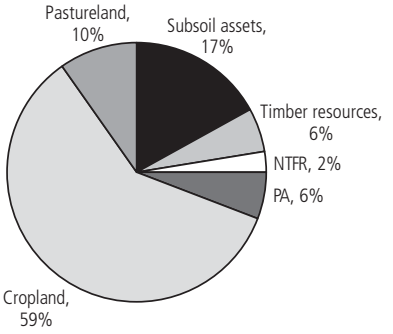
The large share of natural resources in total wealth and the composition of these resources make a strong argument for the role of environmental resources in reducing poverty, fighting hunger, and lowering child

Figure 1 Shares of Total Wealth in Low-Income Countries, 2000



Source: Authors.
Note: Oil states excluded.

Figure 2 Shares of Natural Wealth in Low-Income Countries, 2000



Source: Authors.
Note: Oil states excluded.
NTFR: Nontimber forest resources. PA: Protected areas.

mortality. The analysis in this volume proceeds from an overview of the wealth of nations to analyze the key role of the management of wealth through saving and investments. It also analyzes the importance of human capital and good governance and engages finance ministries in developing a comprehensive agenda that looks at natural resources as an integral part of their policy domain.

Where Is the Wealth of Nations? is organized around three key questions. Each chapter tackles a particular aspect of the wealth-wellbeing equation and describes the story behind the numbers and the relative policy implications. Before engaging the key issues, chapter 1 and chapter 2 introduce the reader into the structure, results, and main policy implications of the volume.

Chapter 1 provides an overview of the wealth estimates with a focus on the implications for policy makers. It introduces the notion of development as a process of portfolio management—a powerful framework for action. Certain assets in the portfolio are exhaustible and can only be transformed into other assets through investment of the resource rents. Other assets are renewable and can yield sustainable income streams. Economic analysis can guide decisions concerning the optimal size of these assets in the portfolio.

The wealth estimates suggest that the preponderant form of wealth worldwide is intangible capital—human capital and the quality of formal and informal institutions. Moreover, the share of produced assets in total wealth is virtually constant across income groups, with a moderate increase in produced capital intensiveness in middle-income countries. The share of natural capital in total wealth tends to fall with income, while the share of intangible capital rises. The latter point makes perfect sense—rich countries are largely rich because of the skills of their populations and the quality of the institutions supporting economic activity.

Chapter 2 takes the reader through the methodology used to estimate wealth, explaining the methods and assumptions used. The total wealth estimates reported in *Where Is the Wealth of Nations?* are built upon a combination of top-down and bottom-up approaches. Total wealth, in line with economic theory, is estimated as the present value of future consumption. Produced capital stocks are derived from historical investment data using a perpetual inventory model (PIM). Natural resource stock values are based upon country-level data on physical stocks and estimates of natural resource rents based on world prices and local costs. Intangible capital, then, is measured as the difference between

total wealth and the other produced and natural stocks. The estimates of natural wealth are limited by data—fish stocks and subsoil water are not measured in the estimates—while the environmental services that underpin human societies and economies are not measured explicitly.

The introduction of the wealth estimates methodology and results in the first two chapters sets the stage for the three leading questions in the volume. The central tenet of *Where Is the Wealth of Nations?* is embodied in chapters 4 through 7. While wealth composition may, to some extent, determine the development options available to a particular country, the quality of development depends crucially on how wealth changes over time. Natural capital can be transformed into other forms of capital, provided resource rents are efficiently invested.

Do Changes in Wealth Matter for the Generation of Well-Being?

Natural resources are special economic goods because they are not produced. As a consequence, natural resources will yield economic profits—rents—if properly managed. These rents can be an important source of development finance, and countries like Botswana and Malaysia have successfully used natural resources in this way. There are no sustainable diamond mines, but there are sustainable diamond-mining countries. Behind this statement is an assumption that it is possible to transform one form of wealth—diamonds in the ground—into other forms of wealth such as buildings, machines, and human capital.

Saving is obviously a core aspect of development. Without the creation of a surplus for investment there is no way for countries to escape a low-level subsistence equilibrium. Resource dependence complicates the measurement of saving effort because depletion of natural resources is not visible in standard national accounts. Adjusted net or *genuine* saving measures the true level of saving in a country after depreciation of produced capital; investments in human capital (as measured by education expenditures); depletion of minerals, energy, and forests; and damages from local and global air pollutants are taken into account. Chapter 3 describes the estimation of adjusted net saving. It then goes on to present and discuss the empirical calculations of genuine saving rates available for over 140 countries.

Development has been referred to as a *process of portfolio management.* The Hartwick rule for sustainability actually mandates that in order to achieve sustainable consumption, countries should invest their rents from natural resources. Drawing on a 30-year time series of resource rent data underlying the adjusted net saving estimates, chapter 4 constructs a Hartwick rule counterfactual: how rich would countries be in the year 2000 if they had followed the Hartwick rule since 1970? The empirical estimations in this chapter test two variants of the Hartwick rule—the standard rule, which amounts to keeping genuine saving precisely equal to zero at each point in time, and a version that assumes a constant level of positive genuine saving at each point in time. In many cases, the results are striking. The calculations show how even a moderate saving effort, equivalent to the average saving effort of the poorest countries in the world, could have substantially increased the wealth of resource-dependent economies. In 2000, Nigeria, a major oil exporter, could have had a stock of produced capital five times higher. Moreover, if these investments had taken place, oil would play a much smaller role in the Nigerian economy today, with likely beneficial impacts on policies affecting other sectors of the economy. Republica Bolivariana de Venezuela could have four times as much produced capital. In per capita terms, the economies of the Republica Bolivariana de Venezuela, Trinidad and Tobago, and Gabon, all rich in petroleum, could today have a stock of produced capital of roughly US$30,000 per person, comparable to the Republic of Korea.

Adjusted net saving is introduced in chapter 3 as a more inclusive measure of net saving effort. Yet, if population is not static, then it is clearly per capita welfare that policy should aim to sustain. While adjusted net saving is answering an important question—did total wealth rise or fall over the accounting period?—it does not speak directly to the question of the sustainability of economies when there is a growing population. This task is undertaken in chapter 5. If genuine saving is negative, then it is clear in both total and per capita terms that wealth is declining. For a range of countries, however, it is possible that genuine saving in total could be positive while wealth per capita is declining. Countries with high population growth rates are effectively on a treadmill and need to create new wealth just to maintain existing levels of wealth per capita. In general, the results suggest very large saving gaps in Sub-Saharan Africa when population growth is taken into account. Excluding the oil states, saving gaps (the increase in saving required to

maintain current levels of wealth per capita) in many countries are on the order of 10 percent to 50 percent of the gross national income (GNI). Against this must be set the realization that reigning in government consumption by even a few percentage points of GNI is extremely painful and often politically perilous. Macroeconomic policies alone seem unlikely to close the gap.

Economic theory suggests that current net saving should equal the change in future well-being, specifically the present value of future changes in consumption. Chapter 6 tests this hypothesis. The saving tests using historical data reported in this volume suggest that a particular variant of genuine saving, one that excludes education expenditures, damage from carbon dioxide emissions, and the immiserating effects of population growth, is a good predictor of future changes in well-being. Genuine saving is, therefore, a potentially important indicator to guide development policy. The analysis includes a further key result: when the sample of countries is limited to high-income countries, there is no apparent empirical relationship between current net saving and future well-being. This raises an important distinction between developed and developing countries. It says quite clearly that asset accumulation, the apparent driver of future welfare when all countries are tested, is not a significant factor in rich countries. This result makes eminent sense. In the richest countries it is clear that technological change, institutional innovation, learning by doing, and social capital, to name a few factors, are fundamental drivers of the economy.

While saving is at the basis of sustainable development, the composition of wealth determines the menu of options a given government has available. The second key question looks at specific types of wealth and their role.

What Are the Key Assets in the Generation of Well-Being?

As pointed out, most of a country's wealth is captured by what we term intangible capital. Given its importance, chapter 7 deals with the decomposition of intangible capital into subcomponents. By construction, the intangible capital variable captures all those assets that

are unaccounted for in the estimates of produced and natural capital. Intangible assets include the skills and know-how embodied in the labor force. The category also includes social capital, that is, the trust among people in a society and their ability to work together for a common purpose. The residual also accounts for all those governance elements that boost the productivity of labor. For example, if an economy has a very efficient judicial system, clear property rights, and an effective government, the effects will result in a higher total wealth and thus a higher *intangible capital* residual. The regression analysis in this chapter shows that human capital and rule of law account for the majority of the variation in the residual. Investments in education, the functioning of the justice system, and policies aimed at attracting remittances are the most important means of increasing the intangible components of total wealth.

In chapter 2 it is observed that as countries become richer, the relative importance of produced and intangible assets rises in ratio to natural assets. Thus, the development process primarily entails growth in the *modern* sectors of manufacturing and services, which depend heavily on more intangible forms of wealth. Yet, the value of natural resources per person does not decline as income rises, particularly for agricultural land. Chapter 8 tests the hypothesis that land and other natural resources are, in fact, key in sustaining income generation. Underlying any wealth accounts is an implicit *production function,* which is a blueprint of the combinations of different assets with which we can achieve a given level of output. These blueprints are usually written as a mathematical function, which describes the precise relationship between the availability of different amounts of inputs, such as physical and human capital services, and the maximum output they could produce. The substitutability between inputs is then measured as an *elasticity of substitution*. The results provide some interesting findings. There is no sign that the elasticity of substitution between the natural resource (land) and other inputs is particularly low. Wherever land emerges as a significant input, it has an elasticity of substitution approximately equal to or greater than one. This outcome, on one hand, confirms that countries' opportunities are not necessarily dictated by their endowments of natural resources. On the other hand, it validates the importance of a Hartwick rule of saving the rents from the exploitation of natural resources if we are to achieve a sustained level of income generation.

How Can Comprehensive Wealth and Its Changes Be Measured in National Accounts?

A central tenet of the volume is the need for a pragmatic vision of sustainable development as a process of administering a portfolio of assets. Having committed themselves to achieving sustainable development, governments face a number of challenges beyond the traditional concerns of their natural resources and environmental agencies. Policy makers setting environmental standards need to be aware of the likely consequences for the economy, while economic policy makers must consider the sustainability of current and projected patterns of production and consumption. Such integration and adoption of the notion of sustainable development by governments have been the motivation for developing environmental accounting. Chapter 9 provides a context to explore the usefulness of the system of environmental and economic accounts (SEEA) as an operational framework for monitoring sustainability and its policy use. The chapter summarizes the four general components of the environmental accounts. Furthermore, it reviews a few policy applications of environmental accounting in industrialized and developing countries, and also indicates potential applications, which may not be fully exploited at this time.

Putting It All Together

It is in developing countries where accounting based on comprehensive wealth and its changes is most likely to be a useful indicator to guide policy. The evidence in this volume suggests that investments in produced capital, human capital, and governance, combined with saving efforts aimed at offsetting the depletion of natural resources, can lead to future welfare increases in developing countries.

The step from saving to investment is crucially important. If investments are not profitable, the effect on wealth is equivalent to consumption, but without the boost to well-being presumed to accompany consumption.

Achieving the transition from natural-resource dependence to a sustained and balanced growth requires a set of institutions that are capable of managing the natural resource, collecting resource rents, and directing these rents into profitable investments. Resource policy, fiscal policy, and political economy all have a role to play in this transformation.

Endnote

1. The largest share, intangible capital, consists of an amalgam of human capital, governance, and other factors that are difficult to value explicitly.