The LaRouche-Riemann model applied to Peru: development or despair

by Sylvia Brewda

Peru's newly elected President Alan García has taken the bold step of refusing to starve Peru into extinction to service foreign debt, as demanded by the International Monetary Fund. While this action has received much attention from the creditor nations—and threatens to be repeated by other developing nations—the issue remains: how to put the country on a solid footing for development.

In the spring of 1984, a group of policy makers in Peru, confronted with the natural disasters of the previous year and increasing pressure from the IMF for more austerity, invited a team from the Fusion Energy Foundation and Executive Intelligence Review *to create a development plan for Peru based on the LaRouche-Riemann economic model. The project was undertaken at the request of the Institute of Social and Economic Studies of the National Industrial Society of Peru, and has been widely distributed and studied by some of President García's closest advisors. The following report on the 1984 study is reprinted by permission from the October 1984 issue of* Fusion Asia *magazine.*

The challenge of Peru

In Peru, the challenge was to determine the best possible course for an economy already sunk deep into a quagmire of austerity and self-cannibalization.

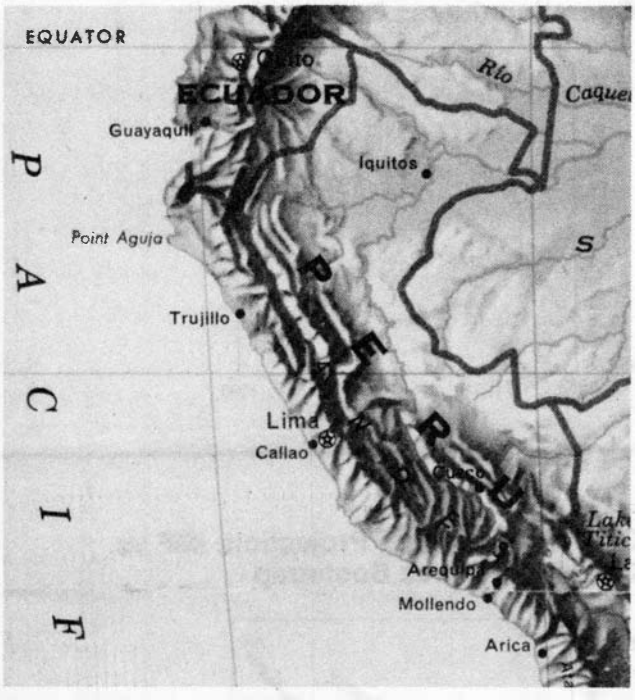
By all measures, Peru is one of the poorest and least developed of the major nations of South America. In terms of energy use per capita, life expectancy, and percentage of the workforce engaged outside agriculture, Peru ranks below Argentina, Brazil, Colombia, Venezuela, and even Chile, although above Ecuador and Bolivia (Table 1). Although the country's physical conditions cannot be assigned all the blame for this lack of development, they do present significant obstacles.

Table 1
Peru's economic status compared to other South American countries

	Energy Per Capita	Animal Protein Intake	Life Expectancy
	(kg coal equiv.)	(g/person/day)	(years)
Peru	807	19	57
Argentina	2,161	74	70
Bolivia	452	17	50
Brazil	1,101	23	63
Chile	1,137	27	67
Colombia	970	24	63
Ecuador	692	24	61
Mexico	1,684	24	65
Venezuela	3,039	37	67

Peru is separated into three major regions, the coast, the Andes, and the jungle (Figure 1). The coast, where the majority of the population and almost all the cities are located, is in the rain shadow of the Andes, and thus is practically a desert. Although the ocean moderates the temperature to some extent, rainfall is almost nonexistent, and agriculture depends completely on irrigation. The jungle, which makes up more than half the area of Peru and contains less than 10%

FIGURE 1
Peru: the physical parameters



Peru's geographical problems are daunting. The desertlike coastal area is separated from the tropical jungle area by the high Andean Mountain range. Immediate tasks in addition to modernizing and developing coastal agriculture will be the construction of roads across the Andes to link the mountain and trans-Andean regions and to prepare for the development of the Amazon basin on the east side of the Andes.

of the population, is still undeveloped, thanks to lack of transportation and infrastructure, as well as the heat, high rainfall, and poor drainage characteristic of the Amazon basin. Between the coast and the jungle lie the Andes, a broad band of extremely high mountain chains, divided by high valleys that generally run North-South.

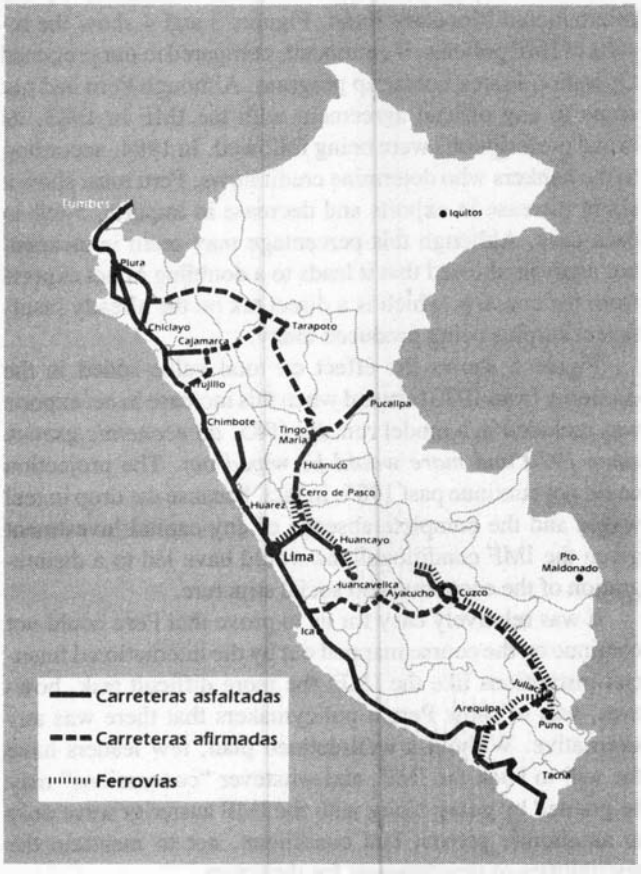
The 1983 natural disasters mentioned above were the result of a southward shift of the warm current known as El Niño, which drenched the northern coastal region with rain and parched the southern mountain area with drought. In the desert areas of the north, where farming is totally based on irrigation, floods and landslides also destroyed roads and washed away houses.

At present, the transportation links between the coast and the interior consist of two corridors with paved roads and rail lines, and a few graded dirt roads (Figure 2). The rail lines, developed primarily for the mining industry, have little connection to the other economic activities of the country. However, even the paved roads are very limited links. The "Carretera Central," which runs inland from Lima, is usually closed for a few weeks every spring because of landslides. In July, when I took a drive into the interior, the section more than 100 km from Lima was so poorly maintained that traffic was limited to 15 mph by the surface condition alone.

The Andes region contains a large portion of the Peruvian population. Predominantly rural, these people live under conditions of such isolation that in much of the area no Spanish is spoken, the only language being the Indian Quechua. It is here that coca leaves, a narcotic when chewed, have been traditionally used as a stimulant and painkiller, a condition that has been tolerated for years by all as a necessary accompaniment to the severe hunger and manual labor in the area.

These circumstances have provided fertile conditions for a group of anthropologists associated with Jacques Soustelle

FIGURE 2
Highways and railways in Peru



The construction of three or four major east-west highways in Peru through the best passes in the mountains will tax the engineering skill of international contractors, but will truly unite the country for the first time in its history.

in France to manufacture and now control the terrorist group Shining Path, *Sendero Luminoso,* which is based in the remote areas of southern Peru. Purporting to defend the indigenous Indian culture, the Shining Path's explicit belief-structure is a hatred of industrialization, urbanization, or anything that might connect the stupefied highlander with the "outside" world. In the few weeks I spent in Peru, I had a vivid sense of how this belief structure translates into terror. One day, the Shining Path "liberated" a town by burning the houses of all those connected with the authorities, because they were unable to find and execute the people concerned. Another day a series of bomb attacks on the electric grid left the capital city of Lima without power for 24 hours. A few days later, the papers reported the discovery of the bodies of an entire group of peasants, massacred because they had not accepted the terrorists' commands.

The IMF-Malthusian factor

The Peru project set out to determine the course of events if current economic policies continued, particularly the austerity and "improved balance of trade" demanded by the International Monetary Fund. Figures 3 and 4 show the results of IMF policies, if continued, compared to our proposed Operation Juarez bootstrap program. Although Peru had not come to any official agreement with the IMF in 1983, its brutal prescriptions were being followed. In 1984, according to the bankers who determine credit flows, Peru must show a slight increase in exports and decrease in imports, 5-6% in each case. Although this percentage may seem innocuous, our analysis showed that it leads to a doubling of net exports from the country, which is a direct tax on the already insufficient surplus being produced today.

Figure 5 shows the effect on total value-added in the economy from 1970 forward when this increase in net exports was included in a model run: *By 1985, all economic growth since 1970 and more would be wiped out.* The projection could not continue past 1985, in fact, because the drop in real wages and the complete absence of any capital investment given the IMF conditionalities would have led to a disintegration of the economic and social structure.

It was relatively easy for us to prove that Peru could not continue on the course mapped out by the international financial institutions like the IMF; the more difficult task, however, was to show Peru's policymakers that there was any alternative. Without a well-defined plan, few leaders have the will to buck the IMF, and whatever "concessions" may be granted by going along with the IMF austerity serve only to ameliorate present bad conditions, not to maintain the possibilities of development for the future.

What we were able to provide for Peru was an alternative: We developed a plan that would not erase the damage of the past few years, but would create and maintain the conditions for future development. Our investigations showed that even without outside help, Peru *can* reverse the existing slide

FIGURE 3
GNP Agriculture Projection: IMF vs. Operation Juarez Bootstrap

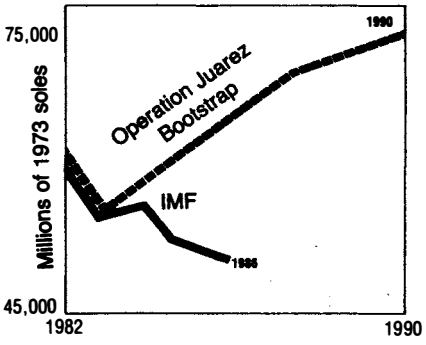


FIGURE 4
GNP Manufactures Projection: IMF vs. Operation Juarez Bootstrap

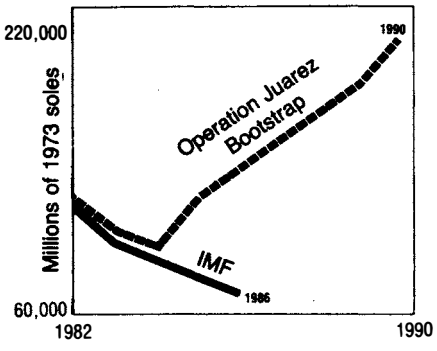
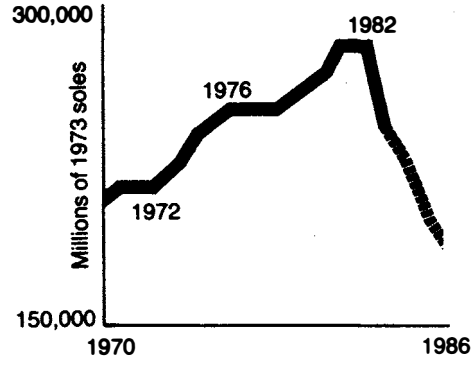


FIGURE 5
Projected impact of IMF program on gross domestic product of productive sectors



toward disaster and improve the internal situation, if some difficult decisions are made now. Given this improvement, even a small amount of external assistance would propel the country onto a trajectory of full-scale, self-supporting growth.

A new look at the past

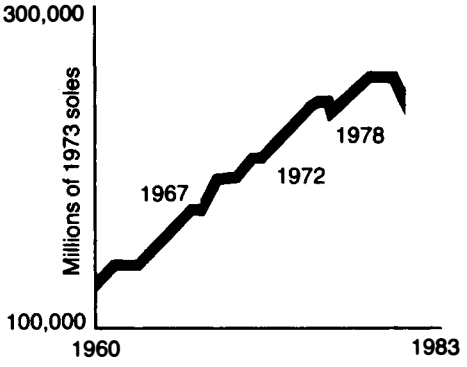
The first step in producing a plan for Peru's future was to examine the past economic history of the country, to assess the economic potential that had been created or diminished over the past 20 years. As a result of this historical analysis of Peru's economy, we could determine areas of strength and weakness in the existing economy, and indicate some of the causal mechanisms. Figure 6 shows the course of value-added during 1960-83 in all the productive sectors of the economy, in constant 1973 soles, the Peruvian currency. This type of analysis is the closest to reality that conventional economics can come, because it eliminates the effects of inflation over time and it controls for the effects of the non-productive areas of the economy. As Figure 7 shows, the economy was growing rather well before the natural disasters of 1983. In looking at this figure alone, in fact, one might be surprised at the weakness exhibited in the face of the agricultural problems in 1983.

One clue to this weakness can be seen in Figure 5. In Peru, as in any developing economy, the relative strength of the manufacturing sector is crucial, since it supplies much of the free energy or available surplus for reinvestment. Since 1980, the figure shows, the production of this key component had been shrinking in relation to the total output of the economy. However, although a worrisome and perhaps dangerous trend, this alone would not have been expected to create the drastic weakness of 1983, or the continuation of that collapse observed in 1984.

The most serious deficiency in manufacturing, as our analysis showed, was the lack of a policy to build up the capital goods sector of manufacturing. Even during the periods when the manufacturing sector as a whole was growing, the production of capital goods stagnated, and net new investment in this area was practically zero from 1970 on (Figures 8 and 9). In contrast, tremendous investments in the intermediate goods sector (mainly nonferrous metal refining) during the mid-1970s increased both production and productivity.

Agriculture represented another ongoing problem. Before 1968, the pattern of land distribution in Peru was the most feudal in South America and needed radical change. However, the agrarian reform of 1969-74 replaced the feudal estates with a collective/cooperative structure that drove away the most competent farmers and abandoned commercial agriculture to inefficient and impersonal collectives. According to the data, net new investment in agriculture has been low or negative except for a spike in 1975. Total *V* (the tangible goods portion of wages) had risen until 1975, but then declined, indicating a severe drop in per capita real income. By

FIGURE 6
Historical analysis, 1960-82: value-added in the total economy



Before the disasters of 1983, the economy was growing fairly well.

FIGURE 7
Historical analysis, 1960-82: manufacturing sector as a percentage of economic output

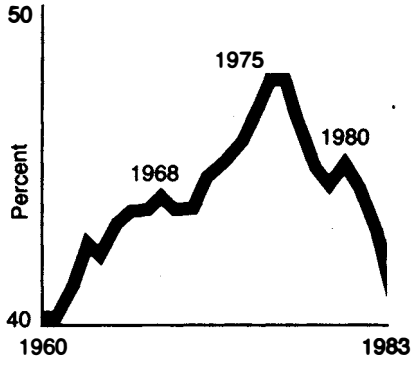
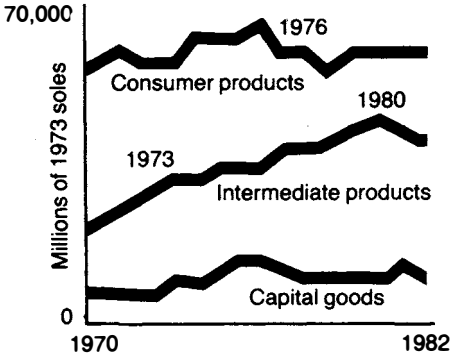


FIGURE 8
Historical analysis, 1960-82: value added in manufacturing



1980, the average agricultural worker produced less than one-tenth as much as the average industrial operative.

The result of this decline is startling when measured in terms of the average Peruvian diet. As shown in Table 2, the calorie and protein intakes of both the lower and middle class have dropped severely during a period when food imports have continued to make up a significant portion of the total import cost.

The most sensitive of the measures used by the La-Rouche-Riemann model for historical analysis is the rate of net reinvestment, $S'/(C + V)$, which provides a precise picture of the overall condition of the economy. As shown in Figure 10, the trend of the rate of net reinvestment was decidedly downward throughout the 1960s and 1970s, except for the spike in refining investment in 1975. Without investment in the expansion of productive capacity, any economy will not only become vulnerable, but will slide downhill at an accelerating rate.

FIGURE 9
Historical analysis, 1960-82: net investment in manufacturing

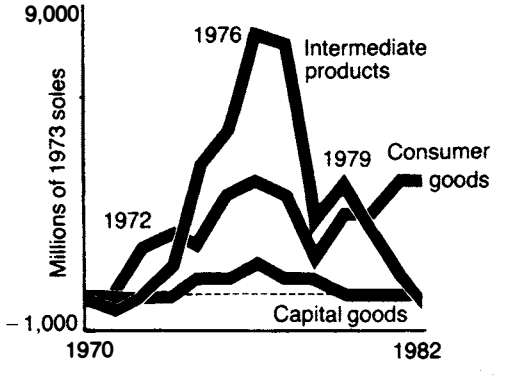


FIGURE 10
Historical analysis, 1960-82: rate of net reinvestment for the total economy $S'/(C + V)$

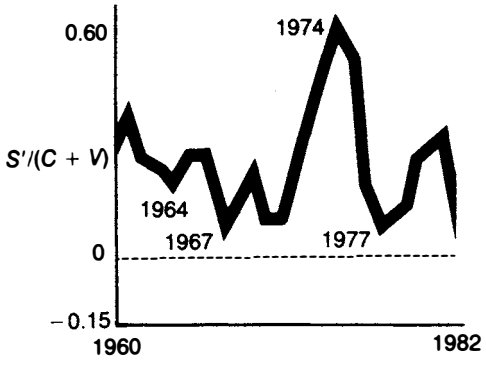


Table 2
Nutritional levels, 1972-79

	1972	1976	1979	Requirement
Caloric intake				
Low income	1934	1645	1486	2492
Medium income	2150	1700	1595	2492
Protein intake				
Low income	52.7	47.6	41.3	56.2
Medium income	65.6	55.6	48.4	56.2

How we modeled a development path

After the historical analysis was completed, we determined a hypothetical development trajectory for Peru. In other words, we answered the question, how would we make the economy grow? We chose to do this from the starting point of 1982, a year in which the underlying weaknesses of the economy were all present, but their effects had not yet been felt. From this point, we would determine a feasible path of development, and only then examine whether, and at what cost, it could be regained after the catastrophes of 1983 and the failure, during 1984, to take decisive action to reverse them.

Our development target was the year 2000, and the first characteristic we looked at was demographic. The population of Peru, 17,295,000 in 1980, must continue to grow. The current population density, less than 13 inhabitants per square kilometer, is scarcely half that of the United States and less than one-tenth that of mountainous Switzerland. The highest estimates for population in 2000 gave a total of 30 million. Of this, we assumed the potential workforce to consist of the age group from 20 to 64, to allow both retirement and the required level of education for technological advancement. Within this, 95% of the men and 45% of the women were considered to belong to the economically active population, for an active workforce of 9.5 million.

The size of the workforce provided one boundary condition for the economy in 2000. Other boundary conditions were determined by the maximum possible rates of growth of particular sectors, for example, capital goods and construction.

Capital goods. No modern economy can survive without the capacity to replicate its own productive capacity, its capital goods. While Peru might remain dependent on imports for certain large items, even in the best case, the rapid growth of the capital goods sector is a prerequisite for continuing and accelerating development. Yearly increases of 6% in productivity and 11% in the size of the workforce were projected for this sector, leading to an 17-fold growth in output over the entire period.

Construction. The construction sector represented another type of emphasis. It combined the requirement of providing productive and necessary jobs for large numbers of people

who should not remain involved in subsistence agriculture, with the necessary task of providing the infrastructure that would allow the development of the trans-Andes region. It was estimated that the sector could absorb an increase of more than 8% per year in the labor force, and that this could be coupled with a yearly 3% increase in per capita productivity.

As part of the emphasis on construction, new cities should be built, both coastal and inland. These would relieve some of the pressure on Lima's overburdened infrastructure, and also serve to bring the reality of development to areas away from the coast. The only truly effective weapons against the coca chewing and the terrorists of Peru's interior will be the creation there of roads, schools, and factories—in other words, progress.

Growth rates in other sectors were determined as secondary results of the growth required by the population itself and in relation to the two key areas described above.

Agriculture. In agriculture, 6 million hectares of new land was brought under cultivation, tripling the current arable land. Most of this was to be developed in the edges of the jungle areas, where provision of transportation, energy, and modern farm inputs would allow rapid establishment of successful farming. At the same time, an absolute decrease in the number of workers was planned, to begin to reverse the current structure of agriculture, in which the average farm operative works 1.5 hectares, and produces a total value added less than two thirds of a living wage for an urban worker. Under these assumptions, total farm output produced for each member of the population increased by 50%.

Transportation. Transportation grew significantly as the overall economy improved and areas outside Lima, including in the interior, became increasingly important as manufacturing centers.

Electricity. Electrical power growth was defined by the requirements of growth in the productive economy. Experiences throughout the advanced sector and in the "miracle economies" like Korea prove that a modern industrial economy cannot develop without a concomitant, and more rapid, growth in electricity availability.

Peru: where the numbers come from

In order to apply the LaRouche-Riemann model to an economy, values for the variables S, V, C, CN, and S' must be calculated. For Peru, as for most economies, we used a value-added national accounting system as the basis for our calculations.

To derive values for V, the tangible goods going to pay the productive workforce in a particular sector, we started with the total wage bill paid in a sector and added a certain amount for independent operators in sectors such as transportation, where an independent operative would actually be performing productive work. All wage packets, without distinction by sector, were adjusted for inflation using the consumer price index, and for the ratio between producer and consumer prices by a value estimated by the Institute. The final adjustment, to eliminate the portion of income that was not spent on tangible goods, was based on studies of the disposition of personal income at various times.

The variable C, the cost of maintaining the physical productive capacity at equipotential, can be considered as analogous to depreciation. However, the depreciation values reported by most governments are primarily reflections of tax policy, and therefore can be very misleading. Instead, we used the same method for Peru that we have used in most countries, basing both C and CN, net new capital investment, on the total capital spending, or gross capital investment (GCI). If the amount of spending required to maintain equipotential is known or estimated for one year, and if the rate of physical depreciation N can be determined, the values of both C and CN can be derived:

$$CN(t) = \mathrm{GCI}(t) - C(t)$$

$$C(t+1) = C(t) + [CN(t) - N].$$

We used this method in Peru, aided by the intimate knowledge of various members of the Institute to help in determining years in which the productive capacity was maintained, shrank, or grew.

The surplus, S, produced by each sector was calculated directly from the value-added statistics for the sector, less the operating costs (in terms of tangible goods) V and C. The LaRouche-Riemann model also requires information on the net reinvested surplus, S'. There is no way to calculate the amount of S' produced by a sector, since the allocation of the total surplus between reinvestment and overhead is a characteristic of the total economy. However, the amount of S' invested in a sector must be reflected in either a change in the tangible wage bill, V, or in net capital investment, CN. Therefore, the level of S' invested in each sector was calculated:

$$S'(t) = [V(t+1) - V(t)] + CN(t+1).$$

The total S' invested in the economy, which is necessarily equal to the total S' generated, was then simply calculated as the sum of the sectoral S'. Apart from net imports or exports, the amount of S not used in reinvestment is the amount spent on overhead, D. Any net exports decrease the amount of S available for overhead spending, while net imports add to the amount available.

The rates of investment necessary to produce and sustain this accelerating growth in electricity, to support an expanded transportation grid and to develop and mechanize the farmland described above, were included in the model run. When all of these were combined, necessary growth rates were estimated and the overall economic picture checked for anomalies, requirements that could not be met using currently known and available technologies. For the model run that used the starting point of 1982, no such constraints were encountered. For the hypothetical run, sufficient reinvestable surplus was generated to carry out the goals of developing the trans-Andes region, maintaining an accelerating tempo of industrial development, and providing productive employment to a rapidly growing population moving away from the destructive dependence on subsistence agriculture. Even net exports grew steadily, though slowly, from the moderate levels of 1982.

The crucial question remaining was the effect of the intervening two years, 1983 and 1984. The hypothetical run had performed its intended function of defining, in a relatively less constrained set of conditions, the definition of a reasonable pathway of development for Peru. The last and most difficult phase of the work was to see whether this pathway of development could be reached from Peru's actual current economic condition, which had collapsed during the agricultural reverses of 1983.

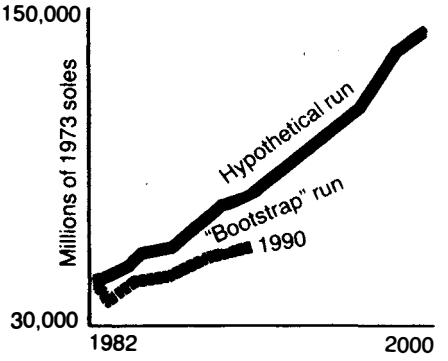
Where could the free energy to reverse the current situation be found? To accord with the current realities of the world financial situation, in this step of the model we did not allow any net imports, and imposed, after two years, a slow but growing schedule of net exports to maintain foreign exchange availability. It was our view that for the plan to be believed, it would have to rely on internal resources alone.

In considering the historical record, it was clear that the agricultural situation was considerably worse, even in 1982, than it had been in earlier years. Yields had generally fallen, land under cultivation had decreased, and relatively large government investments in irrigation projects had shown little return. Agriculture, therefore, appeared to be an area in which a limited, concentrated effort could rapidly produce a certain amount of surplus production to fulfill the most immediate needs of the economy.

A detailed analysis showed that food production could be increased to the level where most imports would be replaced (except those products like wheat, which are difficult to grow in Peru for climatic reasons) and a large increase in salable crops, particularly cotton, could be produced at the same time. The replacement of food imports could be accomplished in three years, and would save an estimated $276 million each year from that point on. Increases in exports of cotton and other commodities would be yielding more than $500 million by that time, and this level could continue to grow. This increase in agricultural productivity could not be accomplished without cost, but the costs incurred—for mechanization, irrigation, improved farm wages, and the

FIGURE 11

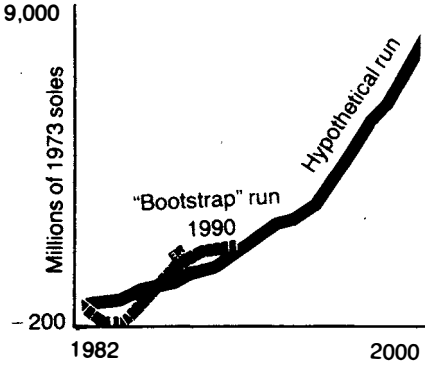
Hypothetical model run vs. 'bootstrap' run, 1982-2000: gross domestic product, agriculture



Both the hypothetical run and the "bootstrap" run, which takes into account the collapse that occurred in 1983, show an increase in agricultural production, although the bootstrap path is much slower.

FIGURE 12

Hypothetical model run vs. 'bootstrap' run, 1982-2000: net investment in capital goods



Again, both the hypothetical run and the "bootstrap" run show an increase in investment in capital goods.

like—are those that would be desirable in any case.

The other "bootstrap" mechanism we identified was an increase in domestic procurement of capital goods. Although the capital goods industry of Peru had never been well developed, the attempt to avoid charges of "protectionism," coupled with a wide range of petty corruptions, had led to a significant fall in the use of Peruvian-made capital goods since 1980. A tariff policy of high duties on goods that could be produced competently within Peru, coupled with extremely low tariffs on any items these industries required that could not be domestically produced, could result in savings of up to 23% of the current yearly import bill for capital goods. Although this would not be of concern under present policies, which are moving toward a total cutoff of imports to "save foreign exchange for debt repayment," it is a requirement if development is to occur. In our outlook, foreign exchange should indeed be saved, in order to pay for the required items such as large generators, numerically controlled machine

tools, and so forth, which Peru itself will not be able to produce in the near future.

The "bootstrap" run, using the available surplus generated by the means described, produced results that are both theoretically interesting and vitally important to the citizens of Peru (Figures 11 and 12). We showed that *the conditions under which growth would be possible can be reached again,* but under extremely strict assumptions. These assumptions include no increase in wages for most of the workforce, small wage cuts for some of the highest-paid sectors, and a policy of telling the consumer goods and intermediate goods sectors of manufacturing to "get along" on their existing capital investment.

Electricity investment can be maintained, as it must be. Food supplies can increase, and a few modern fishing boats can double the per capita fish intake and thus improve protein consumption, which has dropped so disastrously. Agricultural wages in the areas of increased crop production do rise, although not as rapidly as in the hypothetical run, and agricultural workers drop as a percentage of the total workforce, although not in absolute terms.

The role of outside investment

These results, however, are achieved at the expense of the development plans for the trans-Andes area, and also at the untenable expense of maintaining a large portion of the rural population on the same tiny plots that now average just over 1.5 hectares per worker, with the same brutally low incomes, now estimated at less than $700 per year.

To make the immediate requirements for recovery and future development less harsh will require collaboration with other governments concerned with developing the Andean area. Those governments that do not wish to see a seedbed of human misery and terrorist recruitment continue, must work together to devise the specific investment program that would overcome the limitations imposed by the last few years and return the country to a condition in which full-scale development can occur. The results of the Peru model also indicate what can and must be done to maintain the potential of development until such agreement can be achieved.

The LaRouche-Riemann model is not a magic wand by which the effects of centuries of poverty or years of capitulation to the brutal demands of the international financial system can be reversed by changing one's point of view. In the case of Peru, the damage that has been done will continue to affect the lives of millions, unless effective international action changes the limits that we describe for development without any outside investment. Nevertheless, contrary to those who throw up their hands and say the situation is hopeless, there is a possibility for Peru to survive as a functioning national economy, maintaining the potential for growth and development. It means some difficult decisions, and in the best case, some immediate economic collaboration in the region.

The LaRouche-Riemann analysis: a glossary

The LaRouche-Riemann model analyzes the following categories and ratios of economic output:

V: Variable capital, or the wage costs of households economically engaged in the production of tangible wealth, measured in terms of their consumption of tangible goods.

*C*1: Raw materials costs of capital inputs.

*C*2: Replacement costs of plant and equipment in terms of the physical volume of capital goods requred to make such replacements.

CN: Net capital investment, or investment of capital goods in excess of replacement costs.

S: Tangible profit (surplus), or output of tangible goods in excess of the production costs of tangible goods during a given production cycle (production costs equal tangible wage costs plus raw materials costs plus replacement costs).

S′: Reinvested tangible profit, or the component of surplus that is returned to production of tangible goods; the components of the reinvested profit are net capital investment and the margin of expansion of the tangible wage bill and of raw materials inputs.

$S - S'$: Overhead costs, or the component of surplus that is diverted from production of tangible goods to meet the requirements of private and government services.

S/V: Labor productivity, or production of surplus per unit of tangible wage input.

$S/(C1 + C2 + V)$: Total economic or thermodynamic productivity, or production of surplus per unit of labor plus capital inputs. It should be noted that this is both a productivity and a productivity-growth measure. This form of analysis weighs current output from the standpoint of its contribution to future growth, and its measure of productivity, therefore, is the extent to which current inputs of tangible wealth into the production process contribute to the economy's capacity for growth.

$S'/(C1 + C2 + V)$: The rate of reinvested surplus, or the reinvestment of surplus relative to the production costs of the total tangible output of the economy.