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Appendix 1

Building the Wealth Estimates

This appendix details the construction of the wealth and genuine saving estimates.

The wealth estimates are composed of the following components:

- Total wealth
- Produced capital
  - Machinery and structures
  - Urban land
- Natural capital
  - Energy resources (oil, natural gas, hard coal, lignite)
  - Mineral resources (bauxite, copper, gold, iron, lead, nickel, phosphate, silver, tin, zinc)
  - Timber resources
  - Nontimber forest resources
  - Cropland
  - Pastureland
  - Protected areas

Intangible capital is calculated as a residual, the difference between total wealth and the sum of produced and natural capital.

Total Wealth

Total wealth can be calculated as $W_t = \int_t^\infty C(s) \cdot e^{-r(s-t)} ds$; where W_t is the total value of wealth, or capital, in year t; $C(s)$ is consumption in year s; r is the social rate of return from investment.[1] The social rate of return from investment is equal to: $r = \rho + \eta \frac{\dot{C}}{C}$; where ρ is the pure rate of time preference, η is the elasticity of utility with respect to consumption. Under the assumption that $\eta = 1$, and that consumption grows at a constant rate, then total wealth can be expressed as:

$$W_t = \int_t^\infty C(t) \cdot e^{-\rho(s-t)} ds \tag{A.1}$$

The current value of total wealth at time t is a function of the consumption at time t and the pure rate of time preference.

Expression (A.1) implicitly assumes that consumption is on a sustainable path, that is, the level of saving is enough to offset the depletion of natural resources. The calculation of total wealth requires that, in computing the initial level of consumption, the following issues be considered:

- *The volatility of consumption*. To solve this problem we used the average of three years of consumption.
- *Negative rates of adjusted net saving*. When adjusted net saving is negative, countries are consuming natural resources, jeopardizing the prospects for future consumption. A measure of sustainable consumption needs to be derived in this instance.

Hence, the following adjustments were made:

- Wealth calculation considered consumption series for 1998–2000.
- For the years in which adjusted net saving was negative, adjusted net saving was subtracted from consumption to obtain *sustainable* consumption, that is, the consumption level that would have left the capital stock intact.
- The corrected consumption series were then expressed in constant 2000 dollars.
- The average of constant dollars consumption between 1998 and 2000 was used as the initial level of consumption.

For computation purposes, we assumed the pure rate of time preference to be 1.5 percent (Pearce and Ulph 1999), and we limited the time horizon to 25 years. This time horizon roughly corresponds to a generation. We adopted the 25-year truncation throughout the calculation of wealth.

Machinery, Equipment, and Structures

For the calculation of physical capital stocks, several estimation procedures can be considered. Some of them, such as the derivation of capital stocks from insurance values or accounting values or from direct surveys, entail enormous expenditures and face problems of limited availability and adequacy of the data. Other estimation procedures, such as the accumulation methods and, in particular, the perpetual inventory method (PIM), are cheaper and more easily implemented since they only require investment data and information on the assets' service life and depreciation patterns. These methods derive capital series from the accumulation of investment series and are the most popular. The PIM is, indeed, the method adopted by most OECD countries that make estimations of capital stocks (Bohm and others 2002; Mas and others 2000; Ward 1976).

In our estimations of capital stocks we also use the PIM. The relevant expression for computing K_t, the aggregate capital stock value in period t, is then given by:

$$K_t = \sum_{i=0}^{19} I_{t-i}(1-\alpha)^i \tag{A.2}$$

where I is the value of investment in constant prices and α is the depreciation rate. In equation (A.2) we implicitly assume that the accumulation period (or service life) is 20 years.[2] The depreciation pattern is geometric with $\alpha = 5$ percent assumed to be constant across countries and over time.[3] Finally, note that equation (A.2) implies a "One-Hoss-Shay" retirement pattern—the value of an asset falls to zero after 20 years.

To estimate equation (A.2) we need long investment series or, alternatively, initial capital stocks.[4] Unfortunately, initial capital stocks are not available for all the countries considered in our estimation, and even in the cases in which there are published data (such as for some OECD, countries), their use would introduce comparability problems with other countries for which those data do not exist.

The investment series for the 65 countries with complete data coverage extend from 1960 to 2000. For 16 countries, complete investment series are not available, but for the missing years we have data on output, final consumption expenditure (private and public), exports, and imports. With this information we can derive investment series from the national accounting identity $Y = C + I + G + (X - M)$ by subtracting net exports from gross domestic saving. In all the cases, the ratios of the investment computed this way and the original investment in the years in which both series are available are very close to one. Still, to ensure the comparability between both investment series, we divided the investment estimates derived from the accounting identity by the country-specific median of these ratios for each country.

With investment series for 81 countries covering the period 1960–2000, it is even possible to compute capital series estimates that go back to 1979. For the rest of the countries for which the original investment series are not complete (because of lack of data on gross-fixed capital formation or on the required terms to apply the national accounting identity over the period 1960–2000), we tried to overcome the data limitations using a quite conservative approach. We extended the investment series by regressing the logarithm of the investment output ratio on time, as in Larson and others (2000). However, we did not extrapolate output, limiting the extension of the investment series to cases in which a corresponding output observation was available.

Urban Land

In the calculation of the value of a country's physical capital stock, the final physical capital estimates include the value of structures, machinery, and equipment, since the value of the stocks is derived (using the perpetual inventory model) from gross capital formation data that account for these elements. In the investment figures, however, only land improvements are captured. Thus, our final capital estimates do not entirely reflect the value of urban land.

Drawing on Kunte and others (1998) urban land was valued as a fixed proportion of the value of physical capital. Ideally, this proportion would be country-specific. In practice, detailed national balance sheet information with which to compute these ratios was not available. Thus, as in Kunte and others (1998), we used a constant proportion equal to 24 percent:[5]

$$U_t = 0.24K_t \tag{A.3}$$

Energy and Mineral Resources

In this section, the methodology used in the estimation of the value of nonrenewable resources is described. At least three reasons lie behind the difficulties in such calculations. First, the importance of the inclusion of natural resources in the national accounting systems has been recognized only in the last decades, and although efforts to broaden the national accounts are being made, they are mostly limited to international organizations (such as the UN or the World Bank). Second, there are no private markets for subsoil resource deposits to convey information on the value of these stocks. Third, the stock size is defined in economic terms—reserves are "that part of the reserve base which could be economically extracted or produced at the time of determination"—and, therefore, it is dependent on the prevalent economic conditions, namely technology and prices.[6]

Despite all these difficulties, dollar values were assigned to the stocks of the main energy resources (oil, gas, and coal[7]) and to the stocks of 10 metals and minerals (bauxite, copper, gold, iron ore, lead, nickel, phosphate rock, silver, tin, and zinc) for all the countries that have production figures.

The approach used in our estimation is based on the well-established economic principle that asset values should be measured as the present discounted value of economic profits over the life of the resource. This value, for a particular country and resource, is given by the following expression:

$$V_t = \sum_{i=t}^{t+T-1} \pi_i q_i \Big/ (1+r)^{(i-t)} \tag{A.4}$$

where $\pi_i q_i$ is the economic profit or total rent at time i (π_i denoting unit rent and q_i denoting production), r is the social discount rate, and T is the lifetime of the resource.

Estimating Future Rents

Though well understood and hardly questioned, this approach is rarely used for the practical estimation of natural asset values since it requires the knowledge of actual future rents. Instead, simplifications of (A.4) that implicitly predict future rents based on more or less restrictive assumptions (such as constant total rents, optimality in the extraction path) are used.

The simplification used here assumes that the unit rents grow at rate g: $\frac{\dot{\pi}}{\pi} = g = \frac{r}{1+(\varepsilon-1)(1+r)^T}$, where $\epsilon = 1.15$ is the curvature of the cost function, assumed to be isoelastic (as in Vincent 1996). Then, the effective discount rate is r^*, $r^* = \frac{r-g}{1+g}$, and the value of the resource stock can be expressed as:

$$V_t = \pi_t q_t \left(1+\frac{1}{r^*}\right)\left(1-\frac{1}{(1+r^*)^T}\right) \tag{A.5}$$

This expression is used to value resource stocks when extraction will extend beyond the year 2000.

Choice of T

To guide the choice of an exhaustion-time value, we computed the reserves to production ratios for all the countries, years, and resources.[8] Table A1 provides the median of these ratios for the different resources.

Table A.1 Median Lifetime Years

Energy		Metals and Minerals	
Oil	17	Bauxite	178
Gas	36	Copper	38
Hard coal	122	Gold	16
Soft coal	192	Iron ore	133
		Lead	18
		Nickel	27
		Phosphate	28
		Tin	28
		Silver	22
		Zinc	17

With the exception of the very abundant coal, bauxite, and iron, the reserves-to-production ratios tend to be around 20 to 30 years. As in World Bank (1997), we chose the smaller $T = 20$ for all the resources and countries. From a purely pragmatic point of view, the choice of a longer exhaustion time would demand increasing the time horizon for the predictions of total rents (to feed equation [A.4]). On the other hand, rents obtained further in the future have less weight since they are more heavily discounted. Finally, the level of uncertainty increases the more remote the future is. Under uncertainty, it is unlikely that companies or governments develop reserves to cover more than 20 years worth of production.

Timber Resources

The predominant economic use of forests has been as a source of timber. Timber wealth is calculated as the net present value of rents from roundwood production. The estimation then requires data on roundwood production, unit rents, and the time to exhaustion of the forest (if unsustainably managed).

The annual flow of roundwood production is obtained from the Food and Agriculture Organization of the United Nations database

(FAOSTAT).[9] Calculating the rent is more complex. Theoretically, the value of standing timber is equal to the discounted future stumpage price received by the forest owner after taking out the costs of bringing the timber to maturity. In practice, stumpage prices are usually not readily available, and we calculated unit rents as the product between a composite weighted price times a rental rate.

The composite weighted price of standing timber is estimated as the average of three different prices (weighted by production): (1) the export unit value of coniferous industrial roundwood; (2) export unit value of nonconiferous industrial roundwood; and (3) an estimated world average price of fuelwood. Where country level prices are not available, the regional weighted average is used.[10]

Forestry production-cost data are not available for all countries. Consequently, regional rental rates ([price-cost]/price) were estimated using available studies and consultation with World Bank forestry experts.

Since we applied a market value to standing timber, it was necessary to distinguish between forests available and forests not available for wood supply because some standing timber is simply not accessible or economically viable. The area of forest *available for wood supply* was estimated as forests within 50 kilometers of infrastructure.

Rents were capitalized using a 4 percent discount rate to arrive at a stock of timber resources. The concept of sustainable use of forest resources is introduced via the choice of the time horizon over which the stream is capitalized. If roundwood harvest is smaller than net annual increments, that is, the forest is sustainably harvested, the time horizon is 25 years. If roundwood harvest is greater than the net annual increments, then the time to exhaustion is calculated. The time to exhaustion is based on estimates of forest volume divided by the difference between production and increment. The smaller of 25 years and the time to exhaustion is then used as the resource lifetime.

Roundwood and fuelwood production data are for the year 2000, taken from FAOSTAT forestry data online. Data on industrial roundwood (wood in rough) for coniferous and nonconiferous production were obtained from the United Nations Food and Agriculture Organization (UNFAO 2000) yearbook: *Forest Products 1997–2001*. Fuelwood price data are from FAOSTAT forestry data online. Roundwood export prices are calculated from data from UNFAO *Forestry Products 1997–2001*.

Studies used as a basis for estimating rental rates were Fortech 1997; Whiteman 1996; Tay and others 2001; Lopina and others 2003; Haripriya 1998; Global Witness 2001; Eurostat 2002.

Nontimber Forest Resources

Timber revenues are not the only contribution forests make. Nontimber forest benefits such as minor forest products, hunting, recreation, watershed protection, and option and existence values are significant benefits not usually accounted. This leads to forest resources being undervalued. A review of nontimber forest benefits in developed and developing countries reveals that returns per hectare per year from such benefits vary from $190 per hectare in developed countries to $145 per hectare in developing countries (based on Lampietti and Dixon 1995 and on Croitoru and others 2005, and adjusted to 2000 prices). We assume that only one-tenth of the forest area in each country is accessible, so this per hectare value is multiplied by one-tenth of the forest area in each country to arrive at annual benefits. Nontimber forest resources are then valued as the net present value of benefits over a time horizon of 25 years.[9]

Cropland

Country-level data on agricultural land prices are not widely published, and even if local data were available, it is arguable that land markets are so distorted that a meaningful comparison across countries would be difficult. We have therefore chosen to estimate land values based on the present discounted value of land rents, assuming that the products of the land are sold at world prices.

The return to land is computed as the difference between market value of output crops and crop-specific production costs. Nine representative crops were taken mainly based on their production significance in terms of sowing area, production volume, and revenue. With these three aspects taken into consideration the following nine representative crops were considered: maize, rice, wheat, bananas, grapes, apples, oranges, soybeans, and coffee. Maize, rice, and wheat were calculated individually because they occupy most of the world's agricultural land resources. Bananas, grapes, apples, and oranges were used as proxies for the broader category of fruits and vegetables. Soybeans and coffee were used as proxies for the broader categories of oil crops and beverages, respectively. Roots, pulses, and other crops were calculated as the residual of total arable and permanent cropland minus the sowing areas of the above nine categories.

The annual economic return to land is measured as a percentage of each crop's production revenue, otherwise known as the rental rate. The calculated rental rates were obtained from a series of sector studies. For example, the rental rate for rice uses information on rental rates for the Lao People's Democratic Republic (67.6 percent), Egypt (30.6 percent), and Indonesia (56.1 percent) to obtain a world rental rate for rice of 51 percent. The other rental rates used are 30 percent for maize (from China, Egypt, Yemen), 34 percent for wheat (from Egypt, Yemen, Mongolia, Ecuador), 27 percent for soybeans (from China, Brazil, Argentina), 8 percent for coffee (from Nicaragua, Peru, Vietnam, Costa Rica), 42 percent for bananas (from Brazil, Colombia, Costa Rica, Cote d'Ivoire, Ecuador, Martinique, Suriname, Yemen), 31 percent for grapes (from Moldova, Argentina), 36 percent for apples and oranges (the value is based on the average for bananas and grapes, as no sector studies were found).

The crop-specific ratios are then multiplied by values of production at world prices. This has the effect of assigning higher land rents to more-productive soils. However, applying average crop-specific ratios in this manner probably understates the value of the most-productive lands and overstates the value of the least-productive land within a country.

A country's overall land rent is calculated as a weighted average (weighted by sowing areas) of rents from the 10 crop categories. Return to land for the 10th category (roots, pulses, and other crops) is calculated differently. Since there is no representative crop for it, the land rent is calculated as 80 percent of the weighted average (weighted by sow area) of the three major cereals. This is based on the assumption that roots, pulses, and other crops yield lower returns to land per hectare.

In order to reflect the sustainability of current cultivation practices, the annual return in 2000 is projected to the year 2020 based on growth in production (land areas are assumed to stay constant). Between 2020 and 2024, the value of production was held constant. The growth rates are

0.97 percent and 1.94 percent in developed and developing countries, respectively (Rosengrant and others 1995). The discounted present value of this flow was then calculated using a discount rate of 4 percent.

Pastureland

Pastureland is valued using methods similar to those for cropland. The returns to pastureland are assumed to be a fixed proportion of the value of output. On average, costs of production are 55 percent of revenues, and therefore, returns to pastureland are assumed to be 45 percent of output value. Value of output is based on the production of beef, lamb, milk, and wool valued at international prices. As with croplands, this rental share of output values is applied to country-specific outputs of pastureland valued at world prices. The present value of this flow is then calculated using a 4 percent discount rate over a 25-year time horizon.

In order to reflect the sustainability of current grazing practices, the annual return in 2000 is projected to the year 2020 based on growth in production (land areas are assumed to stay constant). Between 2020 and 2025, the value of production was held constant. The growth rates are 0.89 percent and 2.95 percent in developed and developing countries respectively (Rosengrant and other 1995). The discounted present value of this flow was then calculated using a discount rate of 4 percent.

Protected Areas

Protected areas provide a number of benefits that range from existence values to recreational values. They can be a significant source of income from a thriving tourist industry. These values are revealed by a high willingness to pay for such benefits. The establishment and good maintenance of protected areas preserve an asset for the future, and therefore protected areas form an important part of the natural capital estimates. The willingness to pay to preserve natural regions varies considerably, and there is no comprehensive data set on this.

Protected areas (the World Conservation Union [IUCN] categories I–VI) are valued at the lower of per-hectare returns to pastureland and cropland—a quasi-opportunity cost. These returns are then capitalized over a 25-year time horizon, using a 4 percent discount rate. Limiting the value of protected areas to the opportunity cost of preservation probably captures the minimum value, but not the complete value, of protected areas.

Data on protected areas are taken from the World Database of Protected Areas (WDPA), which is compiled by the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). Given the frequent revisions to the database, the data used are for 2003. In the cases of missing data on protected areas, they were assumed to be zero.

Calculating Adjusted Net Saving

Adjusted net saving measures the change in value of a specified set of assets, that is, the investment/disinvestment in different types of capital (produced, human, natural). The calculations are not comprehensive in that they do not include some important sources of environmental degradation such as underground water depletion, unsustainable fisheries, and soil degradation. This results from the lack of internationally comparable data, rather than intended omissions. A detailed description of the methodology to obtain adjusted net saving can be found at the World Bank's Environmental Economics website (www.worldbank.org/environmentaleconomics). The following table summarizes the definitions, data sources, and formulas used in the calculations.

Table A.2 Calculating Adjusted Net Saving

Item	Definition	Formula	Sources	Technical notes	Observations
Gross national saving (GNS)	The difference between GNI and public and private consumption plus net current transfer.	GNS = GNI – private consumption – public consumption + net current transfers	WDI, OECD, UN		
Depreciation (Depr)	The replacement value of capital used up in the process of production.	(data taken directly from source or estimated)	UN	Where country data were unavailable, they were estimated as follows. Available data on depreciation as a percentage of GNI were regressed against the log of GNI per capita. This regression was then used to estimate missing depreciation data. Regression: Dep/GNI = a + (b* Ln(GNI/cap)). The regression was estimated on a five-yearly basis (that is, regression in 1970 was used to estimate depreciation as a percent GNI in years 1970–1974.) Where data were missing for only a couple of years in a country, the same rate of depreciation as a percentage of GNI was applied.	UN data are not available after 1999 for most countries. Missing data are estimated.
Net national saving (NNS)	Difference between gross national saving and the consumption of fixed capital.	NNS = GNS – Depr			
Education expenditure (EE)	Public current operating expenditures in education, including wages and salaries and excluding capital investments in buildings and equipment.	(data taken directly from source or estimated)	Current education expenditure (public): UNESCO	When data are missing, estimation is done as follows: (1) for gaps between two data points, missing information is filled by calculating the average of the two data points; (2) for gaps after the last data point available, missing information is filled on the assumption that education expenditure is a constant share of GNI.	The variable does not include private investment in education. It only includes public expenditures, for which internationally comparable data are available. Notice that education expenditure data are only available up to 1997. One dollar's current expenditure on education does not necessarily yield exactly one dollar's worth of human capital (see, for example, Jorgensen and Fraumeni 1992). However, an adjustment from standard national accounts is needed. In national accounts, nonfixed-capital expenditures on education are treated strictly as consumption. If a country's human capital is to be regarded as a valuable asset, expenditures on its formation must be seen as an investment.

Item	Definition	Formula	Sources	Technical notes	Observations
Energy depletion (ED)	Product of unit resource rents and the physical quantities of energy extracted. It covers coal, crude oil, and natural gas.	ED = production volume * average international market price * unit resource rent	Quantities: OECD, British Petroleum, International Energy Agency, International Petroleum Encyclopedia, United Nations, World Bank, national sources. Prices: OECD, British Petroleum, national sources. Costs: IEA, World Bank, national sources	Energy depletion covers crude oil, natural gas, and coal (hard and lignite). Unit resource rent is calculated as (unit world price – average cost) / unit world price. Notice that marginal cost should be used instead of average cost in order to calculate the true opportunity cost of extraction. Marginal cost is, however, difficult to compute.	Prices refer to international rather than local prices, to reflect the social cost of energy depletion. This differs from national accounts methodologies, which may use local prices to measure energy GDP. This difference explains eventual discrepancies in the values for energy depletion and energy GDP.
Mineral depletion (MD)	Product of unit resource rents and the physical quantities of mineral extracted. It covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.	MD = production volume * average international market price * unit resource rent	Quantitites: USGS (2005) mineral yearbook. Prices: UNCTAD monthly commodity price bulletin. Costs: World Bank, national sources	Mineral depletion covers tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate. Unit resource rent is calculated as (unit price – average cost) / unit price. Notice that marginal cost should be used instead of average cost in order to calculate the true opportunity cost of extraction. Marginal cost is, however, difficult to compute.	Prices refer to international rather than local prices, to reflect the social cost of energy depletion. This differs from national accounts methodologies, which may use local prices to measure mineral GDP. This difference explains eventual discrepancies in the values for mineral depletion and mineral GDP.
Net forest depletion (NFD)	Product of unit resource rents and the excess of roundwood harvest over natural growth.	NFD = (roundwood production –increment) * average price * rental rate	Round wood production: FAOSTAT forestry database. Increments: World Bank, FAO, UNECE, WRI, country-specific sources. Rental rates: various sources	In a country where increment exceeded wood extraction, no adjustment to net adjusted saving was made, no matter what the absolute volume or value of wood extracted. Increment per hectare on productive forest land is adjusted to allow for country-specific characteristics of the timber industry.	Net forest depletion is not the monetary value of deforestation. Data on roundwood and fuelwood production are different from deforestation, which represents a permanent change in land use, and thus is not comparable. Areas logged out but intended for regeneration are not included in deforestation figures (see WDI definition of deforestation), but are counted as producing timber depletion. Net forest depletion only includes timber values and does not include the loss of nontimber forest benefits and nonuse benefits.
CO_2 damages (CO_2D)	A conservative figure of $20 marginal global damages per ton of carbon emitted was taken from Fankhauser (1994).	CO_2D = emissions (tons) * $20	Data on carbon emissions can be obtained from the WDI	Data lag by several years so the data for missing years are estimated. This is done by taking the ratio of average emissions from the last three years of available data to the average of the last three years' GDP in constant local currency unit. This ratio is then applied to the missing years' GDP to estimate carbon dioxide emissions. The atomic weight of carbon is 12 and for carbon dioxide 44, and carbon is only (12/44) of the emissions. Damages are estimated per ton but the emissions data are per kilo ton. The CO_2 emissions data have therefore been multiplied by 20*(12/44)*1000.	CO_2 damages include the social cost of permanent damages caused by CO_2 emissions. This may differ (sometimes in large measure) from the *market* value of CO_2 emissions reductions traded in emissions markets.

Item	Definition	Formula	Sources	Technical notes	Observations
PM_{10} damages ($PM_{10}D$)	Willingness to pay to avoid mortality and morbidity attributable to particulate emissions.	$PM_{10}D$ = disability adjusted life years lost due to PM emissions * WTP			
Adjusted net saving (ANS)	Net national saving plus education expenditure and minus energy depletion, mineral depletion, net forest depletion, carbon dioxide damage, and particulate emissions damage.	ANS = NNS + EE – ED – MD – NFD – CO_2D – $PM_{10}D$			

Source: Authors.

Endnotes

1. A proof that the current value of wealth is equal to the net present value of consumption can be found in Hamilton and Hartwick 2005.

2. The choice of a service life of 20 years tries to reflect the mix of relatively long-lived structures and short-lived machinery and equipment in the aggregate capital stock and investment series. In a study that derives cross-country capital estimates for 62 countries, Larson and others (2000) also use a mean service life of 20 years for aggregate investment.

3. Again, by choosing a 5 percent depreciation rate we try to capture the diversity of assets included in the aggregate investment series.

4. That is, $K_t = \sum_{i=0}^{t} I_{t-i}(1-\alpha)^i + K_0$ for $t < 20$.

5. Kunte and others (1998) based their estimation of urban land value on Canada's detailed national balance sheet information. Urban land is estimated to be 33 percent of the value of structures, which in turn is estimated to be 72 percent of the total value of physical capital.

6. U.S. Geological Survey definition. It is clear that an increase in, say, oil price or a reduction in its extraction costs would increase the amount of "economically extractable" oil and therefore increase the reserves. Indeed, U.S. oil production has surpassed several times the proved reserves in 1950.

7. Coal is subdivided into two groups: hard coal (anthracite and bituminous) and soft coal (lignite and subbituminous).

8. The World Bank database provides good coverage on production data for the 14 resources. Oil and gas reserves data from various issues of *The Gas and Oil Journal* are also fairly complete. However, reserves data on coal from *The World Energy Conference* and on metals and minerals from the U.S. Bureau of Mines' *Mineral Commodity Summaries* are less complete. In fact, for the 10 metals and minerals, the reserves-to-production ratios were computed for a limited number of countries starting in 1987, due to data limitations.

9. When data are missing and if a country's forest area is less than 50 square kilometers, the value of production is assumed to be zero.

10. After consultation with World Bank forestry experts, some country-level prices were replaced by the regional average.

Appendix 2

Wealth Estimates by Country, 2000

Wealth Estimates by Country, 2000, $ per Capita

Country name	Population	Subsoil assets	Timber resources	NTFR	PA	Cropland	Pastureland	Natural capital	Produced capital + urban land	Intangible capital	Total wealth
Albania	3,113,000	300	38	72	247	1,660	1,574	3,892	1,745	11,675	17,312
Algeria	30,385,000	11,670	68	16	161	859	426	13,200	8,709	–3,418	18,491
Antigua and Barbuda	72,310	0	0	28	0	1,003	468	1,500	38,796	91,554	131,849
Argentina	35,850,000	3,253	105	219	350	3,632	2,754	10,312	19,111	109,809	139,232
Australia	19,182,000	11,491	748	551	1,421	4,365	5,590	24,167	58,179	288,686	371,031
Austria	8,012,000	485	829	144	2,410	1,298	2,008	7,174	73,118	412,789	493,080
Bangladesh	131,050,000	83	4	2	9	810	52	961	817	4,221	6,000
Barbados	267,000	988	0	0	0	190	210	1,388	18,168	127,181	146,737
Belgium-Luxembourg	10,690,000	20	254	20	0	575	2,161	3,030	60,561	388,123	451,714
Belize	240,000	0	344	1,272	0	5,201	133	6,950	9,710	36,275	52,935
Benin	6,222,000	15	321	96	207	603	90	1,333	771	5,791	7,895
Bhutan	805,000	0	1,888	849	1,291	589	328	4,945	2,622	180	7,747
Bolivia	8,428,000	934	100	1,426	232	1,550	541	4,783	2,110	11,248	18,141
Botswana	1,675,000	246	172	1,681	299	55	730	3,183	8,926	28,483	40,592
Brazil	170,100,000	1,708	609	724	402	1,998	1,311	6,752	9,643	70,528	86,922
Bulgaria	8,170,000	244	126	102	217	1,650	1,108	3,448	5,303	16,505	25,256
Burkina Faso	11,274,000	0	239	142	100	547	191	1,219	821	3,047	5,087
Burundi	6,807,000	4	23	3	7	1,130	44	1,210	206	1,443	2,859
Cameroon	15,117,000	914	348	357	187	2,748	179	4,733	1,749	4,271	10,753
Canada	30,770,000	18,566	4,724	1,264	5,756	2,829	1,631	34,771	54,226	235,982	324,979
Cape Verde	435,000	0	0	44	0	585	82	711	3,902	28,329	32,942

Country name	Population	Subsoil assets	Timber resources	NTFR	PA	Cropland	Pastureland	Natural capital	Produced capital + urban land	Intangible capital	Total wealth
Chad	7,861,000	0	311	366	80	787	316	1,861	289	2,307	4,458
Chile	15,211,000	5,188	986	231	1,095	2,443	1,001	10,944	10,688	56,094	77,726
China	1,262,644,992	511	106	29	27	1,404	146	2,223	2,956	4,208	9,387
Colombia	42,299,000	3,006	134	266	253	1,911	978	6,547	4,872	33,241	44,660
Comoros	558,000	0	17	3	0	872	75	967	1,270	5,792	8,030
Congo, Rep. of	3,447,000	7,536	0	1,450	3	329	13	9,330	6,343	−12,158	3,516
Costa Rica	3,810,000	2	629	117	657	5,811	1,310	8,527	8,343	44,741	61,611
Côte d'Ivoire	15,827,000	2	367	102	11	2,568	72	3,121	997	10,125	14,243
Denmark	5,340,000	4,173	211	25	1,377	2,184	3,775	11,746	80,181	483,212	575,138
Dominica	71,530	0	..	146	0	5,274	553	5,973	15,310	37,802	59,084
Dominican Republic	8,353,000	286	27	37	461	1,980	386	3,176	5,723	24,511	33,410
Ecuador	12,420,000	5,205	335	193	1,057	5,263	1,065	13,117	2,841	17,788	33,745
Egypt, Arab Rep. of	63,976,000	1,544	0	0	0	1,705	0	3,249	3,897	14,734	21,879
El Salvador	6,209,000	0	105	4	4	404	395	912	4,109	31,455	36,476
Estonia	1,370,000	384	1,382	341	490	1,114	2,572	6,283	18,685	41,802	66,769
Ethiopia	64,298,000	0	63	16	167	353	197	796	177	992	1,965
Fiji	812,000	77	0	227	0	1,381	522	2,208	4,192	38,480	44,880
Finland	5,172,000	58	6,115	1,259	1,090	843	2,081	11,445	61,064	346,838	419,346
France	58,893,000	87	307	77	1,026	2,747	2,091	6,335	57,814	403,874	468,024
Gabon	1,258,000	24,656	1,570	841	1	1,480	37	28,586	17,797	−3,215	43,168
Gambia, The	1,312,000	0	0	83	4	345	81	514	672	5,179	6,365
Georgia	5,262,000	66	0	129	66	737	802	1,799	595	10,642	13,036
Germany	82,210,000	269	263	39	1,113	1,176	1,586	4,445	68,678	423,323	496,447
Ghana	18,912,080	65	290	76	7	855	43	1,336	686	8,343	10,365
Greece	10,560,000	318	82	101	57	3,424	573	4,554	28,973	203,445	236,972
Grenada	101,400	0	0	0	0	572	67	640	16,128	38,544	55,312
Guatemala	11,385,000	301	517	57	181	1,697	218	2,971	3,098	24,411	30,480
Guinea-Bissau	1,367,000	0	195	362	0	1,180	121	1,858	549	1,566	3,974
Guyana	759,000	1,147	680	2,886	12	5,324	252	10,301	3,333	2,176	15,810
Haiti	7,959,000	0	8	3	3	668	112	793	601	6,840	8,235
Honduras	6,457,000	24	727	189	282	1,189	595	3,005	3,064	5,497	11,567
Hungary	10,024,000	536	152	42	366	2,721	1,131	4,947	15,480	56,645	77,072

Country name	Population	Subsoil assets	Timber resources	NTFR	PA	Cropland	Pastureland	Natural capital	Produced capital + urban land	Intangible capital	Total wealth
India	1,015,923,008	201	59	14	122	1,340	192	1,928	1,154	3,738	6,820
Indonesia	206,264,992	1,549	346	115	167	1,245	50	3,472	2,382	8,015	13,869
Iran, Islamic Rep. of	63,664,000	11,370	0	26	109	1,989	611	14,105	3,336	6,581	24,023
Ireland	3,813,000	385	222	51	172	1,583	8,122	10,534	46,542	273,414	330,490
Israel	6,289,000	10	0	6	1,350	1,757	877	3,999	44,153	246,570	294,723
Italy	57,690,000	361	0	51	543	2,639	1,083	4,678	51,943	316,045	372,666
Jamaica	2,580,000	856	157	29	609	824	152	2,627	10,153	35,016	47,796
Japan	126,870,000	28	38	56	364	710	316	1,513	150,258	341,470	493,241
Jordan	4,887,000	9	16	4	89	580	234	931	5,875	24,740	31,546
Kenya	30,092,000	1	235	129	113	361	529	1,368	868	4,374	6,609
Korea, Rep. of	47,008,000	33	0	30	441	1,241	275	2,020	31,399	107,864	141,282
Latvia	2,372,000	0	1,155	279	668	1,506	1,877	5,485	12,979	28,734	47,198
Lesotho	1,744,000	0	4	2	1	239	269	515	3,263	11,699	15,477
Madagascar	15,523,000	0	174	171	36	955	345	1,681	395	2,944	5,020
Malawi	10,311,000	0	184	56	26	474	45	785	542	3,873	5,200
Malaysia	23,270,000	6,922	438	188	161	1,369	24	9,103	13,065	24,520	46,687
Mali	10,840,000	0	121	276	44	1,420	295	2,157	621	2,463	5,241
Mauritania	2,508,159	1,311	14	29	21	1,128	480	2,982	1,038	3,938	7,959
Mauritius	1,187,000	0	0	3	0	577	62	642	11,633	48,010	60,284
Mexico	97,966,000	6,075	199	128	176	1,195	721	8,493	18,959	34,420	61,872
Moldova	4,278,000	0	3	17	52	2,435	752	3,260	4,338	1,173	8,771
Morocco	28,705,000	106	22	24	7	993	453	1,604	3,435	17,926	22,965
Mozambique	17,691,000	0	340	392	9	261	57	1,059	478	2,695	4,232
Namibia	1,894,000	46	0	962	260	204	881	2,352	5,574	28,981	36,907
Nepal	23,043,000	0	233	38	81	767	111	1,229	609	1,964	3,802
Netherlands	15,919,000	2,053	27	7	527	1,035	3,090	6,739	62,428	352,222	421,389
New Zealand	3,858,000	3,596	1,648	611	11,786	5,824	19,761	43,226	36,227	163,481	242,934
Nicaragua	5,071,000	9	475	146	184	867	410	2,092	1,719	9,403	13,214
Niger	10,742,000	1	9	28	152	1,598	187	1,975	286	1,434	3,695
Nigeria	126,910,000	2,639	270	24	6	1,022	78	4,040	667	–1,959	2,748
Norway	4,491,000	49,839	573	586	1,339	567	1,925	54,828	119,650	299,230	473,708
Pakistan	138,080,000	265	7	4	94	549	448	1,368	975	5,529	7,871
Panama	2,854,000	0	176	228	726	3,256	664	5,051	11,018	41,594	57,663
Paraguay	5,270,000	0	882	1,005	78	2,193	1,215	5,372	4,480	25,747	35,600
Peru	25,939,000	934	153	570	98	1,480	341	3,575	5,562	29,908	39,046

Country name	Population	Subsoil assets	Timber resources	NTFR	PA	Cropland	Pastureland	Natural capital	Produced capital + urban land	Intangible capital	Total wealth
Philippines	76,627,000	30	90	17	59	1,308	45	1,549	2,673	15,129	19,351
Portugal	10,130,000	41	438	107	385	1,724	934	3,629	31,011	172,837	207,477
Romania	22,435,000	1,222	290	65	175	1,602	1,154	4,508	8,495	16,110	29,113
Russian Federation	145,555,008	11,777	292	1,228	1,317	1,262	1,342	17,217	15,593	5,900	38,709
Rwanda	7,709,000	2	81	9	27	1,849	98	2,066	549	3,055	5,670
Senegal	9,530,000	4	238	147	78	608	196	1,272	975	7,920	10,167
Seychelles	81,131	0	0	84	0	0	0	84	28,836	96,653	125,572
Singapore	4,018,000	0	0	0	0	0	0	0	79,011	173,595	252,607
South Africa	44,000,000	1,118	310	46	51	1,238	637	3,400	7,270	48,959	59,629
Spain	40,500,000	50	81	105	360	2,806	971	4,374	39,531	217,300	261,205
Sri Lanka	18,467,000	0	58	24	166	485	84	817	2,710	11,204	14,731
St. Kitts and Nevis	44,286	0	0	0	0	0	0	0	35,711	64,457	100,167
St. Lucia	155,996	0	0	13	0	3,394	108	3,516	13,594	49,090	66,199
St. Vincent	111,992	0	0	12	0	2,106	109	2,228	10,486	36,518	49,232
Suriname	425,000	4,451	293	1,173	7,626	2,113	210	15,866	5,818	25,444	47,128
Swaziland	1,045,000	0	314	113	0	372	467	1,267	3,628	22,844	27,739
Sweden	8,869,000	263	2,434	908	1,549	1,120	1,676	7,950	58,331	447,143	513,424
Switzerland	7,180,000	0	493	50	2,195	809	2,396	5,943	99,904	542,394	648,241
Syrian Arab Rep.	16,189,000	6,734	0	6	0	1,255	730	8,725	3,292	−1,598	10,419
Thailand	60,728,000	469	92	55	855	2,370	96	3,936	7,624	24,294	35,854
Togo	4,562,000	7	163	25	21	649	50	915	800	5,394	7,109
Trinidad and Tobago	1,289,000	30,279	42	46	112	444	54	30,977	14,485	12,086	57,549
Tunisia	9,564,000	1,610	27	12	8	1,546	736	3,939	6,270	26,328	36,537
Turkey	67,420,000	190	64	34	86	2,270	861	3,504	8,580	35,774	47,859
United Kingdom	58,880,000	4,739	44	14	495	583	1,291	7,167	55,239	346,347	408,753
United States	282,224,000	7,106	1,341	238	1,651	2,752	1,665	14,752	79,851	418,009	512,612
Uruguay	3,322,000	0	0	88	22	3,621	5,549	9,279	10,787	98,397	118,463
Venezuela, R. B. de	24,170,000	23,302	0	464	1,793	1,086	581	27,227	13,627	4,342	45,196
Zambia	9,886,000	134	276	716	78	477	98	1,779	694	4,091	6,564
Zimbabwe	12,650,000	301	211	341	70	350	258	1,531	1,377	6,704	9,612

Source: Authors.
Note: NTFR: non-timber forest resources; PA: protected areas.

Appendix 3

Genuine Saving Estimates by Country, 2000

Revenue Saving, 2000, % of GNI

Country name	Gross national saving	Consumption of fixed capital	Net national saving	Education expenditure	Energy depletion	Mineral depletion	Net forest depletion	PM_{10} damage*	CO_2 damage	Genuine saving
Afghanistan	..	..	..	..	..	..	..	..	..	..
Albania	19.4	9.0	10.4	2.8	1.4	0.0	0.0	0.1	0.4	11.4
Algeria	41.1	11.2	29.9	4.5	39.7	0.1	0.1	0.7	1.0	–7.3
American Samoa	..	..	..	..	..	..	..	..	..	..
Andorra	..	..	..	..	..	..	..	..	..	..
Angola	54.8	10.6	44.2	4.4	55.9	0.0	0.0	..	0.5	..
Antigua and Barbuda	19.4	12.6	6.8	3.7	0.0	0.0	0.0	..	0.3	..
Argentina	13.4	12.1	1.3	3.2	2.4	0.1	0.0	1.6	0.3	0.1
Armenia	4.0	8.1	–4.2	1.8	0.0	0.1	0.0	2.0	1.1	–5.4
Aruba	..	..	..	..	..	..	..	..	..	..
Australia	19.5	16.1	3.4	4.9	1.8	1.5	0.0	0.1	0.5	4.3
Austria	22.0	14.5	7.5	5.6	0.1	0.0	0.0	0.2	0.2	12.5
Azerbaijan	18.1	14.9	3.2	3.0	54.5	0.0	0.0	1.0	3.5	–52.7
Bahamas, The	..	13.2	..	3.8	0.0	0.0	0.0	..	0.2	..
Bahrain	27.1	12.7	14.4	4.4	17.6	0.0	0.0	..	1.5	..
Bangladesh	25.8	5.9	19.9	1.3	1.3	0.0	0.8	0.3	0.4	18.5
Barbados	12.1	12.4	–0.4	7.2	0.6	0.0	0.0	..	0.3	..
Belarus	23.8	9.2	14.5	5.4	2.9	0.0	0.0	0.0	2.7	14.3
Belgium	24.3	14.4	9.9	3.0	0.0	0.0	0.0	0.2	0.3	12.5
Belize	9.2	6.0	3.2	6.2	0.0	0.0	0.0	..	0.6	..
Benin	10.4	7.7	2.7	2.7	0.2	0.0	1.4	0.3	0.4	3.1
Bermuda	..	..	..	3.3	..	..	..	..	..	..
Bhutan	32.9	9.3	23.6	2.4	0.0	0.0	5.2	..	0.5	..
Bolivia	11.1	9.2	1.8	4.8	4.8	0.8	0.0	0.7	0.8	–0.6
Bosnia and Herzegovina	20.8	8.7	12.0	..	0.2	0.0	0.0	0.4	2.4	..

Country name	Gross national saving	Consumption of fixed capital	Net national saving	Education expenditure	Energy depletion	Mineral depletion	Net forest depletion	PM_{10} damage*	CO_2 damage	Genuine saving
Botswana	41.9	12.1	29.8	5.6	0.0	0.5	0.0	..	0.5	..
Brazil	17.8	11.0	6.8	3.7	2.0	0.8	0.0	0.2	0.3	7.2
Brunei	..	..	..	2.9	..	..	..	..	..	..
Bulgaria	13.0	9.8	3.2	3.0	0.3	0.6	0.0	2.1	2.0	1.1
Burkina Faso	11.0	7.1	4.0	2.4	0.0	0.0	0.0	0.5	0.2	5.6
Burundi	0.9	6.1	–5.2	4.0	0.0	0.0	8.7	0.1	0.2	–10.2
Cambodia	14.1	7.6	6.5	1.4	0.0	0.0	1.2	0.1	0.1	6.6
Cameroon	14.6	8.9	5.7	2.3	9.4	0.0	0.0	0.7	0.5	–2.5
Canada	24.6	13.1	11.5	6.9	4.9	0.2	0.0	0.2	0.4	12.7
Cape Verde	9.2	9.5	–0.3	3.9	0.0	0.0	0.0	..	0.2	..
Cayman Islands	..	..	..	..	..	..	..	..	..	..
Central African Republic	6.7	7.3	–0.6	1.6	0.0	0.0	0.0	0.4	0.2	0.5
Chad	0.7	6.8	–6.1	1.4	0.0	0.0	0.0	..	0.1	..
Channel Islands	..	..	..	..	..	..	..	..	..	..
Chile	21.3	10.0	11.3	3.5	0.3	6.0	0.0	1.0	0.5	7.0
China	38.8	8.9	29.8	2.0	3.6	0.3	0.1	1.0	1.6	25.5
Colombia	15.5	10.2	5.3	3.1	8.4	0.3	0.0	0.1	0.4	–0.9
Comoros	–1.2	7.6	–8.9	4.2	0.0	0.0	0.0	..	0.2	..
Congo, Dem. Rep. of	–4.6	6.9	–11.5	0.9	3.3	0.3	0.0	0.0	0.4	–14.6
Congo, Rep. of	41.0	12.6	28.4	5.9	68.2	0.5	0.0	..	0.5	..
Costa Rica	13.6	6.2	7.4	5.0	0.0	0.0	0.4	0.3	0.2	11.5
Côte d'Ivoire	8.4	9.1	–0.7	4.5	4.1	0.0	0.6	0.6	0.6	–2.1
Croatia	18.1	11.1	7.0	..	1.3	0.0	0.0	0.3	0.6	..
Cuba	..	..	..	6.1	..	..	..	..	..	..
Cyprus	..	10.6	..	5.3	0.0	0.0	0.0	..	0.4	..
Czech Republic	24.5	11.5	13.0	3.9	0.1	0.0	0.0	0.1	1.3	15.4
Denmark	23.5	15.4	8.1	7.9	0.9	0.0	0.0	0.1	0.2	14.8
Djibouti	–2.4	8.5	–10.9	..	0.0	0.0	0.0	..	0.4	..
Dominica	5.7	12.2	–6.6	5.0	0.0	0.0	0.0	..	0.3	..
Dominican Republic	19.2	5.4	13.8	2.0	0.0	0.6	0.0	0.2	0.8	14.2
Ecuador	28.3	10.2	18.1	3.2	25.6	0.0	0.0	0.1	1.0	–5.5
Egypt, Arab Rep. of	16.7	9.5	7.2	4.4	5.6	0.1	0.2	1.4	0.8	3.6
El Salvador	13.9	10.2	3.7	2.4	0.0	0.0	0.7	0.2	0.3	5.0
Equatorial Guinea	..	31.2	..	..	0.0	0.0	0.0	..	0.3	..
Eritrea	28.1	5.3	22.8	1.4	0.0	0.0	0.0	0.5	0.5	23.2
Estonia	23.2	14.2	9.0	6.3	0.5	0.0	0.0	0.2	1.8	12.8
Ethiopia	10.5	6.0	4.5	4.0	0.0	0.1	12.4	0.3	0.5	–4.8

Country name	Gross national saving	Consumption of fixed capital	Net national saving	Education expenditure	Energy depletion	Mineral depletion	Net forest depletion	PM_{10} damage*	CO_2 damage	Genuine saving
Faeroe Islands	..	..	..	..	..	..	..	..	..	..
Fiji	4.9	10.4	–5.4	4.6	0.0	0.2	0.0	..	0.3	..
Finland	28.3	16.4	12.0	7.0	0.0	0.0	0.0	0.1	0.3	18.6
France	22.0	12.6	9.4	5.1	0.0	0.0	0.0	0.0	0.2	14.3
French Polynesia	..	12.6	..	..	0.0	0.0	0.0	..	0.1	..
Gabon	16.6	12.6	4.0	2.7	41.8	0.0	0.0	0.1	0.5	–35.7
Gambia, The	3.4	7.9	–4.4	3.4	0.0	0.0	0.5	0.7	0.4	–2.6
Georgia	12.7	15.6	–2.9	4.3	0.8	0.0	0.0	2.5	1.2	–3.0
Germany	20.3	14.9	5.4	4.3	0.1	0.0	0.0	0.1	0.2	9.3
Ghana	15.6	7.3	8.4	2.8	0.0	1.5	3.3	0.2	0.7	5.6
Greece	19.1	8.7	10.4	3.1	0.1	0.1	0.0	0.7	0.5	12.2
Greenland	..	..	..	..	..	..	..	..	..	..
Grenada	24.1	11.9	12.3	5.4	0.0	0.0	0.0	..	0.3	..
Guam	..	..	..	..	..	..	..	..	..	..
Guatemala	12.6	9.8	2.8	1.6	1.1	0.0	1.1	0.2	0.3	1.7
Guinea	17.2	8.0	9.1	2.0	0.0	3.7	1.9	0.6	0.3	4.8
Guinea-Bissau	–15.1	6.9	–22.1	..	0.0	0.0	0.0	..	0.8	..
Guyana	7.9	9.6	–1.7	3.3	0.0	7.2	0.0	..	1.4	..
Haiti	27.7	1.8	25.9	1.5	0.0	0.0	0.8	0.2	0.2	26.1
Honduras	25.9	5.6	20.3	3.5	0.0	0.1	0.0	0.2	0.5	23.0
Hong Kong, China	31.8	13.1	18.7	2.8	0.0	0.0	0.0	0.0	0.1	21.4
Hungary	23.1	11.8	11.3	4.9	0.7	0.0	0.0	0.4	0.7	14.4
Iceland	14.8	13.5	1.2	5.2	0.0	0.0	0.0	..	0.2	..
India	24.2	9.6	14.6	3.9	2.3	0.4	0.9	0.7	1.4	12.9
Indonesia	21.0	5.6	15.4	1.4	12.5	1.4	0.0	0.5	1.1	1.3
Iran, Islamic Rep. of	38.0	9.1	28.8	4.0	41.7	0.2	0.0	0.7	1.8	–11.5
Iraq	..	..	..	..	..	..	..	..	..	..
Ireland	29.5	11.9	17.6	5.7	0.0	0.1	0.0	0.1	0.3	22.7
Isle of Man	..	..	..	..	..	..	..	..	..	..
Israel	17.2	15.1	2.1	6.8	0.0	0.1	0.0	0.0	0.3	8.5
Italy	20.1	13.7	6.5	4.4	0.1	0.0	0.0	0.2	0.2	10.3
Jamaica	22.5	11.0	11.6	5.9	0.0	1.5	0.0	0.3	0.8	14.8
Japan	28.4	15.9	12.5	3.1	0.0	0.0	0.0	0.4	0.1	15.1
Jordan	21.0	10.6	10.4	5.0	0.3	1.3	0.0	0.7	1.1	11.9
Kazakhstan	23.3	9.9	13.4	4.4	41.5	1.0	0.0	0.4	4.2	–29.2
Kenya	13.4	7.7	5.7	6.0	0.0	0.0	0.1	0.2	0.5	10.9
Kiribati	..	4.8	..	..	0.0	0.0	0.0	..	0.2	..
Korea, Dem. People's Republic of	..	..	..	..	..	..	..	..	..	..

Country name	Gross national saving	Consumption of fixed capital	Net national saving	Education expenditure	Energy depletion	Mineral depletion	Net forest depletion	PM_{10} damage*	CO_2 damage	Genuine saving
Korea, Rep. of	34.0	12.2	21.7	3.1	0.0	0.0	0.0	0.8	0.5	23.6
Kuwait	40.0	6.5	33.5	5.0	48.7	0.0	0.0	2.0	0.6	–12.9
Kyrgyz Republic	15.5	7.8	7.7	3.4	1.3	0.0	0.0	0.2	2.1	7.4
Lao PDR	21.1	7.7	13.4	1.8	0.0	0.0	0.0	0.2	0.1	14.8
Latvia	18.2	10.7	7.5	5.1	0.0	0.0	0.0	0.3	0.5	11.8
Lebanon	2.1	10.2	–8.1	2.5	0.0	0.0	0.0	0.6	0.5	–6.6
Lesotho	16.9	6.4	10.5	7.3	0.0	0.0	2.1	0.4	..	..
Liberia	..	8.5	..	..	0.0	8.0	2.3	0.0	0.6	..
Libya	..	..	..	..	..	..	..	..	..	..
Liechtenstein	..	..	..	..	..	..	..	..	..	..
Lithuania	13.9	10.2	3.7	5.2	0.5	0.0	0.0	0.7	0.6	7.1
Luxembourg	36.0	13.4	22.6	3.7	0.0	0.0	0.0	..	0.3	..
Macao, China	47.2	12.6	34.6	3.6	0.0	0.0	0.0	..	0.2	..
Macedonia, FYR	23.5	9.9	13.6	4.9	0.0	0.0	0.0	0.3	1.9	16.3
Madagascar	9.0	7.3	1.7	1.8	0.0	0.0	0.0	0.2	0.4	2.9
Malawi	3.0	6.8	–3.8	4.4	0.0	0.0	1.6	0.2	0.3	–1.4
Malaysia	40.1	11.8	28.3	4.7	11.4	0.0	0.0	0.1	1.0	20.5
Maldives	36.8	10.6	26.2	6.1	0.0	0.0	0.0	..	0.5	..
Mali	13.9	7.1	6.8	2.1	0.0	0.0	0.0	0.5	0.1	8.3
Malta	15.4	7.5	7.9	4.9	0.0	0.0	0.0	..	0.4	..
Marshall Islands	..	7.8	..	..	0.0	0.0	0.0	..	..	..
Mauritania	16.7	7.5	9.1	3.7	0.0	19.9	0.8	..	1.9	..
Mauritius	25.1	10.8	14.2	3.3	0.0	0.0	0.0	..	0.4	..
Mayotte	..	..	..	..	..	..	..	..	..	..
Mexico	21.0	10.6	10.4	5.0	5.9	0.1	0.0	0.5	0.4	8.4
Micronesia, Federated States of	..	8.9	..	..	0.0	0.0	0.0	..	..	..
Moldova	15.6	7.1	8.6	3.5	0.0	0.0	0.0	0.5	2.9	8.7
Monaco	..	..	..	..	..	..	..	..	..	..
Mongolia	29.1	10.8	18.3	5.7	0.0	1.9	0.0	0.5	4.7	16.8
Morocco	22.9	9.4	13.4	4.8	0.0	0.6	0.0	0.2	0.7	16.8
Mozambique	11.2	7.4	3.8	3.8	0.0	0.0	0.0	0.4	0.2	7.0
Myanmar	..	..	..	0.9	..	..	..	..	..	..
N. Mariana Islands	..	..	..	..	..	..	..	..	..	..
Namibia	27.5	13.1	14.4	7.4	0.0	0.3	0.0	0.2	0.3	21.0
Nepal	21.8	2.4	19.5	3.2	0.0	0.0	3.3	0.1	0.4	18.9
Netherlands	26.1	14.7	11.4	4.9	0.5	0.0	0.0	0.4	0.2	15.1
Netherlands Antilles	..	..	..	..	..	..	..	..	..	..

Country name	Gross national saving	Consumption of fixed capital	Net national saving	Education expenditure	Energy depletion	Mineral depletion	Net forest depletion	PM_{10} damage*	CO_2 damage	Genuine saving
New Caledonia	..	12.4	..	..	0.0	0.0	0.0	..	0.4	..
New Zealand	17.7	10.9	6.8	6.9	1.3	0.1	0.0	0.0	0.4	11.8
Nicaragua	17.3	9.1	8.2	3.7	0.0	0.1	0.9	0.0	0.6	10.3
Niger	2.6	6.7	–4.0	2.3	0.0	0.0	4.1	0.4	0.4	–6.7
Nigeria	25.7	8.4	17.3	0.9	50.8	0.0	0.0	0.8	0.6	–33.9
Norway	36.9	16.2	20.7	6.1	8.0	0.0	0.0	0.1	0.2	18.5
Oman	29.9	11.7	18.1	3.9	47.8	0.0	0.0	..	0.6	..
Pakistan	19.9	7.8	12.1	2.3	3.1	0.0	0.8	1.0	0.9	8.6
Palau	..	10.9	..	..	0.0	0.0	0.0	..	1.2	..
Panama	24.9	7.9	17.0	4.5	0.0	0.0	0.0	0.3	0.3	20.8
Papua New Guinea	..	8.9	..	..	17.8	11.7	0.0	0.0	0.4	..
Paraguay	14.5	9.5	5.0	3.9	0.0	0.0	0.0	0.4	0.3	8.2
Peru	18.1	10.2	7.8	2.6	1.4	1.6	0.0	0.6	0.3	6.5
Philippines	26.7	8.2	18.5	2.8	0.0	0.1	0.8	0.4	0.6	19.5
Poland	18.8	11.0	7.8	6.3	0.5	0.1	0.0	0.7	1.1	11.7
Portugal	18.8	15.3	3.5	5.7	0.0	0.0	0.0	0.4	0.3	8.5
Puerto Rico	..	11.2	..	..	0.0	0.0	0.0	..	0.1	..
Qatar	..	..	..	..	..	..	..	..	..	..
Romania	15.5	9.7	5.8	3.6	4.4	0.1	0.0	0.2	1.4	3.3
Russian Federation	37.1	10.0	27.1	3.5	39.6	0.4	0.0	0.6	3.4	–13.4
Rwanda	12.7	7.1	5.6	3.5	0.0	0.0	3.0	0.0	0.2	5.9
Samoa	..	9.5	..	4.0	0.0	0.0	1.8	..	0.3	..
São Tomé and Principe	–3.3	8.0	–11.2	..	0.0	0.0	0.0	..	1.2	..
Saudi Arabia	29.4	10.0	19.5	7.2	51.0	0.0	0.0	1.0	1.2	–26.5
Senegal	11.6	8.1	3.5	3.7	0.0	0.1	0.3	..	0.6	..
Serbia and Montenegro	–2.6	8.7	–11.3	..	2.3	0.3	0.0	0.2	3.5	..
Seychelles	19.5	9.5	10.1	6.3	0.0	0.0	0.0	..	0.2	..
Sierra Leone	2.7	6.4	–3.8	3.9	0.0	0.0	6.3	0.4	0.5	–7.1
Singapore	47.7	14.0	33.7	2.3	0.0	0.0	0.0	0.4	0.4	35.2
Slovak Republic	22.9	11.0	12.0	4.0	0.1	0.0	0.0	0.1	1.1	14.7
Slovenia	23.8	12.0	11.8	5.4	0.0	0.0	0.0	0.2	0.5	16.5
Solomon Islands	..	8.5	..	3.8	0.0	0.1	10.4	..	0.3	..
Somalia	..	..	..	..	..	..	..	..	..	..
South Africa	15.7	13.3	2.4	7.5	0.0	1.0	0.3	0.2	1.6	6.9
Spain	23.0	12.9	10.1	4.4	0.0	0.0	0.0	0.4	0.3	13.7
Sri Lanka	21.9	5.2	16.7	2.9	0.0	0.0	0.5	0.3	0.4	18.4
St. Kitts and Nevis	32.9	12.9	20.0	3.9	0.0	0.0	0.0	..	0.2	..

Country name	Gross national saving	Consumption of fixed capital	Net national saving	Education expenditure	Energy depletion	Mineral depletion	Net forest depletion	PM_{10} damage*	CO_2 damage	Genuine saving
St. Lucia	16.3	11.7	4.6	7.7	0.0	0.0	0.0	..	0.3	..
St. Vincent	19.3	11.1	8.2	4.7	0.0	0.0	0.0	..	0.3	..
Sudan	7.6	9.2	–1.5	0.9	0.0	0.1	0.0	0.6	0.3	–1.6
Suriname	–0.6	9.1	–9.7	..	12.1	2.1	0.0	..	1.4	..
Swaziland	13.4	9.1	4.3	5.1	0.0	0.0	0.0	0.1	0.2	9.1
Sweden	22.3	14.0	8.3	7.7	0.0	0.1	0.0	0.0	0.1	15.8
Switzerland	32.8	14.5	18.3	4.9	0.0	0.0	0.0	0.2	0.1	22.9
Syrian Arab Rep.	24.3	9.6	14.7	3.5	34.5	0.1	0.0	0.8	1.9	–19.1
Taiwan, China	25.6	12.3	13.3	..	0.0	0.0	0.0	..	0.4	..
Tajikistan	1.7	7.0	–5.3	2.0	0.7	0.0	0.0	0.2	2.5	–6.7
Tanzania	12.4	7.4	5.1	2.4	0.0	0.2	0.0	0.2	0.3	6.8
Thailand	30.9	14.9	15.9	3.6	1.6	0.0	0.3	0.4	1.0	16.3
Togo	0.9	7.5	–6.6	4.2	0.0	0.2	4.3	0.3	0.8	–7.9
Tonga	–13.7	9.6	–23.3	4.7	0.0	0.0	0.1	..	0.4	..
Trinidad and Tobago	28.7	12.4	16.3	4.2	29.7	0.0	0.0	0.0	2.1	–11.4
Tunisia	24.3	10.0	14.3	6.4	4.8	0.6	0.2	0.3	0.6	14.1
Turkey	20.1	6.8	13.2	3.1	0.3	0.0	0.0	1.2	0.7	14.1
Turkmenistan	50.5	8.9	41.6	..	182.7	0.0	0.0	0.3	7.7	..
Uganda	15.0	7.3	7.7	1.9	0.0	0.0	6.1	0.0	0.2	3.4
Ukraine	25.6	19.4	6.2	6.4	7.4	0.0	0.0	1.0	6.7	–2.5
United Arab Emirates	..	..	..	..	..	..	..	0.0	..	..
United Kingdom	15.0	11.5	3.5	5.3	1.1	0.0	0.0	0.1	0.2	7.3
United States	17.4	11.7	5.7	4.2	1.2	0.0	0.0	0.3	0.3	8.2
Uruguay	11.2	11.6	–0.4	2.7	0.0	0.0	0.0	1.9	0.2	0.2
Uzbekistan	18.2	8.4	9.8	9.4	42.1	0.0	0.0	0.6	5.2	–28.6
Vanuatu	..	9.8	..	6.9	0.0	0.0	0.0	..	0.2	..
Venezuela, R. B. de	28.5	7.2	21.3	4.4	27.3	0.3	0.0	0.0	0.8	–2.7
Vietnam	31.7	7.9	23.8	2.8	8.7	0.1	1.0	0.4	1.1	15.5
Virgin Islands (U.S.)	..	..	..	..	..	..	..	..	..	..
West Bank and Gaza	–5.5	8.2	–13.6	..	0.0	0.0	0.0	..	..	..
Yemen, Rep. of	34.4	8.9	25.5	..	43.2	0.0	0.0	0.5	0.6	..
Zambia	4.0	7.9	–3.9	2.0	0.0	2.5	0.0	..	0.4	..
Zimbabwe	11.9	8.5	3.3	6.9	0.0	0.6	0.0	0.5	1.3	7.8

Source: Authors.
*Data for particulate matter damage are for 2001.
.. means missing values.

Appendix 4

Change in Wealth per Capita, 2000

Change in Wealth per Capita, 2000, $ per Capita

Country name	GNI per capita	% Population growth rate	Adjusted net saving per capita	Change in wealth per capita	Saving gap % of GNI
Albania	1,220	0.4	145	122	
Algeria	1,670	1.4	–93	–409	24.5
Antigua and Barbuda	8,700	2.0	911	94	
Argentina	7,718	0.9	154	–109	1.4
Australia	19,703	1.1	963	46	
Austria	23,403	0.2	3,032	2,831	
Bangladesh	373	1.7	71	41	
Barbados	9,344	0.3	588	520	
Belgium-Luxembourg	21,756	0.3	2,811	2,649	
Belize	3,230	2.7	303	–150	4.6
Benin	360	2.6	14	–42	11.5
Bhutan	532	2.9	111	–111	20.9
Bolivia	969	2.0	9	–127	13.1
Botswana	2,925	1.7	1,021	814	
Brazil	3,432	1.2	265	64	
Bulgaria	1,504	–1.8	80	238	
Burkina Faso	230	2.5	15	–36	15.8
Burundi	97	1.9	–10	–37	37.7
Cameroon	548	2.2	–8	–152	27.7
Canada	22,612	0.9	3,006	2,221	
Cape Verde	1,195	2.7	43	–81	6.8

Country name	GNI per capita	% Population growth rate	Adjusted net saving per capita	Change in wealth per capita	Saving gap % of GNI
Chad	174	3.1	–8	–74	42.6
Chile	4,779	1.3	406	129	
China	844	0.7	236	200	
Colombia	1,926	1.7	–6	–205	10.6
Comoros	367	2.5	–17	–73	19.9
Congo, Rep. of	660	3.2	–227	–727	110.2
Costa Rica	3,857	2.1	464	107	
Côte d’Ivoire	625	2.3	–5	–100	16.0
Denmark	29,009	0.4	4,376	4,014	
Dominica	3,344	–0.3	–53	7	
Dominican Republic	2,234	1.6	341	198	
Ecuador	1,170	1.5	–51	–293	25.1
Egypt, Arab Rep. of	1,569	1.9	91	–45	2.9
El Salvador	2,075	1.5	113	37	
Estonia	3,836	–0.5	570	681	
Ethiopia	101	2.4	–4	–27	27.1
Fiji	2,055	1.4	–23	–109	5.3
Finland	22,893	0.1	4,334	4,236	
France	22,399	0.5	3,249	2,951	
Gabon	3,370	2.3	–1,183	–2,241	66.5
Gambia, The	305	3.4	–5	–45	14.6
Georgia	601	–0.5	4	16	
Germany	22,641	0.1	2,180	2,071	
Ghana	255	1.7	16	–18	7.2
Greece	10,706	0.3	1,431	1,327	
Grenada	3,671	0.7	650	533	
Guatemala	1,676	2.6	37	–123	7.3
Guyana	870	0.4	–49	–108	12.4
Haiti	503	2.0	133	106	
Honduras	897	2.6	213	53	
Hungary	4,370	–0.4	676	765	
India	446	1.7	67	16	
Indonesia	675	1.3	20	–56	8.4

Country name	GNI per capita	% Population growth rate	Adjusted net saving per capita	Change in wealth per capita	Saving gap % of GNI
Iran, Islamic Rep. of	1,580	1.5	–142	–398	25.2
Ireland	21,495	1.3	4,964	4,199	
Israel	17,354	2.6	1,540	268	
Italy	18,478	0.1	1,990	1,947	
Jamaica	2,954	0.8	471	371	
Japan	37,879	0.2	5,906	5,643	
Jordan	1,727	3.1	236	28	
Kenya	343	2.3	40	–11	3.2
Korea, Rep. of	10,843	0.8	2,694	2,415	
Latvia	3,271	–0.8	412	551	
Madagascar	245	3.1	9	–56	22.7
Malawi	162	2.1	–2	–29	18.2
Malaysia	3,554	2.4	767	227	
Mali	221	2.4	20	–47	21.2
Mauritania	382	2.9	–30	–147	38.4
Mauritius	3,697	1.1	645	514	
Mexico	5,783	1.4	545	155	
Moldova	316	–0.2	38	56	
Morocco	1,131	1.6	200	117	
Mozambique	195	2.2	15	–20	10.0
Namibia	1,820	3.2	392	140	
Nepal	239	2.4	46	2	
Netherlands	23,382	0.7	3,673	3,176	
New Zealand	12,679	0.6	1,550	1,082	
Nicaragua	739	2.6	81	–18	2.4
Niger	166	3.3	–10	–83	50.3
Nigeria	297	2.4	–97	–210	70.6
Norway	36,800	0.7	6,916	5,708	
Pakistan	517	2.4	54	–2	0.4
Panama	3,857	1.5	829	585	
Paraguay	1,465	2.3	131	–93	6.4
Peru	1,991	1.5	148	15	
Philippines	1,033	2.3	211	114	

Country name	GNI per capita	% Population growth rate	Adjusted net saving per capita	Change in wealth per capita	Saving gap % of GNI
Portugal	10,256	0.6	943	750	
Romania	1,639	–0.1	80	89	
Russian Federation	1,738	–0.5	–164	4	
Rwanda	233	2.9	14	–60	26.0
Senegal	449	2.6	31	–27	6.1
Seychelles	7,089	0.9	1,162	904	
Singapore	22,968	1.7	8,258	6,949	
South Africa	2,837	2.5	246	–2	0.1
Spain	13,723	0.7	1,987	1,663	
Sri Lanka	868	1.4	166	116	
St. Kitts and Nevis	6,746	4.7	1,612	–63	0.9
St. Lucia	4,103	1.5	507	253	
St. Vincent	2,824	0.2	365	336	
Swaziland	1,375	2.5	129	8	
Sweden	26,809	0.1	4,278	4,191	
Switzerland	37,165	0.6	8,611	8,020	
Syrian Arab Republic	1,064	2.5	–175	–473	44.5
Thailand	1,989	0.8	351	259	
Togo	285	4.0	–20	–88	30.8
Trinidad and Tobago	5,838	0.5	–541	–774	13.3
Tunisia	1,936	1.1	291	176	
Turkey	2,980	1.7	476	273	
United Kingdom	24,606	0.3	1,882	1,725	
United States	35,188	1.1	3,092	2,020	
Uruguay	5,962	0.6	137	20	
Venezuela, R. B. de	4,970	1.8	–94	–847	17.0
Zambia	312	2.0	–13	–63	20.4
Zimbabwe	550	2.0	53	–4	0.7

Source: Authors.
Note: Countries with saving gap are those with negative changes in wealth per capita.