GUIDE TO LATIN AMERICA NATURAL RESOURCE DATA

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This document describes natural resource data compiled for the AVINA Foundation study on green accounting in Latin America. These data are available in Excel workbooks on the CID website. They cover virtually every country in South America, plus Mexico. In alphabetical order, the countries are:

1. Argentina
2. Bolivia
3. Brazil
4. Chile
5. Colombia
6. Ecuador
7. Guyana
8. Mexico
9. Paraguay
10. Peru
11. Suriname
12. Uruguay
13. Venezuela.

The data were compiled for the purpose of calculating resource rents, which in turn were used to estimate changes in the values of natural resource stocks. They pertain to three categories of natural resources:

1. Fossil fuels
2. Metal ores
3. Roundwood.

While these three categories do not encompass all natural resources produced in the region, they do account for the most economically important natural resource commodities. Each category includes several individual resources. For example, "fossil fuels" includes oil, natural gas, and coal.

Four basic data series are presented for each resource: production (amount extracted), price, unit cost, and resource rent. Rent is calculated by the formula,

$$\text{Rent} = \text{Production} \times (\text{Price} - \text{ATC}),$$

where ATC is the average total cost of production. "Production" refers to quantities actually used by humans. It excludes unused portions of production, such as roundwood that is damaged during logging or natural gas that is flared or reinjected. It includes noncommercial uses, however, such as direct household consumption of fuelwood.

Most of the data series cover the period 1960-97. Certain series, in particular those related to production costs (and thus resource rents), are considered unreliable before 1973 and should probably not be used.

The following sections describe the workbooks for each of the three resource categories. Many of the workbooks are linked by formulas. ***Click "No" if you are asked whether you want to update linked information when you open a workbook.***

Fossil fuels

The database contains data on three fossil fuels—oil, natural gas, and coal—in the following Excel workbooks:

- *Oil (Latin America).xls*
- *Natural gas (Latin America).xls*
- *Coal (Latin America).xls*

The organization of each workbook is similar. The first worksheet, "Production," contains data on annual output in physical terms (barrels of oil, cubic feet of gas, short tons of coal). The second worksheet, "Price," contains data on price per unit of each fossil fuel, in current U.S. dollars. For the most part, the prices are export unit values. The third worksheet, "ATC," contains data on the average total cost of producing a unit of each fossil fuel, also in current U.S. dollars. The fourth worksheet, "Rent," contains estimates of annual resource rents associated with production of each fossil fuel. Each worksheet is organized with countries in the columns and years in the rows.

The oil workbook includes three additional worksheets containing data on export quantities, export values, and export unit values. The natural gas and coal workbooks each include one additional worksheet, which contains raw production data before conversion to common units across countries and over time.

Sources of the production data are given below the data tables. Chief sources were the websites of the U.S. Energy Information Administration (www.eia.doe.gov), the International Energy Information Agency (www.iea.org), and BP Amoco (www.bpamoco.com/worldenergy), supplemented with data from various yearbooks of the same organizations.

Sources of the price and cost data are indicated in either the titles of the data tables, comments on the column headings, or notes below the data tables. In the case of coal, price data are included in the workbook

- *Coal mining costs and prices in Colombia.xls*.

In the case of oil, detailed cost data are included in the workbook

- *Oil cost estimates (Adelman and Shahi).xls*.

The price and cost "data" shown in the tables are in many cases estimates based on extrapolation or interpolation rather than values obtained from a statistical source. For the most part, these estimates are in italics. To be sure, however, and to determine the precise formula used in the estimation, one should click on cells of interest to determine whether they contain formulas or numerical values. In some cases, Latin American prices are imputed from data on world market prices from the International Monetary Fund's commodity price database, which are contained in the workbook

- *IFS commodity prices in Latin America.xls*.

Citation

Adelman, Morris A. and Shahi, Manoj. "Oil Development-Operating Cost Estimates, 1955-85." *Energy Economics,* January 1989, *11*(1), pp. 2-10.

Metal ores

The database contains data on nine metal ores in the following Excel workbooks:

- *Bauxite (Latin America).xls*
- *Copper (Latin America).xls*
- *Gold (Latin America).xls*
- *Iron ore (Latin America).xls*
- *Lead (Latin America).xls*
- *Nickel (Latin America).xls*
- *Silver (Latin America).xls*
- *Tin (Latin America).xls*
- *Zinc (Latin America).xls.*

The basic structure of each workbook is similar to that for fossil fuels: there are worksheets for production, prices, costs, and rent.

The following differences among the workbooks should be noted:

1. The workbook for silver does not include a worksheet for prices. Instead, price data from the workbook,

   - *IFS commodity prices in Latin America.xls*,

   are linked directly to formulas in the rent worksheet.

2. The cost worksheets in the workbooks for copper, iron ore, lead, and zinc contain data on average variable cost, not average total cost. Conversion to average total cost occurs in the formulas in the rent worksheet.

3. The workbook for bauxite does not include a cost worksheet. Instead, average total cost is set proportional to price in the formulas in the rent worksheet.

4. All the workbooks include worksheets containing export data except the ones for gold and silver.

5. Finally, the workbook for silver includes a worksheet containing data on reserves, which is the source of conversion factors used in the rent worksheet.

Data sources are recorded in the same fashion as in the fossil fuel workbooks. The chief sources of production data were the website of the U.S. Geological Service (www.usgs.gov), yearbooks of the same agency and the now-defunct U.S. Bureau of Mines, and the UNCTAD *Yearbook of International Commodity Statistics*. These sources also provided most of the data on export values and quantities, which were used to calculate prices (i.e., export unit values). Two additional useful sources of export data were the UNCTAD *Commodity Yearbook 1989* (for the years 1983-87) and the UNCTAD *Handbook of World Mineral Trade Statistics* (for the years 1992-97).

Regarding costs, we began with the data sources listed in Appendix B of Kunte et al. (1998). Data from one of these sources, an earlier report by the World Bank (1994), are included in the workbook

- *Mining costs (World Bank 1994).xls*.

We augmented these sources with various other information, in particular

(i) a cross-country study by the Copper Commission of Chile (Picozzi B. 1996), and

(ii) estimates for individual mines in the 1990s from the World Mine Cost Data Exchange (WMCDE).[1]

The workbook

- *Average mining costs (Copper Commission of Chile).xls*

contains the data from (i). Data from (ii) are proprietary and are not included in the database.

Citations

Kunte, Arundhati; Hamilton, Kirk; Dixon, John and Clemens, Michael. "Estimating National Wealth: Methodology and Results." World Bank (Washington, DC) Environment Department Paper No. 57, January 1998.

Picozzi B., Aldo. "Costos de Operacion de la Industria del Cobre Mundo Occidental." Mimeo, Comision Chilena del Cobre, Santiago, Chile, December 1996.

World Bank. "Market Outlook for Major Energy Products, Metals, and Minerals." World Bank (Washington, DC), 1994.

[1] We are grateful to Michael Farrell of WMCDE for providing the mine models at a reduced rate.

Roundwood

The database contains data on four types of roundwood:

1. fuelwood,
2. pulpwood and particles,
3. sawlogs and veneer logs, and
4. other industrial roundwood,

harvested in both natural forests and plantations. The data are contained in two workbooks,

- *C roundwood (Latin America).xls*
- *NC roundwood (Latin America).xls*.

These contain data on coniferous and nonconiferous roundwood, respectively.

The two workbooks have an identical structure. Each includes production, price, and rent worksheets, and also worksheets containing export data. The production and rent worksheets contain five sections: roundwood (the aggregation of values in the other four sections), sawlogs and veneer logs, pulpwood and particles, other industrial roundwood, and fuelwood. The price worksheet contains just three sections: sawlogs and veneer logs, pulpwood and other industrial roundwood, and fuelwood. Prices for sawlogs and veneer logs are set equal to export unit values, calculated using data from the worksheets containing export data. Prices for other types of roundwood are calculated from the sawlog and veneer log prices using conversion factors contained in the workbook,

- *forestproductsprices.xls*.

This workbook contains price series reported in various forestry working papers published by the U.N. Food and Agriculture Organization. We obtained production and export data from the U.N.

Food and Agriculture Organization's website (www.fao.org). Data on average total production costs were compiled from various sources and are contained in the workbook,

- *Logging costs.xls*.

These data are linked to the rent worksheets in master workbooks described above. Sources are included in the list of citations below.

Citations

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