



Environmental Policies and Full Employment

*Mason Gaffney**

A LIVABLE ENVIRONMENT AND PLENTIFUL WORK OPPORTUNITIES ARE BOTH OF THE ESSENCE

In order to protect the environment, we are going to have to face up to the chronic (and now acute) problem of mass unemployment. To save jobs and make jobs we now tolerate polluting mills and vehicles; we chew up more earth each year for energy and materials; we secure and protect mineral rights abroad at great material, environmental and human cost; and we put fat in government budgets, for peace as well as war.

In order to protect and improve our society, too, we must solve the problem of unemployment. Social health and environmental health are compatible, complementary objectives. Some people need work to give meaning to their lives; some to relate constructively to others. Some need work to earn their bread; others to frost their cake. But no society has flourished or long survived when many of its people could not find useful work. When they can't they turn to useless, then obnoxious, then destructive activities. So long as employment is insecure and uncertain, so long will the environment be

*Mason Gaffney is Executive Director at the British Columbia Institute for Economic Policy Analysis. He wishes to express his thanks to Resources for the Future, Inc., for research support. A more technical expansion of the ideas in this chapter is in the writer's "Toward Full Employment with Limited Land and Capital" in Arthur Lynn, Jr. (ed) *Property Taxes, Land Use and Public Policy* (Madison: U. of Wis. Press, 1976) pp. 99-166.

sacrificed to it, along with price stability, a measure of freedom, and a measure of world peace.

Along with short work we face a swelling array of derivative evils: crime, alienation and counter-culture, protracted apprenticeship periods, soaring welfare and dependency, frustration of idle housewives, forced early retirement and geriatric ghettos, imperialism to make jobs and acquire raw materials, weapons constituencies, other pork-barreling, benign approval of waste, slowdowns, featherbedding, fear of change, stunting of creativity through grasping for tenure, seniority and security, suppression of competition, make-work building codes and union rules, loss of flexibility and mobility, and rejection of the free market. All these evils have their independent roots in human weakness, but are inflated by unemployment and the fear of it.

Some unemployment is iatrogenic (caused by the doctor). Critics of welfare point out how welfare payments have boomed into a cause of unemployment. Since work shortage also serves to rationalize welfare, we have a vicious circle. But there is little doubt which came first, nor is there much doubt that we can solve the problem humanely only by opening more jobs, regardless of the direction of welfare reform.

Each of the derivative evils, like welfare, could be a study in itself. Yet until we face the elemental riddle at the fountainhead of all this trouble, each such study only diverts us from meeting the ultimate challenge for economists that Henry George defined in 1879: "Though custom has dulled us to it, it is a strange and unnatural thing that men who wish to labor, in order to satisfy their wants, cannot find the opportunity." "There can be no real scarcity of work . . . until all human wants are satisfied" [1]. That central paradox for economists remains unresolved. We suffer shortages while men and women are out of work. Why cannot the idle persons find work to meet and fill the shortages?

Is it an excess of productive capacity with inadequate demand? Double-digit inflation bespeaks enough dollars of demand—in point of fact, too many. Environmentalists are aware that the natural resource bases of production have risen steeply in relative value for many years now, forcing ever-escalating pressures on the land. Businessmen and home buyers are aware of a capital shortage. Raw materials are high, even though their social cost is higher than their revealed market prices owing to massive subsidies and tax favors. It is only labor that appears to be in long supply. There is plenty of demand for land and capital, goods and services.

The United States which used to soak up displaced world labor

("Bring me your tired, your poor, . . .") to match its mountains and amber waves of grain, now instead reaches out to exploit the raw materials of others, and wonders if payrolls could grow or even stay the same without them. U.S. wage rates, once the wonder of the world, have declined since 1960 relative to many other countries. The great world financier is beginning again to import capital and fret about rising foreign ownership.

The force behind these changes has to be, and is that the coefficients of land, materials and capital used per worker and consumer have risen sharply for many years. We are bumping into the implacable logic that if we require a vast complement of resources per worker we will chew up lots of resources and push on the limits of Earth and the tolerance of other nations. If we require high coefficients of capital and land per worker, then capital and land set the limits to growth of jobs and consumption.

With labor surplus, and land and capital short, the needed adjustment would be evident to any reasonably bright 12-year old: lower the land and capital used per person. The solution is obvious, intuitive, and altogether correct. In *Economese* the appropriate phrasing is more labored but not too obscure: We need to substitute labor for land and capital, at the margins of course, making all processes more labor-using. Thus we would increase the use of labor without pushing on the limits of Earth, without invading others' land and without needing more capital.

THE GROWTH ISSUE—A RED HERRING

It is not a question of stopping "growth." There is no need to divide into factions for and against growth. We can grow by combining more labor with the same land and capital. It is simply a matter of modifying processes and products and consumption [2]. Each time the capital recycles it can embody new techniques as well. Growth of capital is not needed for progress; turnover is. And since the way to substitute labor for capital is to turn over capital faster, this also accelerates embodiment of new knowledge in real capital.

We can also create more capital if we wish, as much or as little as we please. We are certainly better off with more, but we can do with what we have. No matter how much we have and create, we will still have people out of work if we continue to match each 5% increment of capital stock with, say, a 10% increment in the capital coefficient per job. Capital formation is not enough. It is not even necessary. We could match the work force to the present or a lesser stock by lowering the capital coefficient. I don't recommend that but it is entirely

feasible. Prevailing doctrines greatly overstress the role of net capital formation.

The Keynesian school has taught that the key to making jobs for labor is to make work for capital: investment outlets to absorb excessive savings. It imputes powerful, almost magical leverage to increases in net investment flows, multipliers now built into models used to forecast and control the economy. Newly ascendant conservatives plump for more saving to provide required capital to make jobs. Both schools make net capital formation the focus of concern. This diverts them—and almost everyone—from the much larger matter of how the capital stock is used. To match labor with capital we need to stop increasing the capital coefficient per job. Again, since the way to do that is to replace and turn over capital faster, the result is to increase the gross flow of payroll-generating investment. *Turnover* is the key concept. Most job-making investment flows represent reinvestment of capital recovered by sale of final goods, not net investment of new savings. We can raise *gross* investment without *net* investment simply by turning the stock faster. Of this, more later.

THE MOST WANTED SOCIO-ECONOMIC GOALS ARE COMPATIBLE

That leads toward a thesis that we can employ ourselves as fully as we wish without any of the unpleasantness we now suffer in the name of jobs: without inflating, without borrowing, without fighting, without polluting, without any compulsion to “grow,” “develop” and expand, without wasting, without price and wage controls, without invading more wilderness, without impoverishing posterity, without socializing labor or capital, without *dirigisme*, without giving up freedom, and without overspilling our national boundaries. Economic policy can offer better than the dismal choices among inflation, unemployment, pollution and socialism now being thrust upon us in the name of facing reality.

The problem is too much displacement of labor. It is “too much” because it results from biased institutions, a large set of them, operating over many years, which artificially induce substituting land and capital for labor. The way to solve the problem is to identify and remove the biases. This will increase demand for labor without requiring any more natural resources or capital.

No special rate of growth is required. We simply need to grow (or even not grow) in such a way as to combine each worker with less land and capital than now; to run with a leaner mixture of wealth, richer of labor.

There is no need to go any further and reverse the bias in favor of labor. The operation of a free market with flexible prices to serve as equilibrators should do the job. The idea is to make jobs not by waste, but in the very process of mixing inputs more efficiently. This is the sort of thing that a flexible economy can do—this is why they invented the free market. Just as the United States could retool for war quickly back in 1942, given the will, now we can retool for new jobs quickly given the will, the freedom, and know-how in framing public policy.

The possibilities for reducing resource coefficients of work and consumption are far greater than most people have any idea. We know that change is possible, for change is what got us here from there and what man hath wrought, man can unwork. But we need not go backwards. We only need look to realize that the man/land ratio varies over a wide range all around us today.

Just for example, here are some data on farm land use on the east side of the San Joaquin Valley, California. The data refer to neighboring lands, generally, of comparable quality and in the same markets. The differences therefore display that factor mix is sensitive to shadings of input prices so slight that they are not equalized by the market—differences internal to families and firms such as result from credit ratings, tax positions, political connections and other institutional biases. For example, an immigrant with many children goes heavier on labor, a speculator with friends in the banks and the Capitol favors lands, while a doctor with income to shelter might invest heavily in depreciable capital.

In the San Joaquin Valley, east side, land is versatile among many competing uses. These range from dryland grazing up to citrus, fresh tomatoes, and berries. Dryland grazing might gross \$15 from the animal unit; berries might gross \$1,500 a year, 100 times as much. The specific prices are subject to secular and cyclical and inflationary change, but the basic principle is not: the same land yields a little or a lot, depending on what you do with it. Table 6-1 is a crop report gathered by the United States Bureau of Reclamation from its Friant-Kern Canal Service Area. Not all the land is versatile among all the options, but a close study of the area has shown that the margins between the uses are ragged [3]. Almost every area has several options, and many of them are choices between the highest and the lowest gross. To get high yields, of course, requires more labor per acre.

Labor's share of gross rises with intensity, defined here simply as nonland inputs \div output. For grazing, this is on the order of $\$6/\$15 = 40\%$. Grazing is land-intensive. For berries it is more like

$\$1,400/\$1,500 = 93\%$. Berries are labor-intensive. Grazing and other unirrigated uses are not shown in Table 6-1, which shows the high variation of yields on irrigated land only.

Of course the return to land from crops like berries or tomatoes is highly leveraged and volatile, as a short-run gamble, but that is not our concern here. Averaging out the good years and the bad, the return to land from truck crops is very sensitive to wage rates and other costs of hiring like payroll taxes. A slight rise of 7 percent nearly wipes out the rent; a drop of 7 percent nearly doubles it. But the same wage changes would little change the returns to land from grazing. Thus a slight drop of labor costs applies great pressure to shift land to berries and tomatoes and other high-yield, labor-intensive crops, making a very elastic demand for labor.

The scope for this kind of change is manifest in the fact that most of California's prodigious farm output comes from a fraction of her good farm land, that which is used intensively. For example, of the

Table 6-1. Crop Production, Friant-Kern Canal Service Area

<i>Crop</i>	<i>Acres</i>	<i>Value Per Acre (\$)</i>
Barley	15,696	51.09
Corn	10,490	96.68
Rice	907	167.66
Sorghums	17,279	74.77
Wheat	3,176	87.85
Alfalfa Hay	63,460	144.11
Irrigated pasture	17,388	77.66
Beans, dry and edible	4,293	107.14
Cotton, line (upland)	108,928	352.80
Asparagus	1,383	418.70
Beans (processing)	27	900.00
Beans (fresh market)	75	975.33
Corn, sweet (fresh market)	254	205.91
Lettuce	423	336.51
Cantaloupes, etc.	507	547.02
Onions, dry	686	495.70
Potatoes, early	12,711	366.04
Tomatoes (fresh market)	1,343	881.16
Alfalfa	1,279	151.79
Berries (all kinds)	80	1,215.60
Oranges and tangerines	24,952	915.51
Grapes, table	43,795	545.24
Olives	7,172	327.45
Peaches	6,371	644.38
Prunes and plums	3,288	674.00
Walnuts	1,374	338.14

Source: Sacramento Office, U.S. Bureau of Reclamation, 1958. Minor crops omitted. Data refer to irrigated land only.

several million acres of irrigable land in California, there are only about 21,000 acres in plums, 36,000 in freestones, and 65,000 in navels [4]. Most California farm land is used at lower intensities, using little labor to yield barley, alfalfa, forage pasture, hay, sorghum, safflower, rice or cotton.

In irrigated farming water is an indirect land input, since a water right is the right to the water yield of a vast watershed. One might then think the truck crops really use a lot of land in the form of irrigation water. But in fact the high-grossing crops such as tomatoes, citrus, peaches and berries are modest users of water. Pasture, alfalfa, and rice are the heavy drinkers, and they yield only \$50–\$200 per acre, not one-tenth of the high yielders.

PRESENT LABOR USES ARE REGRESSIVE

The high-grossing crops use more labor per acre not just in the fields, but in the packing houses, the railroads, the stores and the kitchens. A \$1500 berry crop will use more labor at every step to the consumer than a \$15 weight gain on a calf, do it sooner, and much more often. Thus a higher use of labor in the field increases demand for labor beyond the field. Reciprocally, lower costs between consumer and farmer, raising field prices by say 7 percent, would (in our example) double land returns from berries and increase demand for labor on the farm.

For another and briefer example in Iowa, a more uniform state, Shrader and Landgren have calculated that if all farmers followed the standards already practiced by the most advanced farmers, Iowa alone could supply the nation's output of feed grain [5].

Now that's agriculture, where people often suppose that yields are hard to raise and depend only on genetic miracles, fertilizers and green revolutions. Turning to other human activities, we find even greater dispersion of resource coefficients. Table 6-2 shows value added per kilowatt-hour (or equivalent energy) in various industries. The numbers speak for themselves.

E.F. Schumacher has struck a responsive chord with "Small is Beautiful," relating size of enterprise to high resource coefficients. Although size is only one factor involved, the data bear him out. The use of labor on property tends, over a whole economy, to be regressive. The *U.S. Census of Agriculture* ranks farms by gross sales. "Class I" farms, those grossing \$25,000 or more per year, had 22% of the land in farms but only 7 percent of the labor in 1950.

Turning to "industrial" corporations, the regressive use of labor on property may be inferred from data in *Fortune* magazine's yearly re-

Table 6-2. Energy-Efficiency in Dollars of Value-Added per Kilowatt-hour (VA/KWH),^{1,2} for Selected Industrial Groups

<i>Industry Group</i>	<i>VA/KWH</i>	<i>Industry Group</i>	<i>VA/KWH</i>
Cookies & crackers	.91	Blast furnaces & steel mills	.033
Book printing	.50	Primary copper	.020
Millwork plants	.36	Paving mixtures	.018
Wood furniture	.28	Paper mills	.016
Fluid milk	.13	Pulp mills	.015
Frozen fruits, vegetables	.12	Petroleum refining	.012
Yarn mills	.12	Beet sugar	.010
Sawmills	.083	Brick	.008
Wool weaving mills	.048	Primary aluminum	.007
Aluminum rolling & drawing	.048	Cement, hydraulic	.006
		Lime	.004

1. KWH equivalents are used where relevant.

2. Source: Dr. John Wilson, citing *U.S. Census of Manufacturers*, 1967, (personal letter from Dr. John Wilson to Dwayne Chapman, Jan. 16, 1974).

Table 6-3. Profits Per Employee, Large and Small Industrial Firms, Ranked by Net Worth [6]

<i>Group</i>	<i>Net Worth (\$000,000)</i>	<i>Profit After Taxes (\$000,000)</i>	<i>Employees (000)</i>	<i>Profits/ Employee (\$)</i>
Top 10	40,090.	5,470.	1,662.	3,291.
All 500	133,660.	14,839.	9,966.	1,489.
Lowest 10	116.	8.826	29.687	297.

Source: Calculated from data in *Fortune Magazine*, (New York: August, 1964).

port on the largest 500. I tested the thesis by ranking them by "net worth" or invested capital, and calculating profits (after taxes) per employee. Table 6-3 shows the broad results. The choice of profits/employee to test the case premises that profits in general are the realized earnings of and some index to the real assets of a firm. In fact, if the larger firms use their property less intensively (as this and other evidence suggest) then their realized profits as an index understate the assets of larger firms compared to smaller ones.

GOVERNMENT THE ARCH WASTREL

Can public employment save the unemployed? Not likely: government is the largest firm of all and the least labor-intensive. That's right, the least. It has a reputation for wasting labor, and in some cases conspicuously does. But it is more prone to waste capital and

land. It pays the market for labor, while it borrows below the market. As to land, it still holds much more than anyone, tax free and unmortgaged, with little internal pressure or shadow price to reflect the foregone gains.

The military, for example, holds 20 percent of San Francisco and Washington, D.C. virtually idle. The annual value of this kind of lavish land input does not appear in the budget. The National Forests use much more capital (as timber) per man employed than do private ones, especially small private ones, a fact of which Forest Service doctrine makes a virtue. Richard Muth has concluded that the outstanding distinguishing trait of public housing is its higher capital intensity [7]. Civil engineers, generally working for governments, have become notorious for producing white elephants by treating capital—not labor—as a free good, and for overstating future benefits next to present costs by using low interest rates [8]. One can justify any project using a low enough interest rate, and ignoring land costs, and many agencies have, because at zero interest the present value of future rents in perpetuity equals infinity.

Private utilities are capital-using, of course. But governments supply the most capital-using utilities, like water and sewer which are increasingly costly because of urban sprawl. Governments are always called upon to put up social front money, to push back and invade frontiers, territorial and otherwise, where the payoff is too slow for private capital.

Public buildings (other than schools) are often monumental, baroque, cavernous, marbled, and better sited than their function warrants. For productive employment small is beautiful, but government is ugly.

Government freezes up capital in public works, much of it at low productivity. Ironically, much of this is done in the name of making jobs. On balance, it destroys jobs by inactivating capital.

RETHINKING "PRODUCTIVITY" AND "EFFICIENCY"

But how about productivity and efficiency? Is not maximum output per worker the goal of economic organization and the index of success? No, it is not. Many economists have for decades now seriously misled themselves and others by speaking loosely of "productivity" as output per worker, even though their own elementary theory textbooks taught better. Defining efficiency as output per worker is a perverse concept with a built-in bias against employment. Only recently with new studies of energy-efficiency and more sophisti-

cated ones of "total factor productivity" are most people beginning to escape this single-minded preoccupation with economizing on labor at any cost.

Substituting capital and land excessively for labor raises "efficiency" only by wasting capital and land and unemployed labor, and only seems efficient in unrealistic models where land and capital are underpriced and unemployment is ignored. High labor-efficiency then means low land-efficiency and low capital-efficiency, either directly or at one remove in the form of low energy-efficiency, low water-efficiency, low feed-grain efficiency, etc. Capital is not free—saving is a sacrifice, too. Land is not free to a nation—past and present military outlays attest to that. And unemployment is not to be confused with voluntary leisure. The time and talent of the unhappy idle is wasted and worse, used to make trouble for others.

Misled by the goal of labor "productivity" we have exulted in high output per man as a symbol and measure of national and company success, and accepted an extreme substitution of capital and resources for labor. The well-known displacement of farm labor is not an exception, but more like the rule. John Kendrick calculated that the ratio of capital to labor for a large group of industries in the United States rose at an average annual rate of 1.3 percent from 1899–1953 [9]. That means a 100 percent increase over that 54-year period. More recently, the United States Department of Commerce studies nonfinancial corporations, 1948–1971. It found capital inputs growing at 4 percent yearly compounded and labor at 1.2 percent [10]. That means there was 2.5 times as much capital in 1971, with 1.3 times as much labor, or 1.9 times as much capital per worker in 1971. Thus the rate of substitution seems to be increasing.

And that's not really the half of it. These studies omitted the public sector, the infrastructure into which we have poured so much public treasure at low interest rates. They omitted housing, which soaks up so much capital per job created. They omitted the recreation boom which requires so much more land and equipment per consumer hour, and per measure of personal job, than the quiet pleasures of yesteryear. And they omit the swing of consumers toward goods and services like electric power and natural gas, whose production is capital-intensive, and whose prices fall relative to labor-intensive products when the capital input is subsidized. Producers as well as consumers use much more of these as inputs. A primary metal like aluminum will consume 135 kwh per dollar of value-added, compared to 10–20 in a normal manufacturing operation. It is energy inefficient and thrives only on underpriced energy, thanks to which

it is cheap relative to competing materials. For years we have been substituting capital and energy for labor and calling it progress and efficiency, only to find that capital and energy are scarce, and labor surplus.

HOW TO INCREASE THE LABOR COEFFICIENT

All right, so efficiency as well as full employment call for increasing the labor coefficient of land and capital. How do we do that? Anyone can see what it means to use more workers per acre—no problem there. Anyone can see, too, what it means to use more men per crew, or use more shifts with given plant, machinery and equipment. Ah, it should be so simple. But who then produces the plant, machinery and equipment—who but labor? There is the problem. Capital is stored-up labor. If we use less stored-up labor per worker, are we not just substituting labor for labor? What is the difference; where the net gain of jobs?

Shop A may equip each of its workers with a smaller or less sophisticated machine, and use more workers. Then Shop B, which produces the machines, needs fewer workers. And Shop A itself may produce cement, the capital for Shops C, D, . . . Z, capital whose obviation would close Shop A. It is tempting to gloss over all that by saying if every shop and farm, mill and mine, office and store, firm and agency, gang and crew, squad and corps, family and kitchen, all up and down the line from the earth to the mouth just used less capital per worker it would all work out. Maybe it would, but maybe is not good enough. If we hadn't enough doubts of our own, modern macro-economics which dominates this field would force us to analyze how capital formation makes jobs.

Modern macro-economics has made much of the fact that labor finds work producing capital, only with the emphasis on the obverse: investment employs labor (to produce capital, of course). Indeed it goes much farther. Investment not only makes some jobs, it is a prime mover, a First Cause that moves independently and exerts enormous leverage over other income-creating flows, which respond dependently. There is a mechanical relation such that aggregate income rises and falls by multiples of changes in investment. Such is the stuff of which macro-economic models are built. Investment is much more important than other flows of equal value because it is autonomous, and determining, they are reactive and determinate. It is fickle and must be wooed, they tag along and may be slighted. The

key to full employment is finding investment opportunities and outlets to absorb the flow of savings. In such a model, reducing capital coefficients to make jobs is dangerous and self-defeating.

Right or wrong, the orthodox macro-economic model and paradigm, in whose grooves and patterns most thought has become channeled, is *vertically integrated*. The emphasis is on investment employing labor, not on the capital coefficient at a given time. It sees the relations of capital and labor in sequence, rather than in parallel; labor producing capital, rather than using it or competing against it. This perception is far too dominant to be ignored or brushed aside. If we would give and receive signals in macro-economics we must make the same switch, and think vertically.* What is the relationship between labor and the capital which it produces? What does it mean to use less capital per worker? How do we accomplish it?

The quantity of labor input, worker-hours, is a product of workers and time. Similarly the capital input is a product of capital and time, say "dollar-years." Although capital takes as many forms as Brahma, the basic idea or transcendental essence is simple enough: capital is something of value produced but not yet fully consumed by users or recovered by investors. The more years elapse between production and recovery the more dollar-years of service are rendered by capital. Unrecovered capital is said to be "tied-up" or in service.

In addition, often capital income goes unpaid. Then it is plowed back and becomes additional capital which claims compound interest. In this case the capital input grows more than in proportion to time. All the needed mathematics has been worked out for centuries and may be found in any HP-80.**

How to use less dollar-years of capital per worker is now evident: recover it faster. We can't cut down on the dollars, they have to cover the payroll. We can cut down the dollar-years of capital combined with payroll by cutting down the years. We accomplish the goal of reducing capital coefficients by modifying the capital stock so capital returns home faster to the investor. The capital financing each payroll is tied up a shorter time with it. The short phrase for it is, make capital that turns over faster.

At the same time we can use larger crews to operate and maintain each plant of given value. In pure logic this second idea is implied by

*After one gets at home in this milieu he can swing between horizontally and vertically integrated models, but rarely with the greatest of ease or without risk of error, and *never* without serious communication problems.

**Hewlett-Packard 80. Hewlett Packard's hand calculator that does what tables of compound interest do.

the first, but there is no harm in stating it separately (so long as we don't later lead ourselves into double counting). The idea is to shorten the pipeline between work and use, to *move labor downstream closer to the consumer*. That implies, at every step, using more warm labor with the frozen labor in machines, materials, plant and equipment.

SHORTENING THE INVESTMENT CYCLES

The overall idea is to shorten investment cycles, so that value is shorter in transit from maker to user. And then back to earth, dust to dust? Not necessarily. I said "investment" cycles, not physical ones; and "value" in transit, not materials. There is a world of difference between economic flows and materials flows; between economic service life and carcass life. Maintenance, recycling, rehabilitating, remodeling, rebuilding, timber stand improvement, veterinary medicine, salvaging, renewing, reclaiming, scavenging, re-assembling, repair, and the like are all investments that extend the useful lives of old carcasses and slow down materials throughput. But they are investments of fairly short payoff and economic life, as a rule, that tie up capital and value a short time and speed up value throughput. It is possible and indeed normal and common to append many short investment cycles in repairs onto the tail end of a longer carcass cycle.

Even outright demolition, scrapping and replacement of a subsystem often extends the usefulness of the whole, like pulling a sick tooth. Replace the battery and save the car; replace old buildings and save a neighborhood and a city.

It is the investment cycle that we must shorten. That lengthens the materials cycle in the instances above. In others it shortens it, as for instance when investment is diverted from new dams and cement-lined canals to water meters; from beef cattle to vegetables; from monuments to tools, and so on. Which is more common would be hard to know. It is clear, though, that as we move labor downstream, nearer the consumer, we need less material overall. Indeed a good deal of labor gets all the way downstream into service industry requiring no materials at all.

Some environmentalists equate short investment cycles with short materials cycles and waste. This is in general a mistaken identity. Producing raw materials from the earth, especially heavy ones, is as far from the consumer as you can get, and the net thrust of policies pushing labor downstream is probably to reduce materials' use. People have difficulty with abstract ideas and seek concrete counter-

parts. That is understandable enough, but the search must be guided by a correct grasp of the concept. Equating materials flow and economic flow is a misapprehension of the concept, a materialistic fallacy. Value is not just material, it is labor imprinted on material, with labor adding the larger share of value, as a rule. To shorten investment cycles we must lock and unlock the labor with material quicker by moving labor downstream. In the work of Mishan, Kneese, Boulding, et al., materials flow has been elevated to a major issue; correlated, if not identified, with economic flows; and made into a limit on growth and an argument against turnover. It is none of those, and should not divert us.

Lowering the capital coefficient per worker is, to many people, a structural or allocative question, in a box called "micro-economics." But when we understand it from the vertically integrated viewpoint it becomes a macro-economic effect of the most central kind. Turnover means sale and reinvestment. Sale means supply to consumers; reinvestment means payrolls and incomes. Added supply prevents inflation, added payrolls mean more jobs.

"Capital is maintained from age to age, not by preservation but by perpetual reproduction" (J.S. Mill) [11]. Labor consumes capital in return for reproducing capital. The flow of payback from capital sold as goods and services is reinvested continually in payrolls in a steady ongoing process, to create new capital. Investment makes payrolls, but most investment is reinvestment, the recycling of past accumulations. The faster capital recycles, the greater is the flow of labor putting value into the pool of capital, and volume of goods and services flowing out. Faster recycling is capital "quickenning." The quicker the capital, the higher rises the flow-to-fund ratio. That means the more employment and production are financed with any given fund of capital, so long as there is idle labor to soak up. There is a lot in this to think about.

It leads to a major proposition: "Turnover limits national income." Otherwise put, "Paybacks deferred are payrolls denied." Hard capital and heavy capital and far-distant capital are slow capital. Soft, light and near capital are quick capital. Quicker capital flows through and delivers value to consumers sooner. Sales mean payback. Payback means money recovered to finance new payrolls. Payrolls mean aggregate demand to match the added sales. It all balances out, but at a higher volume.

A NEW ORIENTATION FOR MACRO-ECONOMICS

Macro-economics is a quest for the bottlenecks of the economy—what keeps us from employing everyone? Turnover is clearly a poten-

tial bottleneck. One firm can invest in excess of capital recovery, but only by tapping others. An economy cannot tap others. It is a closed system with a zero sum of capital transfers. The only source of investment funds other than capital recovery is net saving, but net saving is very small next to capital recovery. Essentially labor finds work pouring value into the pool of capital, and sustenance taking it out again. The flow through the pool is virtually the national income (less a few fringes small enough to leave as secondary matters). The flow is capital (K) times its turnover (T) or $K \times T$.

You would expect macro-economics to have inquired into what determines T , but it never has. Its focus has been on another possible bottleneck which is the recycling of money. Capital was pictured (if one thought of it at all) as a pile of finished goods seeking buyers, always ready for delivery, only wanting the trigger of consumer spending to release the flow. Spending controlled turnover, so much so that one need never think it had other controls, much less is a prime mover, as it is, which itself controls spending. The prevailing tendency was to bury the question by implicitly assuming automatic replacement of goods and service flows consumed, so in macro-economic models "consumption" creates income.

The question rarely arose explicitly because if it did the answer was built into the assumptions and would run like this. The cycle of spending has a fatal tendency to run down because of an excessive propensity to save from income, higher than there are investment outlets to absorb. The problem is always to find outlets which are scarce and to be treasured. The goal of policy is always to increase investment opportunities (as by tax loopholes for investors, or public works). Recovering funds from sale of goods adds to gross saving, but saving, net or gross, is not a limit on autonomous investment. There is always a bottomless cornucopia of funds available to invest. Gross saving just adds to the problem—more leakage from the spending stream that has to be offset by using the precious rare investment outlets.

On the positive side, in the Keynesian picture, sale of goods leaves an empty slot to refill, and this is an investment outlet. To the pessimist, however, this is uncertain, since there is an excess of goods anyway. Only the gross saving is certain. It is preferable to sequester capital in very hard, heavy, remote goods from which the payback is slow. Delivery to consumers is also slow, but there is an excess of goods seeking sale anyway so that is no problem. On the contrary, deferring deliveries helps offset the basic depressing imperative of our dying economy to sink into morbid deflation and choke on its own surplus of final goods wanting buyers.

To the environmentalist the "positive" side of the Keynesian pic-

ture is unattractive, since the benefit of fast turnover is having things decay and need replacing. But the fault is the picture, not the reality. The true benefit of fast turnover is not the decay of goods but the delivery of value to consumers and the recovery and recycling of capital. The gain is not from wasting, as implied in Keynesian models; the gain is in saving capital, by untying it quicker.

Happily, we can now discard the idea that spending or recycling money is a bottleneck limiting national income. It does not at all square with the facts today, if it ever did. Instead of running down, the turnover of demand deposits has risen rapidly for many years now, even as the money supply does, and banks press on their reserve requirements to meet the demand for loans. Instead of a fatal deflationary imperative, there have been years of violent inflation which failed to solve the fatal unemployment problem. New Economists have mastered all too well the arts of creating and spending money. Delivering the goods is where they fail, and it is real goods ready to consume that turn play money into real money.

Instead of a glut of loanable funds and a shortage of investment outlets there is a capital shortage. Instead of a glut of goods there are shortages, an energy crisis, materials scarcities, limited selections in inventory, delivery delays, islands of famine and fears of world hunger. Labor may be in long supply. Money undoubtedly is. It is land, materials, commodities and investment funds that are short.

Unfortunately, the concerns that prevailed when the twig of the New Economics was bent are built into its axioms, laws, models, circuitry and conditioned reflexes. In addition they drew upon deep springs in the cultural subconscious. "New" Economics was always a misleading name. It was more of a regression.. "There is not an opinion more general among mankind than this, that the unproductive expenditure of the rich is necessary to the employment of the poor. Before Adam Smith the doctrine had hardly been questioned; . . . if consumers were to save . . . the extra accumulation would be merely so much waste, since there would be no market for the commodities . . ." [12]. Now everything is different but this mode of thinking which prevails at the top of the economics profession and leads us ever deeper into error and trouble.

The failure of fiscal and monetary policy, in which we once had such faith we talked of "fine-tuning," is by now so notorious we can merely postulate it as a premise. The New Economics foundered as it steered between the shoals of inflation and the rocks of unemployment and ran onto both at once. The New Economics taught that that would not happen. "Fiscal Policy and Full Employment without Inflation" was Samuelson's promise in 1955, and the world believed

it. He wrote of the new "mastery of the modern analysis of income determination," and the "momentous Employment Act of 1946 . . . to fight mass unemployment and inflation." Inflation could result only from "overful employment [13]. All that has turned to ashes in the crucible of 15 percent inflation cum mass unemployment.

Faced with failure, leading economists have adopted the posture of scolding others into facing hard reality and making sacrifices. The New Economics once was positive and optimistic, and promised a lot. There were free lunches in those early halcyon days—when you put the idle to work, there *is* such a thing. The Puritan ethic was the goat, obsolete and absurd. But now the New Economics has become a New Dismal Science, a science of choice where all the choices are bad. "One must face up to the bitter truth that only so long as the economy is depressed are we likely to be free of inflation." (Samuelson, 1970) [14] "No one in the world has a recipe for correcting our price performance without some unfortunate increase in unemployment." . . . the public "should be told the facts of life." (Arthur Okun, 1970) [15]. This is not bread, but a stone.

Conservatives are not offering more. ". . . there is no other way to stop inflation. There has to be some unemployment. . . . It is a fact of life." (Milton Friedman, 1970) [16]. "The election will show whether the American people are mature enough to accept a sustainable (low) level of activity." (Henry Wallich, 1970) [17]. ". . . this economy can no longer stand a real boom with low levels of unemployment without kicking off a rampant inflationary spiral." (Alan Greenspan, 1972) [18]. Thus it seems that conservatives unite with liberals in seeing the choice as a trade-off on a Phillips Curve, and differ mainly in preferring to disemploy more and inflate less. There is no effort to rebuild the conceptual framework. "The collective intelligence of the economics profession is unable to fundamentally restructure the intellectual substance of the field. . . . We have a theoretical apparatus that can be used for a wide variety of things. There is no other one, and I do not think we know how to find one." (Otto Eckstein, 1974) [19].

But all that gloom and scolding seem benign next to the words of Lawrence Klein, President-elect of the American Economic Association. "Defense spending . . . has been a large part of the whole expansion of the American economy since World War II." The key question is "whether we should hold down defense spending for either economic or security reasons, and I think not, on both counts. . . . Every cutback of a dollar in defense will cut two dollars from overall GNP and drag down a lot of jobs. . . . If we were to hold spending to \$395 billion, the recovery of the economy would fade

away" [20]. Reporter Ernest Volkman quotes one Pentagon budget expert, "at least 20 percent of this budget amounts to a federal work-relief program to stimulate the economy. Defence contracts, especially the big ones, have an immense ripple effect" [21].

There you have it, the ultimate insanity to which the New Economics leads, from the unproductive consumption of the rich to warfare for work-relief, waste for waste's sake played with bombs and missiles. Military waste is the last refuge of a bankrupt policy. We have to do better—and we can.

BEYOND THE "NEW ECONOMICS"—SOME POLICY LEADS

New Economists have sharply attacked, rejected and even ridiculed the optimistic J.B. Say for proclaiming that there can be no general overproduction because "Supply creates its own demand." Yet today supply seems to do that and then some. Today one often hears a concern lest increased payrolls just cause inflation. Whether they do depends on where the money comes from. If it is new money why yes, of course. But when the added flow of investible funds has its source in delivery of finished goods to buyers then no, of course not. There is a matching added flow of supply to answer the added demand. Supply and demand still meet but at higher volume. Added flows are synchronized at both ends of the pipeline. The pipeline itself in this metaphor is shortened to speed the throughput and widened to carry more volume.

Keynesian pessimism sees supply overwhelming demand. Inflationary pessimism sees demand overwhelming supply. A confirmed pessimist sees both calamities at once, and there are those who do. Yet each calamity is the counterpart to and solution of the other. Calamity results from neither, but from restrictive and braking policies of other kinds adopted or tolerated by pessimists who believe or proclaim that they must forestall these imagined problems. These are the real macro-economic bottlenecks.

What are they? They include all institutional biases that interfere with the intensive application of labor to land, biases we have accepted and endorsed because we were in doubt about the aggregate benefits of taking the brakes off production and payrolls. There are too many to list here, but a good example is the tendency to base most taxation on the use of land, the activity on land, the payroll on land, the sales, the output, the income generated from land. The alternative is to base more taxation on the value of land, prompting owners to use it harder to serve customers, and make jobs.

They also comprise biases that interfere with the rapid turnover, recovery and reinvestment of capital. Again there are too many to list here, but here are a few. One is the use of low interest rates, or none, in guiding investment in public works, which tie up capital for decades before returning it and may never do so. This bias works in tandem with the bias against intensive use of land which forces the whole network of public capital to be stretched out over much more area than need be. Another set of biases are found in income tax policy which at every turn favors investment in slower capital over quicker [22]. Other biases are subsidies that take the form of cheap money (as U.S. housing programs do); regulatory bias and Averch-Johnson Effect [23]; licensing laws that dispose of resources, franchises, or monopolies subject to heavy capital requirements; ignoring the opportunity cost of public lands devoted to heavy capital works; the "big gadget" approach to pollution control; logrolling, overcommitment, and resulting stretchout of public works; the Highway Trust Fund; and the price-umbrella effect that builds excess capacity into cartels.

A third set of biases are in payroll taxation. In 1975 the U.S. social security payroll tax amounted to about \$73 billions, a sixfold increase since 1960, up to about 25 percent of all federal receipts. The personal income tax, largely another payroll tax, raises another 44 percent. The tendency of payroll taxes is to make labor costlier to employers than beneficial to workers, who always have and increasingly exercise the options of welfare and crime.

Once the basic idea is clear a host of policy changes begin to write themselves. Here I offer only a few last guidelines. One is to use the price system and the market place. They are the only means we have for treating the economy consistently throughout as a total system. It would not work say, to harrass extractive industries in order to move labor downstream to the consumer. Some extractive industries like truck farming are labor intensive and close to the consumer. Some "consumer goods," like housing, are capital-intensive and land intensive. We need the price system to sort out all these anomalies and apply steady, consistent pressures of the kind needed throughout every corner and idiosyncrasy of the complex network of the economic system.

Public spending outside the control of the price system calls for some more admonition. Avoid monuments; tools are better. By "monuments" I mean things built with one eye on eternity, like the pyramids, and things that resemble them, like many works of governments and of other large organizations, the family seats of the very wealthy, and overmature timber.

Many monuments are built to make jobs. The intent is lost in the execution, for monuments soak up a maximum of capital per job created, and yield a minimum of subsistence to advance to labor for the next job. Public works to make jobs are one of history's great self-defeating, self-deluding tragic ironies. There is only a one-shot payroll, after which the capital stops recycling for a long time, often forever. One of the great stupidities of all time, surely, was the English effort to relieve the Irish potato famine of 1845-49 by hiring Irishmen to build roads. 570,000 men, a large fraction of the working population, toiled for the Board of Works while food prices took off like a bird and while half the people died of starvation [24]. The people needed subsistence for tomorrow morning, while public policy directed their effort to the next century.

Beware of "frontiers." They beckon like *Die Lorelei*. As a broad generalization, where we use capital to substitute for land, or open frontiers, the capital is very durable. It lies in close with land and resembles it and takes on some of its durability. Wicksell called such objects "rent-goods," because they so resemble land. Examples are surveying and exploring, cuts and fills, drainage, levelling, clearance, foundations, pipes, tiles, wells, pits, shafts, canals, tunnels, bridges, dams, and roadbeds. The permanence of land warrants building long life into capital that develops it.

Subsidies to tap frontiers make land artificially abundant. This is supposed to help make outlets for labor, and in some ways does. But frontiering taps new land at the cost of sequestering capital. Frontiers soak up scarce capital and hold it so it stops cycling and creating payrolls. Abundant land can still be badly used, and centuries of Caucasian expansion in the new world in a futile flight from unemployment have shown frontiers are not enough. Labor doesn't need great reservoirs of underused land so much as pressure to use the land we already have, and working capital to help labor use it.

SOLACE TO ENVIRONMENTALISTS

Environmentalists are distressed at the perpetual invasion of wild land by men seeking employment. They should be glad to learn that that is not where to make jobs after all, anyway.

The traditional last great sink of capital is war, and the policies of mercantilism and imperialism that attend it. War combines the frontier fallacy and the public works syndrome and the waste-makes-jobs doctrine into a claim on the national treasure that can become greatly inflated above the simple cost of police protection. Imperialism has generally been an economic and environmental catastrophe for most of the players.

The policy of lowering the land and capital coefficients of labor will help us find full employment on our present land base, permanently, freed from the compulsion to grow and expand and pollute. We can continue to create capital, and we can apply new ideas more quickly than now as faster replacement lets us embody new techniques in capital in a shorter time. Thus we can grow in every good sense by substituting real progress for the random lateral expansion and environmental destruction of the past. We can find full employment in peaceful labor on our share of this small planet, and doing so, drop the burden of imperialism that may otherwise destroy us in the ultimate environmental calamity.

APPENDIX: CONSTRUCTION OF TABLE 6-3

Like any data, these might be massaged a good deal more. In particular I surmise that adding unrealized appreciation to profits would raise the profits per employee more for the top ten than for the others, since six of the top ten are oil companies, and all ten are major mineral owners. But this information is not available.

The lowest ten include one net loser, without which the profits per employee would be \$690 instead of \$297. However, negative profits are also relevant, and there are twelve firms in the 500 with net losses. Most of these are in the lowest 100, so it is representative to find one loser among any group of ten. Therefore \$297 seems more accurate than \$690.

Net worth was used for ranking in order to reduce the bias of the regression fallacy. (Had I ranked by profits, the top ten would not have changed much but the lowest ten would have been firms with negative profits.) Although it is only partly successful in that, the trends shown are strong enough to survive further purification.

NOTES TO CHAPTER 6

1. Henry George, *Progress and Poverty*, New York Modern Library, 50th Anniversary Edition, 1939, p. 270.

Social Problems, New York, Robert Schalkenbach Foundation, 1939, first published 1882, p. 130.

2. The research group at Resources for the Future has devoted years to belaboring this point in respect to pollution control. The object here is to generalize the point to the whole economy; e.g., Alan V. Kneese and Blair Bower, *Managing Water Quality*, (Baltimore: Johns Hopkins Press, 1968); Alan V. Kneese, R. U. Ayres, Ralph C. D'Arge, *Economics and the Environment*, (Baltimore: Johns Hopkins Press, 1970).

3. Mason Gaffney, "Diseconomies Inherent in Western Water Laws", in *Economic Analysis of Multiple Use*, Proceedings of Western Agricultural Economics Research Council, Range and Water Section, 1961, pp. 55-82, 77ff. See also Irvin H. Althouse, "Water Requirements of Tulare County," Report to Tulare County Board of Supervisors, January, 1942, (mimeo) map in back pocket.

4. G. W. Dean and Chester O. McCorkle, *Trends for Major California Fruit Crops*, California A.E.S., Extension Service Circular 488, 1960. The source has extensive data on other crop averages.

5. William Shrader and N. Landgren, "Land Use Implications of Agricultural Production Potential," in L. Fischer, ed., *Shifts in Land Use*. Nebraska Agricultural Economics Service 1964.

6. See Appendix.

7. Richard Muth, "Capital and Current Expenditures in the Production of Housing" in L. Harriss (ed.) *Benefits of Public Spending* (Madison: U. of Wis. Press, 1973).

8. A collection of such cases is documented in U.S. Congress. *The Analysis and Evaluation of Public Expenditure: The PPB System*. (Joint Economic Committee, Subcommittee on Economy in Government. Washington, D.C.: U.S. Printing Office, 1969).

9. John Kendrick, *Productivity Trends in the U.S.* (Princeton: Princeton University Press, 1961) pp. 148-149, Table 39.

10. Cited in "The Push to get More from Men and Machines" *Business Week*, Sept. 9, 1972, pp. 80-81.

11. John Stuart Mill, *Principles of Political Economy*, I, Ch. V, Sec. 6, (Boston: Lee and Shepard, 1872) p. 47.

12. John Stuart Mill, *Principles I*, Ch. V., Para. 3.

13. Paul S. Samuelson, *Economics*, 3rd ed., (New York: McGraw-Hill Book Co., 1955) pp. 336 and 350.

14. "Nixon Must Alter his Game Plan," *Washington Post*, Aug. 23, 1970 p. G1.

15. *Inflation*, (Washington, D.C.: The Brookings Institution, 1970) p. 9.

16. *New York Times*, Dec. 1970.

17. *Newsweek*, April 20, 1970, p. 91.

18. "The Budget is the Spur," *Newsweek*, January 31, 1972, pp. 63-64.

19. "Resharpener the Tools," *Business Week*, January 5, 1974, p. 56.

20. "The Impacts of cuts in defense spending," *Business Week*, Jan. 19, 1976, pp. 51-52.

21. *Vancouver Sun*, Oct. 15, 1975, p. 37.

22. For a detailed analysis see the writer's "Toward Full Employment with Limited Land and Capital," in Arthur Lynn, Jr. (ed.) *Property Taxes, Land Use and Public Policy* (Madison: U. of Wis. Press, 1976) pp. 99-166, esp. pp. 124-36.

23. Harvey Averch, Leland Johnson, "Behavior of the firm under regulatory constraint," *American Economic Review*, December, 1962, Vol. 52, pp. 1052-69.

24. Cecil Woodham-Smith, *The Great Hunger* (New York: A Signet Book, 1964) pp. 137-160, *et passim*.



*The Politics of the Environment:
Collective Choice and the Management
of Common Property Resources*

The authors of the chapters in this part struggle with the arduous problem of resolving or reconciling conflict situations that arise from our desire to combine in our public decision making about environmental management problems such warranted but disparate concerns as maximum feasible citizen participation; efficiency, soundness in terms of subject-matter dealt with, the sheer procedural feasibility to develop and effectuate solutions that comply with the tenets of representative government; or the planning of resource utilization and tax policy.

Edwin Haefele addresses the management of water resources, Lisle Baker is concerned with land-use management. The former deals with his subject primarily in terms of theoretical models that approach multiple optimization goals through vote-trading between groups, the latter by analyzing and evaluating, also pursuant to a theoretical model, a specific legislative attempt—so far unique in its kind—at regulatory action through taxation.

Haefele raises the paradox of what he considers the virtual incompatibility between maximum citizen involvement and political representation as it emerges from the electoral process. Also he points to the dilemma between subject-matter determined jurisdictional domains, on the one hand, and the need for coherent dove-tailing, systemic solutions spanning several or all of the diverse problem areas, on the other hand.

He raises the interesting possibility of one-man representation at the local level as one conceivable escape from the impasse due to

those difficulties, which are compounded by the limitations of bureaucrats in the face of unrealistic expectations.

Baker seeks to shed light on the various ways in which the novel Vermont land gains tax may be felt as regards market demand for and supply of land for various uses, and the induced consequences thereof. While his treatment is prevailingly in terms of deduced market effects, his ultimate inferences look to land as a resource rather than a commodity and the possible general convergence of tax policies and land use planning.

Levy goes behind Haefele's preoccupation with properly channeling citizen participation so as to bring representative judgment to bear. He questions whether, today, even the well informed citizen or corporate officer can possibly know what alternatives he is supposed to be weighing against each other. The issues at stake are too ramified to lend themselves to a ready overview. Unlike Baker, Levy does not look for any constructive contribution from our present tax laws. On the contrary, he foresees such a wide disillusionment due to the growing awareness of manifold tax inequities as to view the public trust in our tax system going downhill. Not until, i. a., new techniques to appraise the issues are devised can the people be expected to wield effective decision-making power.