

## ECONOMETRIC ANALYSIS

# The model results for Colombia

by Peter Rush

Ten years ago, the Colombian economy was on the verge of what could have been an era of accelerated economic growth in which manufacturing industry would have reached annual growth rates of 10-12 percent, levels of growth required to achieve constant economic advances. During the first years of the 1970s, the economy showed a tendency toward investment in heavy industry, but the 1975 Tax Reform under President López Michelsen, and the rapidly growing interest rates imposed during the last half of the decade, left the economy seriously disadvantaged to resume the process of accelerated growth.

These problems were compounded by the pernicious influence of the growth of the drug trade and the mushrooming of the so-called financial sector, and real growth finally ceased in the last 18 months of the outgoing Turbay administration. Production of textiles, autos and steel plummeted.

The root cause of Colombia's present stagnation is the failure during the past 15 years to move rapidly from an initial boom in light industry and chemicals in the first half of the 1970s into heavy industry, capital goods, and related high-technology fields. The program for Colombia developed by the *EIR* and the Fusion Energy Foundation is based on creating, rapidly, the absent heavy

industry base for development. The program outlined is expected to result in a six-fold growth in physical output between 1982 and 2002 (see Figure 1), representing a 10.6 percent annual rate of growth.

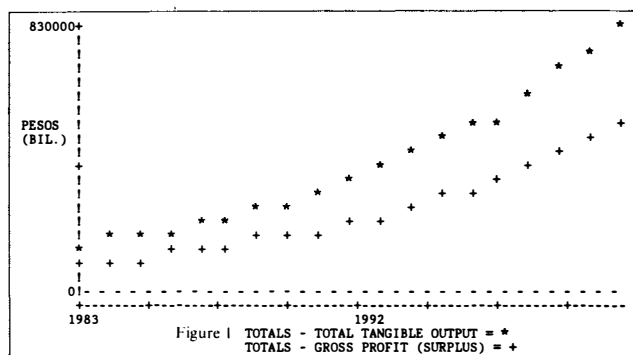
### The heavy industry rationale

A light industry-based economy is inherently stagnant. The most developed countries have two-thirds to three-fourths of their total industrial output devoted to heavy industrial production. Colombia's proportion is well under one-fourth. Until a heavy industry sector is created, a nation is dependent on imports for all such items, to the point imports balloon out of proportion to ability to export to pay for them.

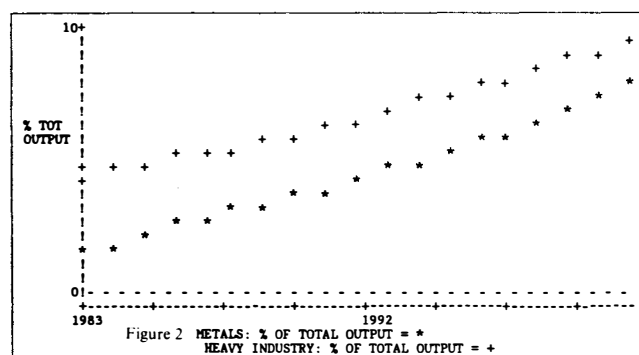
Heavy industry as here discussed, is comprised of: steel and non-ferrous metals (all stages of fabrication), machine tools, machinery making, heavy equipment construction, heavy electrical machinery, vehicles; ship-building; high-technology instruments, and computers. These are the sectors that originate productivity advances for all sectors of the economy, including light industry itself. Equally important, heavy industry produces the steel, cement, and machinery for infrastructural projects which are a rapidly growing source of demand. Finally, only these industries force the production of thousands of scientists, engineers, and technicians, and millions of skilled workers, without which any economy is doomed to low technological levels, and without which any economy is incapable of assimilating the advances of subsequent periods of development.

### Creating Colombia's 'Ruhr'

Heavy industry is best developed in concentrated pockets, at first, where geography and resources define the most efficient production sites. In Colombia, such a location is the northern littoral along the Atlantic coast from the Guajira Peninsula across to Cartagena. The



**Total economic output 1982-2002:** Total tangible output of overall economy, roughly equivalent to value added of *productive* (physical output-producing sectors plus construction and transportation) sectors of the economy, and total gross profit or surplus, defined as total output net of consumption by labor (roughly equivalent to labor costs).



**Metals and heavy industry, percent of totals 1982-2002:** Output of metals (steel and non-ferrous) and heavy industry sectors as percentages of total output. Shows dramatic proportional increase in importance of both sectors.

industries to be developed include:

**Steel:** Huge coal deposits exist in the Guajira, can be transported by water or rail; very large Venezuelan deposits of iron ore can be brought by sea; output can be shipped to interior of country by river and rail.

**Machinery:** Machinery-making industry will utilize the steel to begin manufacture of other machines, including machine tools, power equipment, and machinery for new factories.

**Chemicals:** Both inorganic industrial chemicals and petrochemicals will be greatly expanded.

**Nuclear Power:** One or two nuclear plants, serving as foci for agro-industrial complexes ("nuplexes"), will provide some of the power required while serving as the base for very high-technology production and research.

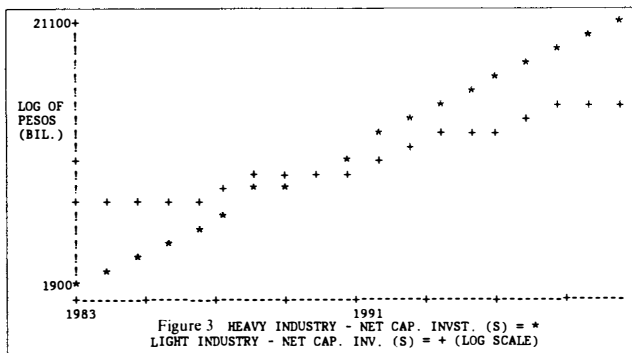
**Satellite industries:** The density of heavy industries will create a demand for a host of satellite industries of all descriptions, including vehicles, pipelines, urban and transportation infrastructure, and consumer goods for the population that will move into the area.

It is anticipated that steel production capacity by 2000 will be between 15 and 20 million tons (up from less than 250,000 tons in 1981), while heavy industry output will increase more than thirteenfold.

This growth will transform the structure of the economy. The share of metals (steel and non-ferrous) in the total economy will grow substantially (Figure 2), and will absorb, by 2000, more than twice the investment resources required by light industry (it now absorbs about one-tenth) (see Figure 3).

### Energy and infrastructure

Coal reserves estimated to be the largest in Latin America will do for Colombia what oil has done for some of the OPEC nations (see box on the Cerrejón coal fields and Figure 4). Very substantial inland coal resources will also be developed for export and power.



**Investment in light and heavy industry, 1982-2002:** Investment in light industry and heavy industry, on a logarithmic scale, showing the relative reversal in priorities. At present, heavy industry receives almost no investment. In 2002, heavy industry investment will be about double that in light industry.

## The world's largest coal mine

Colombia, with national coal reserves estimated at 11 billion metric tons, is on the verge of becoming one of the world's leading exporters of high-grade coal. Exploitation will soon begin of what is reported to be the world's largest coal mine, El Cerrejón, located on the northeast peninsula of Colombia known as La Guajira.

El Cerrejón, which contains proven reserves of more than 1.6 billion metric tons of low-ash, low-sulfur and high-BTU (11,800 BTUs per pound) coal, will cost some \$3 billion to exploit, including project infrastructure consisting, among other things, of a 90-mile diesel-electric railroad, a coal-loading port, employee living facilities, and an electric power distribution grid.

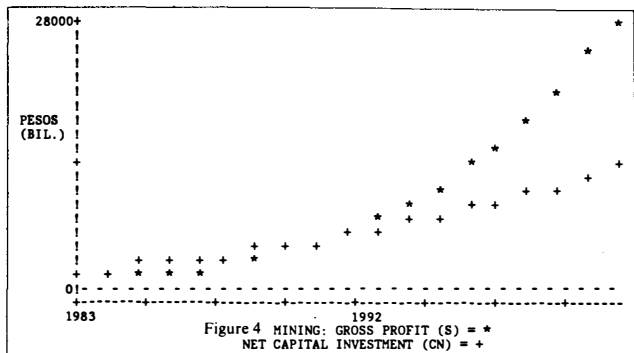
The mine is being developed jointly by the state mining agency Carbocol and the Exxon subsidiary Esso Inter-America Inc., the latter operating through its wholly-owned Colombian affiliate Intercor. Carbocol estimates that the mine and related projects will employ as many as 8,000 workers, while Exxon believes that eventually 30,000 people will be either working directly at the mine or servicing its employees.

### First contract to Spain's Carboex

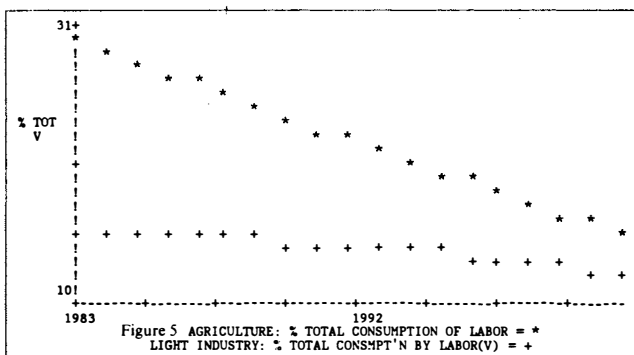
Although the mine will be undergoing exploitation in stages, the first substantial contract for delivery of 350,000 tons of coal by year's end has just been signed with the Spanish company Carboex. That coal will come from the central zone of El Cerrejón, which will begin production at the end of July. Another contract with Carboex, for delivery of 600,000 tons of coal per year for the next 10 years, goes into effect in 1986, when the main northern zone of the mine is scheduled to begin production. That zone is expected to produce 15 million tons of coal a year.

Coal will also be exported to the United States, Western Europe, Japan, Brazil, and other Latin American countries, and Carbocol hopes to be providing a full 10 percent of the 600 million tons of coal that will be exported worldwide by the year 2000. To meet that goal, Carbocol is financing feasibility studies and exploratory projects across Colombia, with at least 11 different zones believed to have major potential.

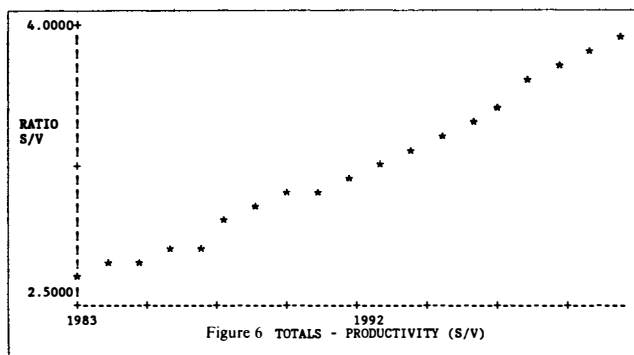
Hydropower resources are also mammoth, and need to be developed even more rapidly than now planned. In total, electricity output should increase eightfold, from 20,000 gigawatt hours to 160,000 gigawatt hours—to provide the equivalent of 4,000 kilowatt hours per capita. This represents an 11 percent annual rate of



**Profit and investment in mining:** Gross profit (surplus) and net capital investment in mining, which is primarily the development of coal resources. Graph shows how after 1990, profit exceeds investment and becomes large net surplus for investment elsewhere in the economy.



**Decline of agriculture and light industry:** Labor compensation in agriculture and light industry, as a percentage of total consumption by labor. Shows structural decrease in relative importance of these two sectors, also reflected in value added and surplus.



**Productivity of overall economy 1982-2002:** Productivity, measured as surplus divided by consumption by labor, shows continual rise to level commensurate with developed countries by 2002. Shows growing portion of output available for reinvestment in growth.

increase, comprised in the main by hydro, secondly by coal. Industrial consumption of electricity should increase thirteenfold—a 14 percent annual increase. Energy growth will be speeded by several nuclear plants.

Investment in transportation infrastructure has been extremely low in relation to need throughout Colombia's history. Colombia needs to expand its rail system, doubling the mileage over the next 20 years from 6,000 to 12,000 kilometers, to connect all the cities west of the Amazon; double-tracking the main lines and building certain essential links, most importantly a transmontane link between the two main river valleys, which would give Bogotá an outlet to the Pacific. Only 20 percent of the nation's roads are paved, which must be increased to 50 percent, while the entire length of the road system needs to be doubled. River dredging of the Magdalena River will again make that artery useful for transportation, while very large investments in port expansion will be needed to handle a twelve- to fifteenfold increase in port throughput by 2000.

The significance of this investment is not calculable on a "cost-benefit" basis, because the "product" of infrastructure is productivity itself, that is, the increases in productivity and efficiency of the overall economy and its leading sectors, and as such can be skimmed on only at the expense of later self-sustaining growth.

## Agriculture

Finally, agriculture will become transformed, even while shrinking as a percentage of total output (see Figure 5). Large-scale water control projects, including the many large and small dams that will be constructed for power production, will permit controlling the Magdalena and Cauca Rivers, and hence reclaiming for agriculture the lower river valleys just south of the new industrial region. The cattle now grazed there will be displaced to the Transcaudillera plains in the Orinoco watershed, and replaced by a wide variety of tropical food and industrial crops. The opening up of several million hectares of new land, provided with irrigation, power, and machinery, will transform agriculture throughout the country as farmers move into the area, forcing mechanization in the presently cultivated lands as labor becomes short.

With this program, Colombia's real living standards will be able to grow by more than 5 percent a year, and output per worker will increase rapidly. The internal efficiency of the economy will improve dramatically, as shown in Figure 6, which graphs total output in relation to total consumption of labor.

This means that real economic surplus, available both for new investment and to sustain a growing percentage of teachers, doctors, scientists, and engineers, will grow as a percentage of total output, a conclusive measure of healthy development.