The LaRouche-Riemann model shows industrial transformation

by Dr. Steven Bardwell

Alexander Hamilton, one of the greatest American economists, rigorously identified the central concept of any industrial development program:

> The employment of machinery forms an item of great importance in the general mass of national industry. 'Tis an artificial force brought in aid of the natural force of man; and, to all the purposes of labour, is an increase of hands; an accession of strength, unencumbered too by the expense of maintaining the labourer.

"Artificial labor" solves the three essential paradoxes of development:

1) Labor power development: a skilled labor force is required to run the machinery of an industrial plant, yet this labor requires the output from that industrial plant for an urbanized, modern standard of living. Without that standard of culture, this labor force cannot function.

2) Infrastructural development: a functioning industrial economy depends on an efficient transport and warehouse system, reliable and plentiful energy, and a dependable communications system. In proportion to the speed, reliability, and efficiency of this infrastructure, an industrial plant is productive. Yet, all the raw material of this infrastructure requires the output of industry—railroads require steel, etc.

3) Machine tools and capital goods: every aspect of industry depends on machinery, especially the machinery that makes other machinery (machine tools). Yet, these capital goods can only be manufactured by industry.

Application to Mexico

To address these "paradoxes" of development in Mexico, the AMEF-FEF program prescribes a aggressive use of oil revenues to purchase the capital goods necessary for industrial growth; a Korean-style infrastructural construction program to solve the bottlenecks in water availability and transport; and finally, a serious program to discourage growth of the subsistence agriculture sector, combined with incentives for urbanization and education of the peasant populations.

Based on historical examples provided by the industrial development of Europe and South Korea, it is clear that growth rates in excess of 10 percent per year (in

Figure 1
Total tangible output
Trillions of pesos

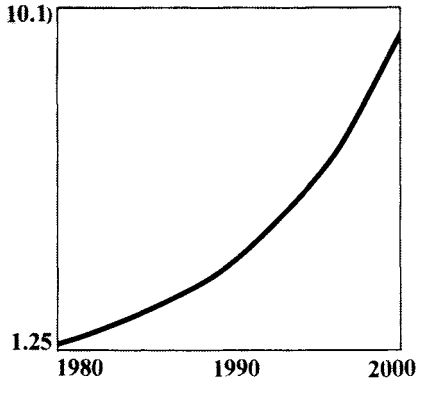


Figure 2
Total tangible output
Trillions of pesos (logarithmic scale)

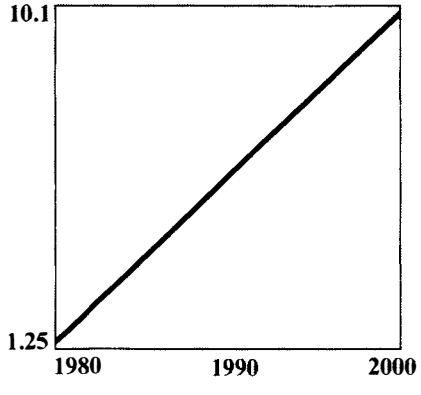
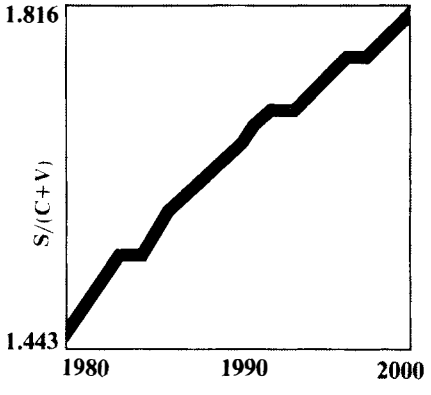


Figure 3
S/(C+V) total economy



tangible output) are not only possible, but, in fact, necessary if employment and productivity are to grow. In the experience of these countries, there is a direct correlation between periods of growth rates greater than 10 percent in industrial sectors and falling unemployment. South Korea, for example, experienced an average growth rate for almost 10 years of 13 percent per annum, and urbanized a population which was, in 1960, more rural than India today.

Figures 1 and 2 show the total tangible output of the Mexican economy under the AMEF-FEF investment program. As Figure 2 shows, we have demonstrated the feasibility of an average growth rate in real terms of approximately 12 percent over 20 years. This growth rate results in a roughly 8.5-fold increase in the size of the Mexican economy over two decades.

The composition and efficiency of the economy changes both as a means and end of this growth. Figure 3 shows the rate of "economic energy" generation in the economy. The gross tangible profit generated by the economy is shown as a ratio of the equilibrium or replacement costs for production. This fundamental measure of productivity of the whole economy shows a rising tendency over the course of the 20 years of our program. But, as Figure 4 shows, the fact that this ratio rises at a decreasing rate is due to the decreasing role of petroleum and the conservative assumption made in our program of no qualitative new technology taking its place. Figures 12 and 13 give a quantitative indication of the changing character of the Mexican economy as it industrializes. In spite of the last 15 years of economic growth, Mexico is, in 1980, a largely agrarian economy (in contrast, for example, to Korea). This agricultural sector is rapidly replaced, after 1980, by the petroleum sector and after 1990, the industrial sectors. Agriculture's growth rate shrinks from 9 percent per year to 6 percent by the year 2000, while industrial sectors increase from 11 percent to 15 percent per year. The most critical phase of this growing contribution of industry to the Mexican economy is in capital goods, which grow steadily from 1980 to 1990 and then, in what is a turning point for the Mexican economy, in 1991-95, grow at an accelerating rate. By the year 2000, capital goods must be as large a part of the Mexican economy as agriculture.

To accomplish these goals, a unique strategy of "concentrated investment" has been developed. The construction of agro-industrial complexes—nuclear factories producing fertilizer, industrial raw materials, and energy—are the centerpoint for waves of rapid growth, education, and technological change. Much in the way that the Koreans used the textile industry, these new cities, and the industry they create, will be the stepping stone to countrywide industrialization.

Rapid rates of industrialization

The driving force of this process of industrialization is defined by the rate at which reinvestment occurs—S′/C+V—shown in Figure 5. This "free energy ratio" expresses the ability and willingness of an economy to productively invest tangible surplus. As long as this ratio is rising, an economy is functioning in a mode where its current consumption is directed not merely to replacement of inputs, but also to preparation for succeeding modes of production.

In engineering terms, the success of rapid industrialization requires high rates of capital intensity, shown in Figures 6 and 7. The ratio of capital used to productive employees' consumption shows the amount of "artificial labor" at the command of the workforce. This ratio rises, in all sectors (see Figure 7), but rises about twice as fast in the industrial sectors as it does in agricultural

Figure 4
Annual rate of growth of S/C+V) total economy

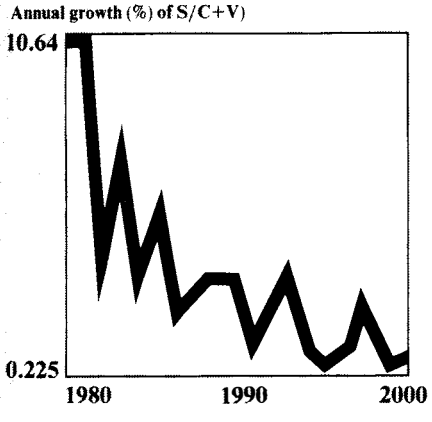


Figure 5
S′/(C+V) total economy

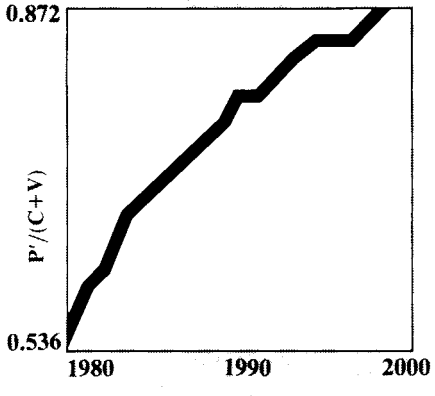


Figure 6
Capital intensity of the economy

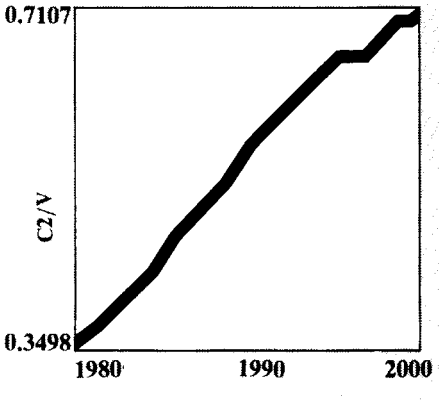


Figure 7
Capital intensity by sector

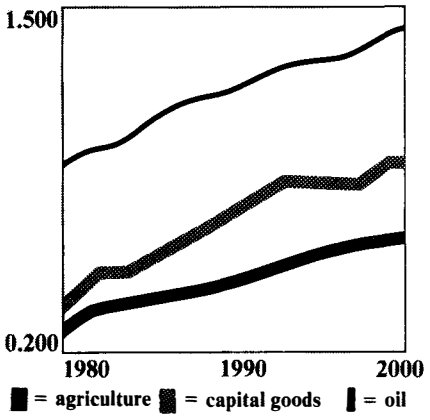


Figure 8
New capital investment by sector
Billions of pesos

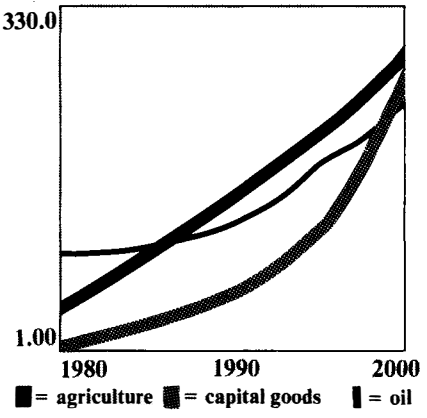
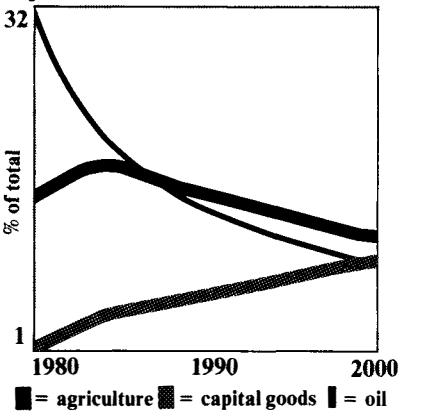


Figure 9
Sectoral distribution of new capital investment



sectors. This differential rate of capital intensity is the most important feature of the relative emphasis that must be given to industry. Figures 8 and 9 show the same feature in terms of new capital investment.

The key to Mexican industrialization is the surplus generated by the petroleum sector. This surplus comes from large rates of investment in that sector. However, as Figure 9 shows, the Mexican economy must rapidly change from a raw materials exporter to an industrial producer—this transition occurs in an irreversible form during the early 1990s. This transition cannot take place earlier without seriously slowing the rate of growth of the economy and, perhaps, missing entirely the chance for industrialization.

Urbanization and manpower development

Figure 10 shows the changing living standards of the Mexican workforce. While levels of consumption (of tangibles) increase rapidly (at about 8 to 9 percent per year), in all sectors, the relative portion by sector of consumption changes dramatically over the course of Mexico's industrialization. The dominant tendency is the decrease of agriculture from almost 25 percent of the consumption (higher in number of workers since the average wage is lower in agriculture) to about 14 percent by 2000. The industrial sectors account for two-thirds of the consumption by the year 1991, the beginning of the final transition period (see Figure 11).

As important as this general shift in composition of the workforce is, the more critical element is the rapid decline in the subsistence agriculture workforce after 1984. This sector, since its level of services and nonproductive consumption exceeds its productivity, is a net drain on the economy. That is, it is not only unproductive in a relative sense, it is actually parasitic on the rest of the economy. Without the most rapid possible disappearance of this sector—and the misery, poverty, and ignorance that it means—Mexico cannot develop. Fig-

Figure 13
Total tangible output by sector

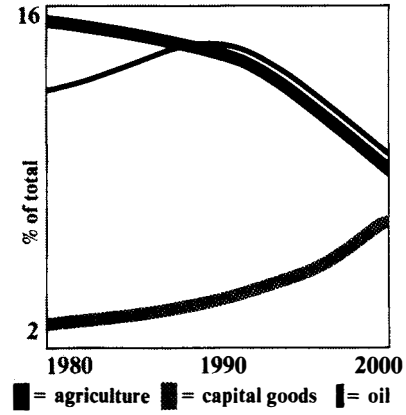


Figure 14
Tangible consumption in the two agricultural sectors
Billions of pesos

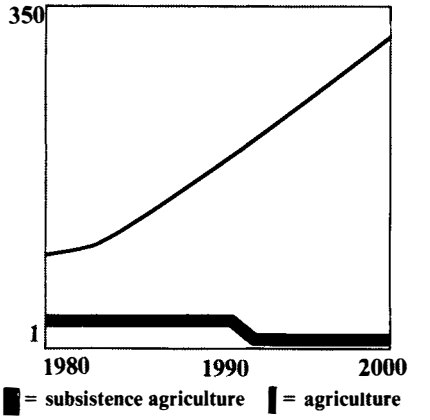


Figure 15
Total tangible output: comparison of strategies
Trillions of pesos

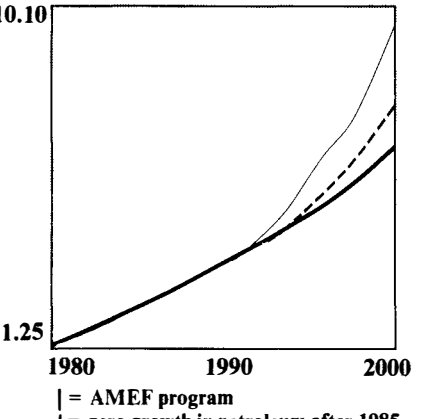


Figure 10
Tangible consumption of productive workforce by sector

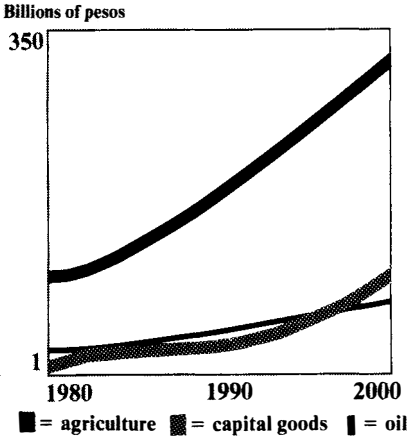


Figure 11
Sectoral distribution of tangible consumption of productive workforce

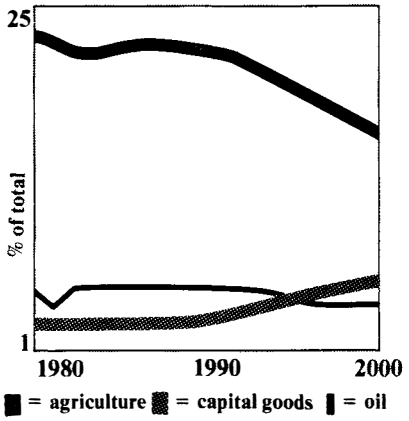
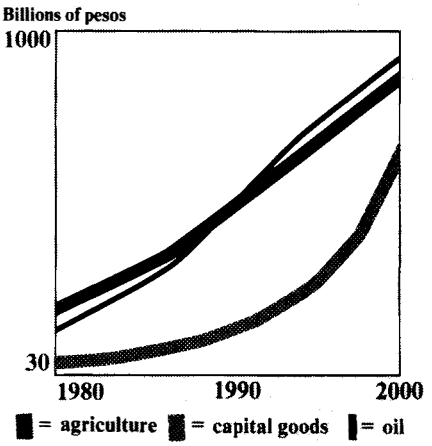


Figure 12
Total tangible output by sector



ure 14 shows the rapid change in the composition of the agriculture sector required for industrialization. The subsistence sector, which accounts for more than one-quarter of agriculture in 1980, shrinks to less than 1 percent by 1990. This must occur not only for the productivity of the Mexican economy, but, even more, for the human potential that such a transition implies.

The alternative

There are two dominant features of the Mexican development program described here: 1) the aggressive exploitation and export of petroleum; 2) the rapid destruction of the subsistence agriculture sector.

The advisability of both of these steps has been challenged by various representatives of the World Bank, the United Nations Institute for Training and Research (Unitar), and even some officials of the Mexican government. Two alternative simulations were prepared which contrast these options with the investment strategy proposed by the AMEF-FEF. In the first of these, we assume that oil output is held constant after 1984, at approximately 2.5 to 2.7 million barrels per day. The second of these invests the surplus that would have been used in petroleum's development, in the sector that "needs it most," subsistence agriculture.

The results of these differing investment strategies are contrasted in Figures 15-18. Even under very generous assumptions of the negative impact of the other investments, the total output of the Mexican economy is about 80 percent of its size with the slower petroleum investment (by 1999) and about 65 percent of its possible size if this investment is diverted to the subsistence agriculture sector. Consumption in agriculture suffers even more (as shown in Figure 16)! As Figures 17 and 18 show, such a plan would doom the Mexican economy to the permanent status of an agrarian economy—productivity and capital intensity are so low that industrial development becomes impossible.

Figure 16
Tangible consumption of productive workers in agriculture:

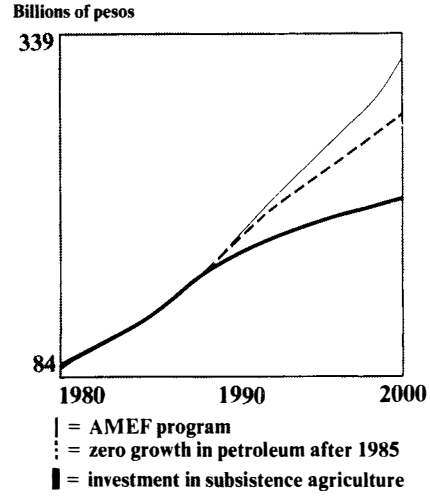


Figure 17
Productivity: comparison of strategies

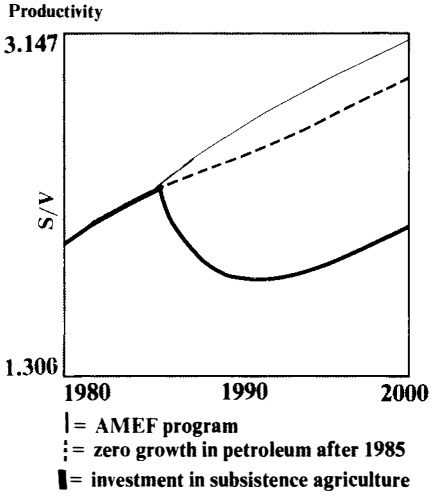


Figure 18
Capital intensity: comparison of strategies