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INTERNATIONAL LAND QUALITY INDEXES

Willis Peterson

Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

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In a recent article a cross-section (state level) land quality index was constructed for the U.S. (Peterson). The special feature of this index as opposed to one constructed from raw land prices was the removal of the affect of differences in population densities among states on land values.

For a variety of reasons it would be useful to have a similar index for individual countries in an international context. A comparison of land productivity among nations is not particularly meaningful unless differences in land quality is taken into account. Also for econometric purposes, the use of a land variable unadjusted for quality causes biased estimates of the coefficients to the extent that the measurement error is correlated with the variables in the regression.

Unfortunately data on land prices are not available for many countries; in some countries, mainly the centrally planned economies, land prices do not even exist. However, applying the land quality weights derived in the above mentioned article to international data should provide an index of land quality that, although not perfect, is better than using a simple area measure of land. The U.S. land market is open and competitive. Hence U.S. land prices should be a reasonably accurate measure of quality after accounting for nonagricultural uses.

The purpose of this note is to construct international land quality indexes for 1. all agricultural land, and 2. crop land, for 126 countries using the weights presented in the earlier article.

In the earlier article the reduced form equation explaining state differences in per acre land values (excluding buildings) holding population density constant is:

(1) LPV = .0077 * PNICL + .0133 * PIL + .4161 * LP + .3325 * LN

where: LPV = log of the predicted per acre value of agricultural land

PNICL = nonirrigated crop land in each state as a percent of all crop land plus land in farms designated as permanent pasture.

PIL = irrigated land as a percent of all cropland in farms

LP = log of long run average annual precipitation

LN = log of soil nitrogen

Data to construct the first three independent variables for individual variables for individual countries are readily available. Although soil nitrogen data for individual countries is not available, this variable explained only 3.7 percent of the variation in land prices among states in the U.S. Therefore its omission from the weights should not introduce a large error in the international land quality measures.

Following the same procedure of the earlier paper, the LPV for each country given by equation (1) (LN omitted) is computed. The resulting land quality index for all agricultural land shown in column (1) of Table 1 is obtained by taking the anti-log of LPV, dividing by its 126 country average value, and multiplying by 100. The land quality index for crop land shown in column (2) of Table is computed in a similar manner except PNICL is omitted.

The resulting land quality indexes reveal substantial differences among countries. According to these figures Surinam has the highest quality agricultural land in the world followed by Japan. Generally the rice producing countries exhibit high quality land because of high rainfall and a relatively large share of land under irrigation. The extensive grazing countries of Africa exhibit relatively low land quality indexes because of low rainfall, a small share of land in crops, and a small share of cropland that is irrigated. The United States exhibits somewhat below average land quality in both the all land and crop land categories.

Table 1. International Land Quality Indexes
(Sample average = 100)

Country	all land	crop land	Country	all land	crop land
Algeria	38	47	Syria	50	53
Angola	65	85	Thailand	164	124
Benin	119	92	Albania	159	185
Botswana	43	60	Austria	96	66
Burkina Faso	64	78	Belgium-Lux.	81	75
Burundi	97	88	Bulgaria	97	95
Cameroon	109	109	Cyprus	100	86
CAR	92	96	Czechoslovakia	86	70
Chad	48	65	Denmark	114	88
Congo	75	101	Finland	98	69
Egypt	68	96	France	86	79

Ethiopia	62	74	E. Germany	98	77
Gabon	84	112	W. Germany	86	77
Gambia	126	121	Greece	87	96
Ghana	90	91	Hungary	90	70
Guinea	110	120	Iceland	54	77
IV. Coast	112	104	Ireland	67	84
Kenya	69	74	Italy	102	96
Lesotho	55	71	Malta	99	69
Liberia	102	91	Netherlands	124	153
Madagascar	88	119	Norway	114	87
Malawi	90	84	Poland	92	72
Mali	50	69	Portugal	125	102
Mauritania	27	38	Romania	98	92
Mauritius	145	112	Spain	90	83
Morocco	53	57	Sweden	87	67
Mozambique	62	83	Switzerland	77	94
Niger	45	52	Turkey	89	74
Nigeria	112	100	U.K.	78	84
Rwanda	123	103	USSR	55	65
Senegal	73	72	Yugoslavia	82	77
Sierra Leone	127	128	Barbados	128	91
Somalia	35	49	Canada	79	68
S. Africa	56	72	Costa Rica	93	111
Sudan	60	75	Cuba	125	131
Swaziland	95	126	Dominican Rep.	104	112
Tanzania	66	86	El Salvadore	129	128

Togo	125	91	Guatemala	122	115
Tunisia	57	51	Haiti	115	104
Uganda	98	92	Honduras	104	114
Zaire	99	103	Jamaica	93	90
Zambia	47	60	Mexico	82	100
Zimbabwe	83	91	Nicaragua	93	114
Afganistan	57	73	Panama	116	130
Bangladesh	190	150	Trinidad-Tob.	148	113
Burma	214	156	U.S.	83	87
China (PRC)	115	146	Argentina	55	68
Hong Kong	202	187	Bolivia	61	80
India	166	136	Brazil	90	102
Iran	50	63	Chile	50	59
Iraq	57	59	Colombia	73	92
Israel	87	108	Ecuador	94	106
Japan	224	252	Guyana	143	172
Jordan	67	55	Paraguay	74	96
N. Korea	182	173	Peru	83	111
S. Korea	182	135	Surinam	249	300
Malaysia	193	135	Uruguay	66	87
Nepal	153	109	Venezuela	77	97
Pakistan	99	118	Australia	54	72
Philippines	178	136	Fiji	175	135
Saudi Arabia	32	45	Indonesia	179	180
Singapore	181	119	New Zealand	117	165
Sri Lanka	179	158	Papua N. Guinea	167	130

FOOTNOTES

* Professor, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul.

1 Data on nonirrigated cropland as a percent of all land, and irrigated land as a percent of crop land were obtained from the United Nations, FAO, Production Yearbook 1984. The percentages are for 1981. Long run average precipitation was obtained by averaging the figures from all reporting stations in the country as given in the British Air Ministry Meteorological Office, Tables of Temperature, Relative Humidity, and Precipitation for the World.

REFERENCES

British, Air Ministry Meteorological Office, Tables of Temperature, Relative Humidity, and Precipitation for the World. London: Her Majesty's Stationary Office, 1958.

Peterson, Willis, "Land Quality and Prices," American Journal of Agricultural Economics 68(1986):812-19.

United Nations Food and Agriculture Organization, Production Yearbook, Rome, 1984.