THE WEALTH OF NATIONS

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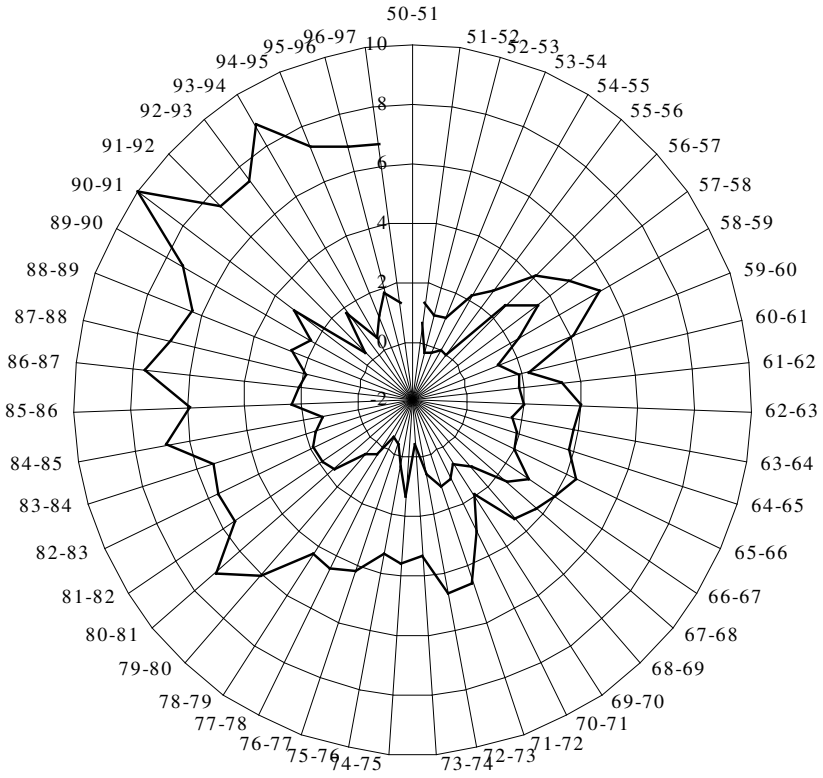

DEPARTMENT OF ECONOMICS
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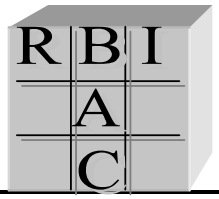
DR. BABASAHEB AMBEDKAR CHAIR:
RBI UNIT IN POLITICAL ECONOMY

DISCUSSION PAPER NO. 2/2000



DISCUSSION PAPER SERIES

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THE WEALTH OF NATIONS

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Abstract

Using the World Bank estimates on the "wealth of nations", "green" NNP, and "genuine" savings rate, we have shown in this paper that the production function approach to growth accounting provides a satisfactory framework for explaining aggregate as well as region-specific variations in per capita output. The results indicate that, while for the sample as a whole, human capital is the post powerful predicator of growth; the region-specific production functions indicate that, as fare as the Asia-Pacific countries are concerned, physical capital is still the most dominant factor of production. It is also seen that of all the regions, the Asia-Pacific group of countries has the least amount of bias against genuine savings; in effect, for identical levels of per capita output, the Asia-Pacific region would generate the highest genuine savings rate. However, the results also conclude on a rather sobering fact which has hitherto gone largely unnoticed: that the generation of output for developing countries as a whole requires a greater amount of natural resources than physical capital which is a matter of grave concern because it suggests that, at this level of environmental degradation, it would be difficult to ensure sustainable development, let alone an inter-generational transfer of wealth.

Key Words: "Green" NNP, Genuine Saving Rate, Asia-Pacific
JEL Code(s): O15, O57, Q20

THE WEALTH OF NATIONS

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1. Introduction

The exploratory work carried out by the World Bank (1995) in estimating the "wealth of nations" focuses not only on physical capital, but also on natural and human capital (see Annexure A). Preliminary estimates of these alternative forms of capital assets are available for 192 countries for the year 1990 using data closest to this year (see Annexure B). It is seen that countries differ widely in their per capita wealth endowments with the estimates ranging from US $ 1,400 (Ethiopia) to US $ 835,000 (Australia). The world average wealth per capita is estimated at US $ 86,000; with produced assets (physical capital), human resources and natural capital being distributed in the approximate ratio of 16:64:20. Thus, these findings indicate that human capital is the most important form of wealth, followed distantly by natural capital and then physical capital. The estimated wealth per capita for the Asia-Pacific region works out to about US $ 36,750; the component-wise per capita break-up being – physical capital of US $ 6010; human capital of US $ 25,625 and natural capital of US 5,115.

In a similar vein, the World Bank (1995) has also estimated the so-called environmentally-adjusted per capita NNP of countries, very much on the lines suggested by Daly (1989) in this regard (see Annexure C). While originally called sustainable social net national product (SSNNP), it is currently referred to as "green" NNP and is defined as the maximum amount of per capita output that can be generated over a given accounting period while leaving the natural wealth of the economy constant.

2. Production Function Approach To Growth Accounting

In order to empirically analyze the relationship between the "wealth of nations" and their "green" NNP, which could open up the possibility of better understanding the concept of environmentally-sustainable growth as well as the complementarity among the various kinds of capital, we estimated the following Cobb-Douglas production function *in per capita terms*:[1]

$$\ln y = \alpha(0) + \alpha(1) \ln k + \alpha(2) \ln h + \alpha(3) \ln n \qquad (2.1)$$

where y is "green" GNP; k is physical capital, h is human capital, and n is natural capital.

Initially, an aggregative version of eq. (2.1) was estimated by using the entire sample of 192 countries (listed out in Annexures B and C). Subsequently, five region-specific versions of eq. (2.1) were estimated, corresponding to the following regions: (1) Asia-Pacific, (2) Latin America & the Caribbean, (3) Europe, (4) Sub-Saharan Africa, and (5) Arab States.

The resulting equations are presented in Table 1 (where the figures in parenthese beneath each set of coefficients indicate their t-statistics). It is very interesting to note that the aggregative equation, eq. (2.1a), explains more than 97 percent of the variation in the dependent variable (i.e., per capita "green" GNP) with all the estimated coefficients being statistically very significant. The estimated elasticities of physical capital (0.37), human capital (0.49) and natural capital (0.07) indicate, interestingly enough, that human capital is the most potent predicator of per-capita output. As far as the regional production functions are concerned, it is seen that only for the Asia-Pacific region, eq. (2.1b), physical capital is *still* the most important factor in explaining cross-country variations in per capita output – what with the estimated elasticity for physical capital (0.60) being almost twice that of natural capital (0.31). For all the other four regions, human capital is, by far, the most important determinant of output – especially for the Latin American & Caribbean region, see eq. (2.1c); while natural capital is relatively important only for the European region, see eq. (2.1d).

Table 1
$\ln Y = \alpha(0) + \alpha(1)\ln K + \alpha(2)\ln H + \alpha(3)\ln N$

Equation No.	α_0	α_1	α_2	α_3	R^2
		ENTIRE SAMPLE (N = 192)			
2.1a	-1.068	0.367 (9.8)	0.491 (18.2)	0.071 (5.6)	0.972
		ASIA-PACIFIC COUNTRIES (N = 32)			
2.1b	-0.959	0.599 (6.1)	0.312 (3.9)	0.032 (1.3)	0.979
		LATIN AMERICA & THE CARIBBEAN (N = 35)			
2.1c	-1.576	0.261 (2.6)	0.631 (9.1)	0.069 (2.3)	0.959
		EUROPE (N = 44)			
2.1d	-2.128	0.429 (9.7)	0.515 (15.1)	0.093 (6.4)	0.996
		SUB-SAHARAN AFRICA (N = 42)			
2.1e	0.026	0.170 (1.7)	0.526 (8.6)	0.087 (2.6)	0.918
		ARAB STATES (N = 19)			
2.1f	-0.622	0.350 (2.8)	0.413 (6.1)	0.126 (2.1)	0.971

2.1 Production Functions: Industrialized Versus Developing Countries

To distinguish between the production functions for the developing and industrialized countries, we re-estimated eq. (2.1a) by incorporating three slope dummies (for the industrialized countries) – one for each type of capital – into it. The results (see Table 2), interestingly enough, indicate that the output elasticities of capital stock in both groups of countries are almost identical what with all the dummy variables being statistically insignificant. Qualitatively, however, the results indicate that the elasticity of physical (human) capital could be biased slightly upwards (downwards) in industrialized countries.

Table 2: Differential Production Functions

$\ln y = \alpha(0) + \alpha(1)\ln k + \alpha(2)\ln h + \alpha(3)\ln n + \alpha(4)\text{dum:k} + \alpha(5)\text{dum:h} + \alpha(6)\text{dum:n}$

Regression Output:	
Constant	-1.0446774
Std Err of Y Est	0.2496159
R Squared	0.9734367
No. of Observations	172
Degrees of Freedom	165

	$\alpha(1)$	**$\alpha(2)$**	**$\alpha(3)$**	**$\alpha(4)$**	**$\alpha(5)$**	**$\alpha(6)$**
X Coefficient(s)	0.4002405	0.4647536	0.0622179	0.0747631	-0.0611444	-0.0015306
Std Err of Coef.	0.0433397	0.0305122	0.0150063	0.1235236	0.0912617	0.0368652
t-statistics	**9.234954**	**15.23172**	**4.146126**	**0.605253**	**-0.66999**	**-0.04152**

3. Genuine Savings

As the concept of sustainable development involves an inter-generational transfer of wealth, the objective of environmentally sustainable development would need to focus on the creation and protection of wealth, including environmental wealth. If natural resources are viewed as assets, then conservation of these resources should be introduced into the standard system of national accounts. In this context, the concept of "genuine savings" extends the conventional definition of savings – see eq. (A.3) in Annexure A – and, thus defined, negative genuine savings in a country is an indication that its consumption of environmental assets is unsustainable. Preliminary estimates of genuine savings for the period 1980-91 by Hamilton (1995) suggest that, contrary to conventional measures of savings, many countries do have negligible or substantially negative genuine savings (see Annexure D).

To obtain an approximate idea of the extent of environmental degradation involved in sustaining development, we initially estimate a Harrod-Domar type growth equation given by:

$$g = ß(0) + ß(1)\, s \tag{3.1}$$

where *g* is the real GDP growth rate and *s* is the savings rate. In the above equation, ß(1) can be interpreted as the incremental output-capital ratio, which is the inverse of the ICOR.

The above equation was estimated using a sample of 56 developing countries for which data on genuine savings were available over the period 1980-90 (see Annexure D). For reasons that will shortly become apparent, two variants of eq. (3.1) were estimated: in the first, the traditional savings rates (s) were used; while, in the second, the genuine savings rates (s*) were used. The estimated equations are given below (with t-values in parentheses):

$$\underset{\quad(0.9)}{g = 0.635} + \underset{(3.4)}{0.126\, s}; \quad R^2 = 0.19 \tag{3.2}$$

$$\underset{\quad(8.7)}{g = 2.879} + \underset{(3.0)}{0.059\, s^*}; \quad R^2 = 0.14 \tag{3.3}$$

While the explanatory power of both these equations is quite low, as is usually the case for such cross-country growth regressions, the coefficients of both these savings rates are significant. Eq. (3.2), which uses traditional savings, yields an ICOR of 7.9 (= 1/0.126); while eq. (3.3), which uses genuine savings, yields an ICOR of 16.9 (= 1/0.059). As expected, the use of traditional savings rates in growth equations yields ICORs which are much lower than those obtained using genuine savings rates. This is because the former measures only the amount of additional physical capital required to generate an additional unit of output; while the latter measures the amount of additional physical as well as natural capital that is required to produce an additional unit of output. Thus, the difference between these two estimates of ICORs, equal to 9 (= 16.9 - 7.9), indicates the amount of natural capital required to increase output by an additional unit. Thus, it is seen that the generation of output requires a greater amount of natural resources than physical capital. This is a matter of genuine concern because it suggests that at this rate of environmental depletion, it would be difficult to ensure sustainable development, let alone an inter-generational transfer of wealth.

4. Quality of Growth

Environmental quality is a key ingredient in the well-being of people. While some environmental changes have no bearing with human activities, most other forms of environmental degradation are directly related to economic expansion largely because most economic activities, by and large, require some form and amount of environmental inputs. This leads to the trade-off between the benefits of economic growth (as a result of depleting natural resources) and the costs of the ensuing environmental damage. However, the latter aspect, in view of the hidden costs involved, has been difficult to quantify largely because of our incomplete understanding of the complex relationship between environment damage, human activity and economic growth.

In such a context, two polarized views have dominated the debate over environment and economic growth. The "anti-growth" view that economic growth and development are essentially damaging to the environment because of the inevitable depletion of natural resources involved; and the "pro-growth" view that economic growth will lead to an increase in per capita incomes which, in turn, will be more conducive for environmental protection. In between them is the "green growth" hypothesis which contends that while, in the short term, growth could have an adverse impact on environmental resources, in the longer term, higher growth and per capita incomes will lead to sustainable economic development and growth. In addition, there is the "environmental transition" hypothesis of Ruttan (1971) which states that growth is likely to be accompanied by environmental degradation at low income levels, but as income increases, the demand for environmental quality would also increase, thereby leading to sustainable economic development (see Antle and Heidebrink 1995).

The anti-growth view is based on the two-way association between growth and environmental degradation: in effect, there is a limit to the renewal rate of the environment and therefore rapid growth would eventually lead to a depletion of natural resources. The consequent environmental degradation, if untreated, would impose limits on future growth. Even if contained through stricter environmental regulations, these would raise costs and, by diverting investment away from production, would reduce growth. In this context, there is no doubt, as pointed out by the 1987 Brundtland Commission Report (World Commission on Environment and Development), that economic growth, especially in the industrial countries, by emphasizing needs rather than resource limitations, has exhausted a relatively high share of global resources.

However, at an empirical level, the anti-growth view finds very limited support. If growth does cause environmental depletion or damage, then the industrial countries should have exhibited a gradually declining trend in environmental quality and their environmental

state should have been far inferior to that of the developing countries. However, the fact that this has not happened does not mean to imply that unfettered growth and economic development will be beneficial to the environment because enough examples abound regarding the harmful residual effects of growth on environment.

Regardless of such evidence, or the lack of it, the growth-environment trade-off faced by countries during the process of development is yet to be fully understood. While in the short term, such a trade-off may be observed, in the longer term, even in a world in which environmental quality does not command a market price, economic growth may not necessarily lead to environmental degradation. This is because, with increasing economic growth and per capita incomes, the negative external effects of environmental degradation can be contained by policies which ensure that a larger share of the GNP is committed to environmental protection activities. Moreover, it has also been observed that as economies mature, there is a gradual shift away from environmentally degrading industries towards "cleaner" technologies and services that are less environmentally demanding. For example, during the period 1986-91, on a per capita basis, the United States is estimated to have emitted ten times the carbon dioxide than that emitted by China (see World Bank 1995). However, the same data on greenhouse gas emissions, when examined relative to GNP, suggests that as a result of greater efficiency and changing economic structures from manufacturing to services based industries, the emissions in the richer countries have declined with increases in GNP.

Considering that the observed income elasticity of demand for environmental quality is quite high, the above evidence implies that consumers in richer nations would be more willing than those in the developing countries to spend (or be taxed) a larger proportion of their incomes for environmental protection. Such environmental regulations are likely to increase resources expended on research and development which, in turn, may lead to technological innovations with a positive impact on environmental quality. Moreover, increases in investment

costs due to forced compliance of environmental regulations could change the composition of the aggregate capital stock that could leave the long-term growth unaffected. To sum up, environmental regulations and policies could not only lead to "green growth" but could also improve the quality and productivity of human capital and, therefore, raise the long-term growth rate.

Table 3: Genuine Savings Rate Function

Ln s* = b[ln(NNP)] + d(Dum1) + e(Dum2) + f(Dum3) + g(Dum4)

Regression Output:					
Constant		0			
Std Err of Y Est		0.8455603			
R Squared		0.3664447			
No. of Observations		31			
Degrees of Freedom		26			
X Coefficient(s)	0.5510334	-1.3814117	-2.5351885	-2.1891383	-1.9422328
Std Err of Coef.	0.2004959	1.3189603	1.4876404	1.4949207	1.1231569
t-statistics	**2.748353**	**-1.04735**	**-1.70417**	**-1.46438**	**-1.72926**

ANNEXURE A

ENVIRONMENTAL ACCOUNTING

A.1 Methodology

During the past couple of decades, several studies on environmental accounting have pointed out the shortcomings of the 1968 United Nations System of National Accounts (see UN 1968), particularly with regard to two aggregate, viz. gross domestic product (GDP) and gross domestic savings. These inadequacies can be classified into two types. First, the production of certain goods is invariably associated with the production of certain "bads" such as pollution, congestion, environmental degradation, amongst others. As such, estimates of GDP have to be adjusted in order to reflect these negative externalities. Second, the creation of new wealth is invariably associated with the depreciation of produced assets as well as the depletion of natural resources. Therefore, the estimation of national savings would need to be adjusted in order to incorporate this drawing down of capital. In this context, it needs to be mentioned that the United Nations and the World Bank have collaborated in order to improve environmental accounting and thereby arrive at better estimates of the wealth of a nation.

The national wealth estimates provided by the World Bank (1995) focus not only on physical capital, but also include natural capital, human resources and social capital. It is this total stock of wealth that presents available opportunities to a country for improving its well-being. Physical assets are initially measured from gross fixed capital formation which is then adjusted for depreciation to obtain net fixed capital formation. From this net flow, it is possible to derive stock estimates of physical capital using the Perpetual Inventory Model (PIM) which sums up the annual estimates of net capital formation over time (see Lutz 1993). Similarly, efforts have been made in the World Bank (see Kunte 1996) to estimate stocks of natural capital, human capital and social capital; and the methodology used in this regard is discussed below in Table A.1.

Table A.1
Estimation of Wealth of Nations Index: Methodology

Type of Assets/ Components Valued	Methodology
Physical Capital: Machinery and buildings	Perpetual Inventory Method
Natural Capital: 1. Land a. Cropland b. Forests (excluding standing timber) c. Pastures d. Other area e. Hyper-arid area f. Protected area g. Prime soil 2. Commercial timber a. Tropical countries b. Nontropical countries 3. Oil, gas and coal 4. Metals 5. Water	Monetary value of: a+b+c+d+e+f+g Area * pci * 2.00 Area * pci * 1.25 Area * pci * 0.75 Area * pci * 0.25 Area * pci * -0.25 Area * pci * 0.50 Area * pci * 0.50 Area * sub-regional average logging Intensity * 0.5 (world log price) Area * Personn's volume over bark Estimate * 0.5 (world log price) Recoverable reserves * world oil price Unit value of each metal * reserves Known volume of internal renewable water resources * $ 10 million per cubic km.
Human Capital: Net present value of future income stream	Net present value of future income stream less produced assets less land value NNP discounted at 4 percent over average expected life duration for population
pci: per capita net national product *Source*: A. Kunte (1996)	

The total economic value of natural resources is presented in World Bank (1995). Natural resources are treated as raw materials for current economic production. Land prices are assumed to be related approximately with per capita incomes of the countries. Therefore, land is valued as a certain factor of per capita income, with income being approximated by net national product (NNP) which is adjusted for extraction of timber and minerals. The use value of forests is considered by the value of timber that is commercially exploitable. Different valuation

techniques are used for tropical and non-tropical countries. The value of oil, gas and coal reserves is based on known reserves at unit value. Rather than assign a zero value for water, known reserves of water are multiplied by assuming a low value per cubic kilometer of water.

The value of the stock of human resources is estimated as the present value of future incomes to be earned by the current population, from which the claims of produced assets and land are deducted to arrive at a human capital "residual". A 4 percent discount rate was assumed for the purpose. The time horizon was assumed to be the average years of life remaining for the current population based on present life expectancy.

A.2 Preliminary Estimates and Findings

Using this methodology, preliminary estimates for 192 countries (see Annexures B and C) by the World Bank indicate that of the total global wealth: produced assets account for 16 percent, natural capital accounts for 20 percent, while human capital accounts for the remaining 64 percent. Table A.2 below provides the sources of wealth by different regions of the world.

Table A.2
Sources of Wealth by Region: 1990

	Wealth per capita	Human Resources	Produced Assets	Natural Capital	Genuine Savings
	($ 000)	(as percent of total wealth)			% of GNP
World	86	64	16	20	na
High-income countries	436	67	16	17	na
Developing countries					
Sub-Saharan Africa	12	31	17	52	-13
India and China	6	73	18	9	7
Other Asia	19	75	13	12	5
East Asia	26	75	13	12	10
Latin America and the Caribbean	53	50	15	35	-1
Middle East and North Africa	36	39	29	32	na
Eastern Europe	59	41	16	43	10

na: not available

Source: World Bank (1995)

The following are some of the preliminary findings of the study:

■ Countries differ in their endowments of "wealth". The extremes between rich and poor countries are about the same as for per capita GNP.

■ It is observed that produced assets tend to be in the range of 15-20 percent of the total wealth, regardless of the income disparities among the regions. Individual country data (e.g. Algeria, Kenya, Uganda and Nigeria) also indicate that real growth rates are not significantly enhanced when produced assets are pushed far above this range.

■ Variation in real growth rates across regions and across countries is better explained by the contribution of human capital rather than by accumulation of physical capital (produced assets).

A.3 Genuine Savings

The key to further accumulation of wealth is "genuine" savings or conservation. Environmentally sustainable development would require that a proper balance be maintained between the use of all resources and adequate savings and investment. Therefore, the essential step in creating new wealth is to generate genuine savings which are defined as the difference between production and consumption after taking into account the depreciation of produced assets as well as the depletion or drawing down of natural resources. While human resource savings realized through investment in education and health should also have been technically included, it has not been possible to consider this aspect at the current preliminary stage of estimation.

Where genuine savings is negative, the situation is said to be unsustainable. Estimation of genuine saving begins with the standard national accounts and extends it by making allowances for the use of natural resources (also called the value of asset sales) and for pollution damage caused by use of fossil fuels. Estimates of resource rents are used for the value of asset

sales. For example, the sales of assets is 50 percent below the market price for raw materials and for tropical timber once extracted or harvested; while the resource rent is lower for oil production than for certain minerals. Based on Fankhauser (1994), the damage due to carbon dioxide (CO_2) emissions is valued at about $ 20 per metric ton of carbon emission.

In effect, the following three identities are used sequentially to estimate genuine savings. In the first stage, eq. (A.1), which is based on the conventional SNA, is used to define gross domestic savings (S) in terms of gross domestic investment (I) and the current account deficit, i.e., imports (Z) less exports (X):

$$S = I - (Z - X) \qquad \text{(A.1)}$$

In the second stage, once again the conventional SNA is invoked to define net domestic savings (NDS) which is given by:

$$NDS = S - \text{depreciation of produced assets} \qquad \text{(A.2)}$$

It is only in the final stage that environmental accounting is used to estimate genuine savings (GS) as follows:

$$GS = NDS - (\text{value of asset sales} + \text{damage due to } CO_2 \text{ emission}) \qquad \text{(A.3)}$$

The preliminary estimates (see Annexure D) indicate that many countries have very low or even negative genuine savings. This is especially true of sub-Saharan Africa and Latin America which have had negative genuine savings rates since the 1980s following the aftermath of the second oil price shock and the debt crisis. This is in sharp contrast to the positive gross domestic savings recorded by their national accounts. On the other hand, genuine savings rates for East Asia have been as high as 15 percent in the 1980s, although they are currently about 10 percent largely due to the depletion of natural resources. The high estimates of genuine savings rates for the East European countries is largely due to the unavailability of consumer goods around the year 1990 (the sample year) as a result of their being in the early stages of transition.

ANNEXURE B

THE WEALTH OF NATIONS (1990)

Global Wealth Rank		Sources of Wealth			Estimated Wealth $/cap	Human Resources $/cap	Prod. Assets $/cap	Natural Capital $/cap
		Human Resources	Prod. Assets – % total –	Natural Capital				
1	Ethiopia	40	21	39	1,400	560	300	550
2	Nepal	56	27	17	1,600	900	440	270
3	Burundi	67	26	7	2,100	1,430	560	140
4	Malawi	42	32	26	2,200	950	710	580
5	Uganda	18	51	32	2,300	400	1,150	720
6	Tanzania	11	31	58	2,400	260	750	1,400
7	Vietnam	74	15	11	2,600	1,890	380	290
8	Mozambique	14	40	46	2,900	400	1,160	1,340
9	Sierra Leone	14	18	68	2,900	400	520	1,960
10	Guinea-Bissau	18	21	62	2,900	520	610	1,800
11	Rwanda	70	22	9	2,900	2,010	630	250
12	Bangladesh	79	14	7	3,100	2,400	430	220
13	Niger	34	27	39	3,200	1,100	850	1,240
14	Cambodia	24	17	59	3,500	850	600	2,070
15	Burkina Faso	44	26	30	3,500	1,510	910	1,030
16	Gambia	56	32	12	3,500	2,000	1,130	410
17	Kenya	46	42	12	3,800	1,730	1,570	460
18	Mali	22	19	59	4,000	860	760	2,340
19	Nigeria	18	54	28	4,100	730	2,230	1,160
20	India	64	25	11	4,300	2,740	1,080	480
21	Madagascar	24	16	60	4,500	1,090	710	2,730
22	Chad	18	14	68	4,600	820	650	3,120
23	Haiti	78	18	4	5,000	3,860	910	200
24	Somalia	22	34	43	5,200	1,180	1,800	2,260
25	Sao Tome	79	17	4	5,400	4,290	920	230
26	Benin	41	29	30	5,800	2,390	1,650	1,730
27	Sudan	15	27	58	6,000	870	1,640	3,460
28	Togo	50	32	18	6,300	3,160	2,030	1,110
29	Afghanistan	48	28	24	6,500	3,130	1,800	1,540
30	Bhutan	8	7	85	6,500	510	480	5,550
31	China	77	15	8	6,600	5,100	1,010	530
32	Lao PDR	12	12	76	6,700	810	790	5,100
33	Pakistan	81	13	6	6,800	5,530	920	390
34	Equatorial Guinea	10	15	75	7,000	720	1,020	5,210
35	Ghana	53	14	33	7,400	3,890	1,050	2,440
36	Yemen Rep.	59	21	21	7,500	4,430	1,560	1,550
37	Nicaragua	49	13	38	8,000	3,930	1,050	3,000
38	Comoros	75	19	5	8,100	6,070	1,540	440
39	Djibouti	28	32	41	8,300	2,310	2,640	3,380
40	Tajikistan	57	28	15	8,500	4,890	2,360	1,270
41	Maldives	82	18	0	8,800	7,160	1,560	40
42	Sri Lanka	77	17	6	9,400	7,280	1,630	520
43	Honduras	50	28	22	10,000	5,030	2,750	2,200
44	Lesotho	74	17	8	9,900	7,380	1,730	810
45	Senegal	52	18	30	10,000	5,160	1,820	3,020
46	Cote d'Ivoire	47	29	24	10,500	4,890	3,060	2,560
47	Egypt	76	21	4	10,600	8,030	2,190	370
48	Zaire	24	5	71	11,000	2,540	560	7,660
49	Zimbabwe	32	26	42	11,000	3,440	2,870	4,550
50	Armenia	79	16	4	11,000	8,560	1,770	470

ANNEXURE B (Continued)

Global Wealth Rank		Sources of Wealth			Estimated Wealth $/cap	Human Resources $/cap	Prod. Assets $/cap	Natural Capital $/cap
		Human Resources	Prod. Assets – % total –	Natural Capital				
51	Kiribati	73	19	8	11,000	7,750	2,060	850
52	Indonesia	55	17	28	12,000	6,870	2,080	3,440
53	Zambia	9	18	73	13,000	1,210	2,330	9,670
54	Azerbaijan	68	25	6	14,000	9,410	3,510	850
55	Cameroon	34	22	45	14,000	4,810	3,080	6,400
56	Kyrgyz Rep.	53	22	24	14,000	7,730	3,230	3,520
57	Myanmar	66	18	16	14,000	9,500	2,590	2,380
58	Mauritania	19	11	71	15,000	2,880	1,620	10,930
59	Philippines	74	17	9	15,000	10,770	2,470	1,360
60	Uzbekistan	69	19	12	15,000	10,390	2,900	1,830
61	Liberia	17	12	71	16,000	2,720	1,800	11,130
62	Georgia	65	28	6	16,000	10,120	4,420	1,010
63	Cape Verde	80	17	3	16,000	13,050	2,730	460
64	Western Samoa	63	17	21	17,000	10,540	2,800	3,480
65	Romania	70	17	13	17,000	11,940	2,920	2,170
66	Guatemala	75	15	10	18,000	13,150	2,690	1,700
67	Morocco	70	18	12	18,000	12,260	3,170	2,070
68	Central Africa	13	7	80	18,000	2,440	1,250	14,560
69	Peru	23	29	48	18,000	4,140	5,240	8,690
70	Ecuador	42	31	27	18,000	7,490	5,560	4,900
71	Dominican Rep	76	17	7	18,000	13,630	3,050	1,160
72	Jordan	57	37	5	19,000	10,730	6,980	990
73	El Salvador	83	14	3	20,000	16,670	2,740	570
74	Syrian Arab Rep	66	23	11	21,000	13,900	4,920	2,350
75	Bolivia	17	15	68	22,000	3,740	3,200	14,860
76	Moldova	77	19	4	22,000	17,020	4,150	910
77	Bulgaria	61	15	24	23,000	14,010	3,430	5,530
78	Lebanon	78	21	2	23,000	17,860	4,750	380
79	Angola	20	7	72	24,000	4,780	1,750	17,170
80	Lithuania	62	29	9	24,000	15,250	7,080	2,140
81	Paraguay	27	16	57	25,000	6,800	3,990	14,190
82	Colombia	59	16	25	26,000	15,530	4,150	6,660
83	Tonga	77	17	7	27,000	20,820	4,520	1,810
84	Turkmenistan	23	14	63	29,000	6,730	4,240	18,340
85	Micronesia	80	18	2	29,000	23,180	5,060	620
86	Marshall Islands	78	17	5	29,000	22,990	5,060	1,440
87	Algeria	20	55	25	30,000	6,070	16,570	7,520
88	Korea, Dem.	77	17	7	30,000	23,150	5,060	2,040
89	Ukraine	77	17	6	30,000	23,020	5,080	1,790
90	Solomon Islands	8	7	85	31,000	2,560	2,090	25,860
91	Vanuatu	15	12	73	31,000	4,730	3,700	22,750
92	Kazakhistan	80	19	1	31,000	24,590	5,840	260
93	Tunisia	67	21	12	31,000	20,950	6,410	3,720
94	Albania	75	15	10	33,000	24,570	5,060	3,220
95	Slovak Rep.	78	17	5	33,000	25,600	5,650	1,540
96	Turkey	72	15	13	34,000	24,170	5,080	4,320
97	Thailand	81	11	8	34,000	27,310	3,700	2,680
98	Cuba	65	14	21	35,000	22,940	5,060	7,350
99	Latvia	68	20	12	35,000	23,820	7,030	4,300
100	Papua N.G.	9	3	88	36,000	3,200	1,080	32,100

ANNEXURE B (Continued)

Global	Wealth Rank	Sources of Wealth			Estimated Wealth $/cap	Human Resources $/cap	Prod. Assets $/cap	Natural Capital $/cap
		Human Resources	Prod. Assets – % total –	Natural Capital				
101	Iraq	40	32	28	36,000	14,400	11,720	10,280
102	Costa Rica	70	16	14	36,000	25,410	5,840	4,950
103	St. Vincent	81	17	2	36,000	28,880	5,960	830
104	Guinea	5	4	91	38,000	1,780	1,520	35,040
105	Iran	34	37	29	38,000	12,970	14,230	10,870
106	Congo	18	22	60	39,000	7,030	8,640	23,230
107	Fiji	64	15	21	39,000	25,110	6,070	8,260
108	Grenada	81	17	2	40,000	32,830	6,820	830
109	Panama	59	19	22	43,000	25,570	8,270	9,350
110	Jamaica	23	19	58	46,000	10,760	8,700	26,550
111	Dominica	77	16	6	46,000	35,850	7,560	2,930
112	Belize	26	14	60	48,000	12,230	6,640	28,880
113	Brazil	37	19	45	47,000	17,390	8,740	20,990
114	Mauritius	85	14	2	48,000	40,840	6,500	800
115	Swaziland	18	9	73	49,000	8,890	4,290	35,610
116	Poland	56	13	31	50,000	28,130	6,440	15,660
117	Czech Rep.	66	15	19	50,000	32,570	7,620	9,370
118	Mongolia	18	3	79	51,000	9,270	1,640	39,830
119	Belarus	79	11	10	53,000	41,990	5,680	5,450
120	St. Lucia	82	16	2	54,000	44,290	8,810	1,070
121	Malaysia	59	16	25	56,000	32,860	8,900	14,050
122	Estonia	71	14	14	55,000	39,450	7,940	7,980
123	Venezuela	39	25	36	58,000	22,530	14,710	20,980
124	South Africa	40	14	46	61,000	24,240	8,410	28,240
125	Uruguay	56	14	30	61,000	34,350	8,700	18,270
126	Hungary	72	16	12	63,000	44,980	9,860	7,710
127	St. Kitts / Nevis	77	18	5	68,000	51,980	12,010	3,610
128	Chile	49	9	43	70,000	33,920	5,940	29,960
129	Trinidad-Tobago	59	30	11	70,000	41,400	20,770	7,540
130	Yugoslavia	18	54	28	71,000	12,840	38,020	19,760
131	Mexico	73	11	16	74,000	53,540	8,190	12,100
132	Reunion	76	21	2	78,000	59,770	16,580	1,870
133	Guyana	3	5	92	90,000	2,370	4,400	82,730
134	Libya	23	43	35	93,000	21,200	39,530	32,080
135	Guadeloupe	80	17	3	97,000	78,060	16,580	2,490
136	Martinique	82	17	2	98,000	79,720	16,580	1,480
137	Seychelles	81	17	2	98,000	80,190	16,460	1,740
138	Russian Fed	15	15	70	98,000	14,450	14,420	68,750
139	Aruba	80	17	3	100,000	80,500	16,580	3,000
140	Netherlands A	81	17	3	100,000	80,930	16,580	2,640
141	Guam	80	16	4	101,000	80,480	16,580	3,900
142	Macao	84	16	1	105,000	87,890	16,580	780
143	Slovenia	67	16	17	111,000	74,140	18,230	18,270
144	Puerto Rico	81	17	1	114,000	92,980	19,790	1,560
145	Barbados	82	17	1	117,000	95,530	19,600	1,670
146	Antigua-Barbados	83	15	2	119,000	97,820	17,910	2,790
147	Argentina	39	10	51	120,000	46,760	11,910	61,490
148	Oman	64	15	20	122,000	78,310	18,800	24,810
149	Korea, Rep	88	10	2	123,000	107,810	12,580	2,130
150	Bahrain	75	17	8	126,000	94,740	21,450	10,240

ANNEXURE B (Continued)

Global	Wealth Rank	Sources of Wealth			Estimated Wealth $/cap	Human Resources $/cap	Prod. Assets $/cap	Natural. Capital $/cap
		Human Resources	Prod. Assets – % total –	Natural. Capital				
151	Malta	83	16	0	134,000	111,150	21,900	590
152	Portugal	81	12	7	141,000	114,790	16,670	9,920
153	Greece	75	14	11	142,000	106,330	20,310	14,920
154	French Polynesia	72	17	11	149,000	107,450	25,200	16,790
155	Channel Islands	82	17	1	151,000	123,270	25,200	2,240
156	Virgin Islands	82	16	2	156,000	128,110	25,200	2,860
157	Brunei	72	15	12	165,000	119,700	25,200	20,250
158	Cyprus	79	16	5	172,000	135,950	28,060	7,960
159	Namibia	22	3	75	181,000	39,520	5,020	136,360
160	New Caledonia	13	9	78	182,000	22,830	16,580	142,870
161	Saudi Arabia	28	18	55	184,000	50,950	32,410	100,450
162	Botswana	17	2	81	188,000	31,270	4,710	152,480
163	New Zealand	39	23	38	212,000	82,580	48,340	81,230
164	Ireland	76	15	9	212,000	161,110	30,990	19,860
165	Bahamas	71	16	13	227,000	161,270	37,310	28,510
166	Gabon	21	14	65	232,000	48,830	31,580	151,210
167	Israel	86	12	2	255,000	219,670	30,650	4,510
168	Spain	78	13	9	268,000	208,160	34,180	25,290
169	Hong Kong	88	12	0	302,000	267,150	34,790	140
170	Singapore	85	15	0	306,000	259,440	46,590	130
171	United Kingdom	83	14	3	324,000	267,570	45,990	10,040
172	Finland	34	28	38	347,000	116,620	97,990	132,150
173	Italy	82	15	3	373,000	305,610	54,720	13,010
174	Netherlands	80	18	2	379,000	303,570	68,330	7,140
175	Belgium	83	16	2	384,000	317,390	59,620	7,240
176	Suriname	19	4	77	389,000	74,740	16,210	298,360
177	Austria	75	18	7	394,000	295,420	71,260	27,590
178	Germany	79	17	5	399,000	313,240	66,130	19,510
179	Kuwait	62	9	29	405,000	250,350	36,290	118,420
180	France	77	17	7	413,000	317,650	68,320	27,360
181	United States	59	16	25	421,000	250,480	66,650	104,280
182	Norway	48	22	30	424,000	203,090	94,970	125,940
183	Denmark	76	17	7	463,000	351,430	78,980	32,220
184	United Arab Emir	65	14	21	471,000	304,900	66,530	99,200
185	Qatar	51	11	39	473,000	239,530	50,930	182,330
186	Iceland	23	16	61	486,000	110,540	77,430	298,260
187	Sweden	56	16	29	496,000	276,450	77,030	142,660
188	Japan	81	18	2	565,000	455,030	99,640	10,530
189	Switzerland	78	19	3	647,000	505,570	123,060	18,680
190	Luxembourg	83	12	4	658,000	548,390	81,610	27,700
191	Canada	22	9	69	704,000	154,820	60,900	488,120
192	Australia	21	7	71	835,000	177,740	62,540	594,650

Source: *Monitoring Environmental Progress: A Report on Work in Progress*, Environmentally Sustainable Development, The World Bank, Washington D.C., 1995

ANNEXURE C

ENVIRONMENTALLY ADJUSTED NATIONAL INCOMES (1990)

Global	Wealth Rank	Basic Data					Est'd	Global Re-Ranking		Importance
		Per capita income				Life		GNP->	NNP->	as Natural
		GNP	NNP		Pop.	Exp.	Wealth	NNP	Wealth	Habitat
		$	$		000,000	yrs.	$/cap	p/cap	p/cap	%world
1	Ethiopia	120	70		46.09	47	1,400			0.39
2	Nepal	150	90		17.53	51	1,600			0.05
3	Burundi	190	140		5.03	48	2,100			0.00
4	Malawi	200	130		7.69	46	2,200			0.04
5	Uganda	180	110		14.84	48	2,300			0.08
6	Tanzania	100	30		22.45	52	2,400			0.45
7	Vietnam	130	120		61.75	66	2,600			0.82
8	Mozambique	50	20		14.53	44	2,900			0.29
9	Sierra Leone	140	100		3.84	41	2,900			0.12
10	Guinea-Bissau	200	150		0.92	39	2,900			0.08
11	Rwanda	220	180		6.32	47	2,900		-	0.01
12	Bangladesh	210	180		102.77	52	3,100			0.04
13	Niger	280	220		7.00	44	3,200		-	0.23
14	Cambodia	200	140	a	7.92	48	3,500			0.07
15	Burkina Faso	300	220		8.31	47	3,500			0.05
16	Gambia	380	280		0.83	43	3,500		-	0.02
17	Kenya	300	200		21.80	58	3,800			0.14
18	Mali	310	220		7.78	47	4,000			0.16
19	Nigeria	270	150		88.27	50	4,100			0.13
20	India	270	230		798.68	58	4,300			2.42
21	Madagascar	230	170		10.61	50	4,500			1.48
22	Chad	220	150		5.27	45	4,600			0.17
23	Haiti	380	300	a	6.10	54	5,000			0.04
24	Somalia	600	320	a	7.11	47	5,200	-	-	0.32
25	Sao Tome	310	280		0.11	65	5,400			0.00
26	Benin	420	300		4.31	50	5,800			0.07
27	Sudan	220	170		23.15	50	6,000		+	0.46
28	Togo	400	350		3.26	53	6,300		-	0.03
29	Afghanistan	600	520	a	19.00	41	6,500		--	
30	Bhutan	160	100		1.34	46	6,500		++	0.02
31	China	380	330		1084.00	69	6,600			5.33
32	Lao PDR	260	170		3.80	48	6,700		+	0.10
33	Pakistan	420	380		102.32	57	6,800			0.22
34	Equatorial Guinea	340	220		0.39	45	7,000			0.24
35	Ghana	430	320		13.53	54	7,400			0.22
36	Yemen Rep.	520	450	a	10.26	50	7,500			0.14
37	Nicaragua	350	310		3.40	62	8,000			0.09
38	Comoros	510	460		0.43	54	8,100			0.08
39	Djibouti	880	620		0.43	47	8,300		--	0.01
40	Tajikistan	490	430		4.87	70	8,500			0.03
41	Maldives	520	470		0.20	60	8,800			0.29
42	Sri Lanka	550	460		16.36	70	9,400			0.30
43	Honduras	580	460		4.67	64	10,000			0.13
44	Lesotho	600	550		1.63	58	9,900		-	0.00
45	Senegal	790	650		6.76	47	10,000		-	0.16
46	Cote d'Ivoire	670	540		10.72	56	10,500			0.13
47	Egypt	650	580		48.88	59	10,600		-	0.13
48	Zaire	600	360		33.86	52	11,000	-		1.45
49	Zimbabwe	520	420		8.89	62	11,000			0.12
50	Armenia	590	530		3.44	74	11,000			0.00

ANNEXURE C (Continued)

Global Wealth Rank		Basic Data					Est'd	Global Re-Ranking		Importance
		Per capita income				Life		GNP->	NNP->	as Natural
		GNP	NNP		Pop.	Exp.	Wealth	NNP	Wealth	Habitat
		$	$		000,000	yrs.	$/cap	p/cap	p/cap	%world
51	Kiribati	690	650		0.07	55	11,000			1.08
52	Indonesia	680	560		168.99	58	12,000			10.55
53	Zambia	290	160		7.11	53	13,000		++	0.14
54	Azerbaijan	740	670		6.89	70	14,000			0.01
55	Cameroon	800	670		10.54	53	14,000			0.24
56	Kyrgyz Rep.	810	730		4.16	66	14,000		-	0.03
57	Myanmar	860	770		39.18	58	14,000		-	0.54
58	Mauritania	540	360		1.82	46	15,000		+	0.06
59	Philippines	840	720		57.36	63	15,000			1.90
60	Uzbekistan	860	780		19.18	68	15,000			0.05
61	Liberia	600	340	a	2.29	53	16,000	-	++	0.10
62	Georgia	850	770		5.38	72	16,000			0.02
63	Cape Verde	910	820		0.34	66	16,000			0.12
64	Western Samoa	930	800		0.16	64	17,000			0.00
65	Romania	970	860		22.94	69	17,000		-	0.02
66	Guatemala	1,050	890		8.43	62	18,000		-	0.13
67	Morocco	1,040	940		23.38	61	18,000		-	0.11
68	Central Africa	420	320		2.77	48	18,000		++	0.23
69	Peru	950	780		20.23	61	18,000			2.20
70	Ecuador	1,090	840		9.80	65	18,000			1.78
71	Dominican Rep	1,020	900		6.69	66	18,000			0.11
72	Jordan	1,130	930		2.85	67	19,000			0.01
73	El Salvador	1,190	1,040		4.93	62	20,000		-	0.05
74	Syrian Arab Rep	1,170	1,030	a	10.97	65	21,000			0.01
75	Bolivia	670	560		6.67	57	22,000		+	0.50
76	Moldova	1,260	1,140		4.27	68	22,000		-	0.00
77	Bulgaria	1,140	1,020		8.97	71	23,000			0.02
78	Lebanon	1,580	1,370		3.43	65	23,000		-	0.01
79	Angola	1,690	1,060		8.43	44	24,000	-		0.76
80	Lithuania	1,310	1,190		3.64	72	24,000			0.02
81	Paraguay	1,420	1,150		3.92	67	25,000			0.07
82	Colombia	1,400	1,230		30.63	68	26,000			1.56
83	Tonga	1,510	1,360		0.09	66	27,000		-	0.21
84	Turkmenistan	1,270	1,270		3.40	65	29,000			0.04
85	Micronesia	1,690	1,490	a	0.10	61	29,000		-	
86	Marshall Islands	1,690	1,490	a	0.04	72	29,000		-	
87	Algeria	1,640	1,280		23.15	64	30,000			0.26
88	Korea, Dem.	1,690	1,500	a	20.59	69	30,000		-	0.03
89	Ukraine	1,670	1,510		51.29	70	30,000		-	0.14
90	Solomon Islands	700	550		0.29	61	31,000		++	0.60
91	Vanuatu	1,230	1,100		0.14	59	31,000			0.11
92	Kazakhistan	1,680	1,520		16.25	69	31,000		-	0.20
93	Tunisia	1,800	1,570		7.64	66	31,000		-	0.04
94	Albania	1,690	1,550	a	3.08	72	33,000		-	0.01
95	Slovak Rep.	1,880	1,640		5.22	71	33,000		-	
96	Turkey	1,900	1,700		52.62	66	33,000		-	0.23
97	Thailand	1,880	1,710		53.61	67	34,000		-	0.23
98	Cuba	1,690	1,490	a	10.29	75	35,000			0.28
99	Latvia	1,920	1,740		2.65	70	35,000		-	0.03
100	Papua N.G.	950	690		3.62	54	36,000		++	2.92

ANNEXURE C (Continued)

Global	Wealth Rank	Basic Data: Per capita income GNP $	NNP $		Pop. 000,000	Life Exp. yrs.	Est'd Wealth $/cap	Global Re-Ranking: GNP-> NNP p/cap	NNP-> Wealth p/cap	Importance as Natural Habitat %world
101	Iraq	1,690	1,400	a	16.38	65	36,000			0.05
102	Costa Rica	1,970	1,700		2.80	75	36,000			0.37
103	St. Vincent	1,990	1,790		0.10	69	36,000			0.00
104	Guinea	510	420		5.27	43	38,000		++	0.11
105	Iran	1,900	1,610		49.94	63	38,000			0.32
106	Congo	1,060	850		2.07	52	39,000		++	0.12
107	Fiji	2,020	1,800		0.72	70	39,000			0.33
108	Grenada	2,270	2,040		0.09	69	40,000			0.01
109	Panama	2,360	2,030		2.27	72	43,000			0.39
110	Jamaica	1,170	970		2.30	73	46,000		++	0.19
111	Dominica	2,520	2,270		0.07	72	46,000		-	0.01
112	Belize	2,210	1,950		0.18	67	48,000			0.01
113	Brazil	2,520	2,210		141.10	65	47,000			12.30
114	Mauritius	2,720	2,480		1.04	69	48,000		-	0.33
115	Swaziland	1,120	840		0.71	55	49,000		++	0.00
116	Poland	2,150	1,920		37.66	71	50,000			0.02
117	Czech Rep.	2,540	2,210		10.35	71	50,000			0.01
118	Mongolia	550	490		2.02	61	51,000		++	0.02
119	Belarus	2,910	2,630		10.11	71	53,000			0.03
120	St. Lucia	2,940	2,660		0.14	70	54,000			0.00
121	Malaysia	2,960	2,450		16.53	70	56,000			0.62
122	Estonia	2,760	2,740		1.56	71	55,000			0.05
123	Venezuela	2,940	2,350		17.97	70	58,000			1.29
124	South Africa	2,800	2,240		35.31	61	61,000			2.38
125	Uruguay	3,580	3,130		3.04	72	61,000			0.06
126	Hungary	3,290	2,910		10.62	71	63,000			0.01
127	St. Kitts / Nevis	4,000	3,600		0.04	66	68,000			0.00
128	Chile	2,890	2,580		12.54	72	70,000			1.05
129	Trinidad-Tobago	2,880	3,160		1.20	71	70,000			0.07
130	Yugoslavia	1,690	1,470	a	10.16	71	71,000		++	0.04
131	Mexico	3,790	3,420		77.56	69	74,000			4.40
132	Reunion	5,530	3,870	a	0.57	72	78,000			0.00
133	Guyana	300	120		0.79	63	90,000	-	++	0.20
134	Libya	5,530	4,070	a	4.10	61	93,000			0.17
135	Guadeloupe	5,530	4,870	a	0.37	74	97,000			0.00
136	Martinique	5,530	4,870	a	0.35	75	98,000			0.00
137	Seychelles	5,490	4,920		0.07	70	98,000			0.41
138	Russian Fed	2,680	2,430	a	145.91	70	98,000		+	5.35
139	Aruba	5,530	4,870	a	0.07	76	100,000			0.00
140	Netherlands A	5,530	4,870		0.18	76	100,000			0.00
141	Guam	5,530	4,920	a	0.13	72	101,000			0.00
142	Macao	5,530	4,920	a	0.31	71	105,000			0.00
143	Slovenia	6,080	5,590		1.94	72	111,000			0.00
144	Puerto Rico	6,600	5,710		3.44	74	114,000			0.00
145	Barbados	6,530	5,880		0.25	74	117,000			0.05
146	Antigua-Barbados	5,970	5,340		0.06	73	119,000			0.00
147	Argentina	6,780	6,050		31.14	71	120,000			0.99
148	Oman	6,270	5,550		1.37	68	122,000			0.10
149	Korea, Rep	6,730	6,330		41.58	69	123,000			0.01
150	Bahrain	7,150	5,950	a	0.46	68	126,000			0.00

ANNEXURE C (Continued)

Global	Wealth Rank	Basic Data: Per capita income GNP $	NNP $		Pop. 000,000	Life Exp. yrs.	Est'd Wealth $/cap	Global Re-Ranking: GNP-> NNP p/cap	NNP-> Wealth p/cap	Importance as Natural Habitat %world
151	Malta	7,300	6,670	a	0.35	75	134,000			0.02
152	Portugal	8,120	7,170		10.25	74	141,000			0.38
153	Greece	7,640	6,940		9.98	76	142,000			0.18
154	French Polynesia	8,400	7,640	a	0.18	66	149,000			0.00
155	Channel Islands	8,400	7,640	a	0.14	76	151,000			0.00
156	Virgin Islands	8,400	7,580		0.11	73	156,000			0.00
157	Brunei	8,400	7,640	a	0.23	73	165,000			0.00
158	Cyprus	9,350	8,510		0.68	76	172,000			0.02
159	Namibia	1,670	1,510		1.31	56	181,000		++	0.12
160	New Caledonia	5,530	4,920	a	0.16	69	182,000		+	0.00
161	Saudi Arabia	7,230	6,580		13.72	68	184,000			0.09
162	Botswana	2,660	2,310		1.15	67	188,000		++	0.09
163	New Zealand	11,490	10,310		3.30	75	212,000			1.53
164	Ireland	12,280	10,570		3.54	74	212,000			0.03
165	Bahamas	12,440	11,160		0.24	71	227,000			0.14
166	Gabon	4,460	3,700		1.05	52	232,000		++	0.24
167	Israel	13,380	12,340		4.37	76	255,000			0.01
168	Spain	14,510	13,430		38.72	76	268,000			0.34
169	Hong Kong	16,510	14,870		5.58	77	302,000			0.00
170	Singapore	16,590	14,770		2.55	74	306,000			0.00
171	United Kingdom	18,040	16,640		56.93	75	324,000			0.19
172	Finland	19,900	17,560		4.93	75	347,000			0.04
173	Italy	20,800	19,070		57.35	76	373,000			0.19
174	Netherlands	21,050	19,040		14.67	77	379,000			0.02
175	Belgium	21,660	19,570		9.87	76	384,000			0.00
176	Suriname	5,400	4,830		0.41	67	389,000		++	0.16
177	Austria	23,330	20,240		7.57	75	394,000			0.01
178	Germany	22,240	20,380		77.84	75	399,000			0.03
179	Kuwait	17,850	13,860		1.87	74	405,000			0.00
180	France	22,800	20,810		55.63	76	413,000			0.67
181	United States	23,260	20,700		243.94	75	421,000			7.97
182	Norway	25,510	20,910		4.19	76	424,000			0.23
183	Denmark	26,470	24,050		5.13	75	463,000			0.22
184	United Arab Emir	22,180	20,170		1.44	71	471,000			0.01
185	Qatar	16,980	15,270		0.39	69	473,000		+	0.00
186	Iceland	24,550	20,080		0.25	78	486,000			0.03
187	Sweden	27,600	24,810		8.40	77	496,000			0.06
188	Japan	29,770	27,850		111.09	78	565,000			1.72
189	Switzerland	36,330	32,780		6.55	77	647,000			0.01
190	Luxembourg	36,650	34,290		0.37	74	658,000			0.00
191	Canada	19,810	17,670		25.63	77	704,000		+	1.03
192	Australia	16,260	14,330		16.26	76	835,000		++	7.12

Notes: a: Gap-filler or "educated" guess
+: Movement at least 9, but not greater than 20, rankings upwards
++: Movement 20 or more rankings upwards
–: Movement at least 9, but not greater than 20, rankings downwards
--: Movement 20 or more ranking downwards

Source: *Monitoring Environmental Progress: A Report on Work in Progress*, Environmentally Sustainable Development, The World Bank, Washington D.C., 1995

ANNEXURE D

GENUINE SAVINGS RATES (1980-90)

Country-level Calculations of Genuine Saving Rates Over the Decade of the 1980's

	Genuine Saving Rates by Country (% of GNP)					
	Average 1980-85	1986	1987	1988	1989	1990
East Asia						
China	11.9	12.1	11.5	12.1	15.2	17.0
Indonesia	-2.3	-6.0	-0.7	1.8	8.1	3.4
South Korea	18.6	25.2	32.1	38.8	34.6	32.7
Malaysia	6.7	-1.1	13.0	13.6	11.1	11.5
Papua New Guinea	-7.9	-4.7	-10.9	-4.0	-9.3	-0.2
Philippines	9.7	5.6	3.5	5.6	7.0	6.2
Thailand	11.6	13.6	15.8	19.7	21.8	23.7
Latin America and the Caribbean						
Argentina	2.5	1.5	4.1	7.7	-3.5	7.3
Belize	9.6	13.3	12.8	12.5	12.8	20.4
Bolivia	-46.2	-49.3	-43.5	-35.9	-35.4	-31.8
Brazil	4.4	3.5	8.8	12.3	15.7	10.4
Chile	-2.9	-2.4	3.4	5.9	3.5	6.2
Colombia	2.1	1.4	4.9	5.4	2.1	2.2
Costa Rica	4.9	14.1	1.03	8.5	7.7	9.4
Dominican Republic	8.6	7.1	9.7	13.8	18.0	13.9
Ecuador	-14.8	-21.9	-14.0	-17.0	-18.6	-19.6
Guatemala	0.7	-1.8	-4.8	-4.1	-2.8	-2.4
Guyana	-26.1	-17.1	-52.6	-51.9	-46.6	-71.7
Haiti	1.9	1.7	3.5	2.4	1.6	2.6
Honduras	-4.8	-1.8	0.2	3.5	-2.3	1.0
Jamaica	-22.4	-17.6	-9.9	0.9	-11.1	-11.7
Mexico	-1.1	-9.1	0.9	-0.8	1.3	2.4
Panama	13.2	11.2	10.7	5.0	-8.9	6.2
Paraguay	5.5	-1.1	-9.1	-2.8	6.6	0.6
Peru	-1.1	-6.4	-3.0	-14.6	-11.2	-11.9
Suriname	-2.7	-15.2	18.6	7.5	3.2	-6.1
Trinidad and Tobago	-9.7	-25.1	-17.4	-25.4	-22.6	-13.7
Venezuela	-13.9	-23.4	-14.7	-15.7	-27.8	-19.1
Middle East and North Africa						
Algeria	0.4	-1.0	4.4	-5.6	-5.5	-1.9
Egypt	-11.1	-11.2	-7.2	-2.9	-8.4	-12.1
Iran	-3.9	3.6	0.4	-7.2	-5.6	-3.4
Morocco	4.5	11.1	12.9	11.0	7.4	13.8
Oman	-24.7	-51.3	-22.0	43.9	-36.7	-27.3
Syria	0.2	-4.0	-6.5	-10.7	-0.5	1.6
Tunisia	0.4	-5.2	3.7	5.7	4.1	7.3
United Arab Emirates	3.6	-19.1	-2.4	-8.0	-22.0	-23.1

ANNEXURE D (Continued)

Genuine Saving Rates by Country (% of GNP)

	Average 1980-85	1986	1987	1988	1989	1990
South Asia						
Bangladesh	1.1	0.3	2.8	2.8	1.5	1.7
India	7.4	8.3	9.5	9.7	8.8	9.8
Pakistan	7.7	6.3	8.1	6.1	6.3	5.2
Sub-Saharan Africa						
Burundi	-2.9	-1.5	3.4	-1.4	4.8	1.3
Cameroon	6.1	-3.2	-0.5	-4.3	-9.4	-10.2
Congo	-28.5	-68.7	-36.2	-51.0	-41.6	-44.9
Cote d'Ivoire	-5.8	-9.7	-13.7	-12.9	-16.8	-20.8
Ethiopia	3.0	7.8	6.4	7.4	2.6	1.4
Ghana	-12.4	-3.9	-3.3	-2.3	-2.2	-4.7
Kenya	4.6	6.9	4.5	6.1	3.1	3.3
Madagascar	-13.3	-14.3	-19.0	-19.0	-17.3	-20.2
Mali	-8.9	-4.6	1.4	1.3	2.2	3.8
Mauritania	-13.3	-17.7	-9.5	-2.9	-8.3	-7.7
Niger	2.4	4.6	-5.3	6.0	-3.5	-5.7
Nigeria	-12.8	-23.8	-31.3	-38.0	-41.2	-28.7
Rwanda	7.7	8.3	5.3	5.1	4.2	4.1
Senegal	-12.4	-7.1	-2.8	-0.5	-1.6	3.0
Sierra Leone	-1.5	-6.8	-10.7	-7.6	-9.1	-10.4
Zambia	-36.6	-70.4	-84.5	-96.3	-65.8	-65.1
Zimbabwe	1.8	-3.6	3.7	9.7	5.5	4.4

Source: K. Hamilton (1995), "Genuine Savings in Developing Countries", CSERGE, University College London and University of East Anglia. October.

Notes

[1] It needs to be noted that an aggregate (or extensive) Cobb-Douglas type production function of the form:

$$\ln Y = \alpha(0) + \alpha(1) \ln K + \alpha(2) \ln H + \alpha(3) \ln N + \alpha(4) \ln L \quad (1.A)$$

– where Y is aggregate output, K is aggregate physical capital stock, H is aggregate human capital stock, N is aggregate natural capital stock, and L is the stock of population – can be converted into its per capita (or intensive) form given by:

$$\ln y = \alpha(0) + \alpha(1) \ln k + \alpha(2) \ln h + \alpha(3) \ln n \quad (1.B)$$

– where y (=Y/L) is per capita output, k (=K/L) is per capita physical capital stock, h (=H/L) is per capita human capital stock, n (=N/L) is per capita natural capital stock – only if eq. (1.A) satisfies the property of constant returns to scale (CRS), i.e., $\alpha(1) + \alpha(2) + \alpha(3) + \alpha(4) = 1$. In this context, the estimated version of eq. (1.A) using the entire sample was:

$$\ln Y = -1.056 + \underset{(18.1)}{0.490} \ln K + \underset{(9.8)}{0.367} \ln H + \underset{(5.6)}{0.071} \ln N + \underset{(4.4)}{0.067} \ln L \quad (1.C)$$

$R^2 = 0.989$; SER = 0.249; N = 192

It is interesting to note that the sum of the estimated coefficients in eq. (1.C) above is almost equal to unity, thereby implying that the aggregate production function exhibits the CRS property. This implies that the estimated values of the three capital-stock coefficients, i.e., $\alpha(1)$, $\alpha(2)$, and $\alpha(3)$, should be identical regardless of whether the estimate the production function in its aggregate or per capita form. This empirical fact is seen to be true by comparing the coefficients of eq. (1.C) above and eq. (2.1a) in Table 1.

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