6 *Mason Gaffney*

Toward Full Employment with Limited Land and Capital

Capital is kept in existence from age to age not by preservation, but by perpetual reproduction.—J. S. Mill

The Paradox of Surplus Labor, Shortages, and Inflation

"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 human wants are all satisfied." Today, nearly a century after Henry George wrote that, and with nearly 40 years of the New Economics, we are right back at square one. Federal fiscal and monetary policies prove powerless to soak up surplus labor, even while creating two-digit inflation. Prominent economists seem confused and helpless faced with the most basic malfunction of the system, that is, shortness of work along with short supplies and soaring prices, and we are at once overwhelmed and diverted by the spawn of derivative evils. Why cannot these idle persons find work to fill those shortages? If economics cannot solve this elementary but stubborn riddle, it is not good for much.

Nor is a job what it used to be. United States wage rates have lost ground since 1960 compared to many countries,[1] even as we who used to soak up displaced world labor have reached out to control and exploit raw materials of others.

At the same time, the other sinews of production, capital and land, are growing short, and very dear. Materials prices are high, even though the *social* cost of primary products is higher than the price because of massive

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tax benefits and other subsidies. The required complement or duty of land and capital per worker and consumer has risen sharply for many years, much faster than the work force. So now we are bumping into the ineluctable logic that if we require a vast complement of resources per worker, and require jobs for all, we will chew up lots of resources, and push on the limits of Earth. We will push up materials prices; we will pollute the environment; and we will provoke our neighbors by coveting their raw materials. We will push on the limits of our capital supply, too, unless it grows faster than it has been.

If we look to science and innovation to help us, these are mainly harnessed to the goals of saving labor, and using more land and capital to do it. Some, indeed, have revived the themes of Ned Ludd, John Henry, and Karel Kapek, and blamed unemployment fatalistically on science and innovation out of human control. While this vogue has happily abated for the nonce, it is true enough that Science has been in the saddle for a long time without meeting the present problem.

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, geriatric ghettos, imperialism to make jobs and acquire raw materials, weapons constituencies, other pork-barreling, glorification of waste, slowdowns, featherbedding, fear of change, stunting of creativity through grasping for tenure, seniority, and security, suppression of competition, exclusionary local codes and zoning, loss of flexibility and mobility, and rejection of the free market. All these evils have their independent roots, but are inflated by unemployment and the fear of it.

Some unemployment is iatrogenic; that is, 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 George defined in 1879.

The failure of fiscal and monetary policy, in which we once had such faith that 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[2] in 1955, and the world believed it. He wrote of the new "mastery of the modern analysis of income determination," and of the "momentous Employment Act of 1946 . . . to fight mass unemployment and inflation." Inflation could result mainly only from "overful employment."[3] All that has turned to ashes in the crucible of 15 percent inflation.

And yet the New Economics is what taught the generation now in command, and economists of influence seem capable of little but following Pavlovian responses learned in school twenty years ago: in a word, that the way to make jobs is to recycle money faster. Most of what we call macroeconomics today is an embroidery on that one simple theme, the simplicity hidden beneath elegant variations and elaborate circumlocutions that dazzle and boggle and addle without adding much substance.

The New Economics, when new, was positive and optimistic, and promised a lot. There were free lunches in those days—when you put the idle to work, there *is* such a thing. The Puritan ethic was the goat, obsolete and absurd, dour and dismal. 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).[4] "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).[5] 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).[6] "The election will show whether the American people are mature enough to accept a sustainable (low) level of activity" (Henry Wallich, 1970).[7] ". . . this economy can no longer stand a real boom with low levels of unemployment without kicking off a rampant inflationary spiral" (Alan Greenspan, 1972).[8] 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 little challenge to the conceptual framework. Controlling spending is where it's all at.

Monetarists debate Keynesians over the most effective way to regulate spending, and are more disposed to favor less of it, and recognize other constrains. Yet neither side much deviates from the premise that spending money is the governor of the economy, the autonomous force which other activity obeys, the key of control. "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 way, and I do not think we know how to find one (Otto Eckstein, 1974).[9]

Yet, along with the policy failures, there are intellectual substances and theoretical apparati one can identify which are clearly wrong, and must interfere with any effort to make jobs. Modern macroeconomics evolved under a different set of problems than we face today, and its founders built into its vitals a number of special premises and limitations. It is geared to assume no or few resource constraints, and has little response for the new challenges of environment, scarce raw materials, and anti-growthmanship. "Growth," indeed, is one of its ideals, and simply to make jobs in a stable equilibrium independent of growth is outside its purview. Geared to approve waste, it has nothing for emerging needs to conserve scarce resources. Geared to define the economic problem as how to dispose of surpluses, it ill becomes a world of excess demand and short supplies. Geared to treat capital as a glut, and the central economic problem as how to dispose of excess saving, it is at a loss with high interest rates and capital shortage.

The falling rate of profit is built into the apparatus, and Samuelson is still disputing that capital is really short.[10] Geared to treat both resources and capital as cheap, it all too easily lets labor be treated as the only cost of production worth mentioning—a new labor theory of value—ignores distribution, and plays into the hands of antilabor interests by picturing the economic scene as a continuous "wage-price spiral." It ignores the possibilities of substituting labor for land and capital. Geared to idealize federal spending, it drifts easily into mercantilism and imperialism, especially in the more idealistic, missionary faces of AID and "economic development." Geared to accept and live with concentration of wealth and economic power, it has little to say about the effects of industrial mergers in substituting capital for labor by putting plants on standby and laying off workers. It has no basis for not condoning the monumental waste of capital in urban sprawl, or the global sprawl of imperialism, because each inflated need is an investment outlet. On the contrary, continuous territorial expansion and development are its answers to the limited land supply.

In the apparatus of modern macroeconomics, it is built in that the best way to recycle stagnant money is to find investment outlets. Since the rate of profit is always threatening to push zero, such outlets are to be cherished, and we should subsidize and force-feed investment if needed, as by loans at low interest, to keep money recycling. If we stack up layers of capital at low productivity, that is no problem. Seminal investments like roads and water supplies that open new lands are best of all, for they induce ancillary investments which recycle yet more stagnant money. Boondoggling is all right because it makes jobs, and if it soaks up a disproportionate quota of capital per job, that helps dispose of excess saving.

The result of this attitude has been to let a thousand policies bloom which foster substituting capital for labor. This finds support from some other errors or half-truths left over from the old economics which die very hard.

One of these is to define "efficiency" as output per worker. Only very recently, with the birth of the concept of total factor productivity, and the new emphasis on energy-efficiency, are most economists beginning to escape this perverse concept with its built-in bias against use of labor.

Substituting capital and land for labor raises "efficiency," so conceived, only by wasting capital and land, and is only efficient in unrealistic models in which land and capital are underpriced or 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.

Misled by this concept, we have exulted in high output per man as a symbol and measure of national and company "productivity," 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 to 1953.[11] That means a 100 percent increase over that fifty-four-year period. More recently, the United States Department of Commerce studied nonfinancial corporations, 1948-1971. It found capital inputs growing at 4 percent yearly compounded and labor at 1.2 percent.[12] That means there was 2.5 times as much capital in 1971 with 1.3 times as much labor, which is 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 joy, 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 also 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 energy for labor and calling it progress and efficiency, only to find that energy is scarce and

labor surplus. A comprehensive accounting of our lavish input of capital and land per worker would reverse the common stereotype that labor invented featherbedding.

The second supporting ancient half-truth is that capital cannot really displace labor, in a vertically integrated whole economy, because labor produces capital anyway. This is the counterpart of the modern macroeconomist's concept that investment employs labor. Either way you perceive it, the meaning is that benefits to capital are passed through to labor.

That is a half-truth, and the untrue half has helped lead us into our present crisis. The problem is that capital can substitute for labor. It is a problem that neo-Georgists, in their zeal to untax capital, have overlooked as well.

Keynesians and Georgists have this in common. Keynesians say investment creates jobs and Georgists say labor produces capital. Keynesians would subsidize investment and Georgists would untax capital. Many Keynesians would untax or downtax the income from capital, too, Keynesians focusing on the income tax and Georgists on the property tax. The investment tax credit, expensing of capital investments, accelerated depreciation and exempting imputed income of homeowners are the income tax counterparts of exempting buildings from the property tax. Jack Stockfisch had the insight to point out years ago that these Keynesian inducements to invest were Georgist ideals applied to the income tax.[13] Both schools share the idea that benefits to capital are benefits to labor.

But a great deal of the cash and service flow from capital imputes to capital as such, as interest. The longer the life of the capital item, generally, the larger share that is. A great deal of interest is internalized and invisible, hence too easily overlooked and forgotten. But a couple of simple examples should make the point.

When one buys a durable good on the installment plan, if the payments stretch out beyond fifteen or so years more than half the total is interest. Just how many years depends on the interest rate and the term, but at say 10 percent over a twenty-year term the yearly payment required is 11.7 percent of the principal. Twenty times 11.7 percent is 2.34. Since the principal is one, the interest is 1.34. So, 1.34/2.34 or 57 percent of the payments are interest.

Thus the cost of a mortgaged house, or a debt-financed highway, or a debt-financed war can be mainly interest. But even if these are not debt-financed, they cost interest—the interest foregone on the equity capital.[14] A house thus "financed" over sixty years at 10 percent requires yearly level payments of 10.03 percent of the principal. Sixty times 10.03 percent is 6.02, so 5.02/6.02 or 83 percent of the payments are interest. Accordingly,

it is understandable that housing starts are more sensitive to financing than to any other cost.

But note now how little of the salable service flow is produced by labor. It would only be (100 — 83) percent or 17 percent even if the entire construction bill were for payroll. In fact, of course, onsite labor is only 20 percent or so of construction cost. Materials like lumber take another big chunk. But lumber comes from trees which take decades to grow. One dollar invested in forest regeneration must double every 7.2 years to yield 10 percent, so if lumber comes from second-growth cut at age 9 x 7.2 or 65, stumpage of 2^9 of $512 embodies $1 of planting labor and $511 of compound interest. Of course harvesting, hauling, milling, and selling apply more labor to add value, so lumber value embodies a higher share of labor value than timber alone. Still, timber is a splendid second example of capital-intensity where it is largely capital, and not labor, that produces capital.

Timber growth is a good example of "passive investment." It is internally financed in the most literal way. Each year's growth is a product, an income to the owner, which he automatically invests in growing stock, adding to capital. But this investment employs no labor. It only employs capital and land, that is, growing stock and site. Mature timber, finally, has not been produced by labor so much as by capital—the young growing stock—and land.

Preferential tax treatment for timber, then, is a good way to make work for capital but a bad way for labor. Capital-gains treatment of timber sales, expensing of interest and property taxes, and preferential low property-tax rates and assessments for timber tie up capital in the slowest of cycles and fence off land from labor, except once a century or so when the crop is cut. The job-creating efficiency of capital frozen this way is very low.

A third ancient error is that it takes a fixed quota of capital to "create" a job, visualized as a kind of niche made of capital in which we place one worker. The weekly ads of Warren and Swasey pound this theme recurrently, and Norman Ture, writing for the National Association of Manufacturers, has dignified it with an economist's formality.[15] If the premise were true, of course, then the way to make jobs is to create capital, case closed. But in fact, factor mix varies over a wide range, and policies which are more certain to raise capital needs than capital formation are not a way to make jobs. Capital is capable of complementing labor, but the extent to which it actually does so depends entirely on how it is invested and used, and cannot be assumed. The value of capital to labor depends on how active the capital is. Looking ahead, we will see that each time capital is recovered and reinvested it can recombine with and reactivate labor. But

torpid capital, like that in trees, and many public works, and premature exploration, and so on is withdrawn from abetting labor. It may preempt land as well, just as the landlords' sheep did in sixteenth-century England.

In the growth models of and following Harrod and Domar, New Economists have been quite comfortable with assumed constant ratios of capital to output. Growth was linked closely with capital formation. This harmonized nicely with the Warner and Swasey assumption. It all served to reconcile the Marxist streak in the New Economists with the puritanism of capitalists. The New Economists viewed growth as an escape from the doom of oversaving; the capitalists saw it as their social duty, which rationalized and helped aggrandize their functions, prerogatives, incomes, wealth, and status. It has been a curious but powerful partnership, hardly challenged until it brought us double-digit inflation.

It has had to exclude, however, from its intellectual substance and theoretical apparatus the good news buried in a few obscure pages of Wicksell,[16] that capital can increase its "valence" (to borrow a chemical term) for labor easily, and combine with more or less, in response to relative prices. We may not need to find a new theory, but resurrect one.

Like any entrenched system, the New Economics was unassailable when things went tolerably well, regardless of its merits. Now that its single-minded preoccupation with purchasing power as the job-maker is inflicting us with intolerable inflation, and failing to make jobs, it is time to review and reconstruct. The New Economics has grown old, and become a terminal case. It had to break down because it was superficially based. The suffering is not welcome, but the opportunity for review is.

Faced with a surplus of labor and a shortage of land and capital, an obvious way to adapt is 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.

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.[17] Each time the capital recycles it can embody new techniques as well. Growth of capital is not needed for progress; turnover is. And since one way to substitute labor for capital is to turn over capital faster, this also accelerates embodiment of new knowledge in real capital.

This study develops 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 dismal choices.

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 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 process of mixing inputs more efficiently. This is the very sort of thing that a flexible economy can do. Just as the United States could retool for war quickly in 1942, given the will, now we can retool for new jobs quickly given the will, the freedom, and a certain know-how in framing public policy.

We will also see that substituting labor for capital, "structural" change in another world from macroeconomics, refuses to stay in that pigeonhole. It entails faster recovering of capital, and faster ripening of capital into final goods. The first increases the rate of reinvestment; the second the flow of consumer goods. Thus the "structural" substitution is a macroeconomic effect of the most central kind.

Let us ask how those matters fit into the concerns of the Committee on Taxation, Resources and Economic Development and of those of other neo-Georgists. One set of institutional biases against labor is in tax policy—and I am limiting this paper to that set. These taxes affect the way we develop resources. In its founding articles the committee expresses a concern for how land taxation affects employment. It has focused on other aspects of its work, which was desirable to build a base of expertise, but is all the more reason for compensating now and building on that base to achieve the original, more ambitious goals.

The original high interest in land taxation as expounded by Henry George has never been matched since. George did not write primarily on municipal finance, important as that is. The problem he posed was more cosmic and gripping, the association of poverty with progress; of "industrial depression; of labor condemned to involuntary idleness; . . ." That is, George addressed the same problems as Keynes and the New Economists.

He said these resulted from an artificial scarcity of land. Like Keynes, he thought positively. He did not hand us another dismal iron law of inevitable suffering. He pointed to a solution—we could thaw the frozen land, the passive factor, by taxing it, and employ labor, the active factor, by untaxing activity and labor and its products, that is, capital. He said there was no limit in a truly free economy on jobs, other than human desires for the fruits of work. This theme commanded attention because that was *the* problem needing solving, even as today. In the more evolved lexicon of modern economics we would say he favored "changing factor proportions" or "substituting labor for land," but that would not change the substance or the importance.

Again like the New Economists, George was weak on capital theory. He ran labor and capital together, seeing their interest as one and set off against landowners'. He overlooked the substitutability of capital for labor, that which looms so large in Austrian School economics. Keynes and George alike treated the Austrians as their natural enemies, an unfortunate and needless impoverishment of their respective philosophies.

The oversight in George was not so serious, because he wanted to untax labor, not just capital. The oversight by neo-Georgists is serious, because their emphasis has been largely on untaxing capital. But if we untax capital and continue to tax payrolls, we stack the cards against labor, we bias the system to substitute capital for labor.

It *is* important, as George said, to use more workers per unit of land and primary products. It is also important, as he did not say and we are in danger of overlooking, to use more workers per unit of capital. To support that thesis, I have four points in what follows:

A. Factor mixes vary over a wide range and are by inference sensitive to relative costs and other stimuli like tax bias.
B. Tax bias force-feeds land and capital into the production mix but militates against labor.
C. Demand for capital is not a sufficient or even necessary condition to make jobs. It often helps, but there is a trade-off in the factor mix between labor and capital. We must distinguish among investment outlets and find policies to guide investment into more labor-using ones.
D. Using labor for capital means recovering and replacing capital oftener, which increases aggregate demand for labor, as well as the flow of consumable goods and services so long as there is surplus labor to employ. It increases the *flow* of gross investment associated with any given *fund* of capital.

Based on that analysis we can then see how to invest so as to put capital where the jobs are, to invest so that the "job-creating efficiency," if you will, of capital and land is higher—not a maximum, but an optimum

where idleness is only voluntary and the amount of capital suffices that people save voluntarily. And we can finally mention what tax policies would serve to remove the present bias.

A. Factor Mix Is Sensitive to Factor Prices

We can make more jobs by using more workers (W) per unit of land (L) and capital (K). That this is feasible is suggested by showing that the mix of factors already ranges widely, that some employers already mix enough workers with their land and capital to employ everyone if only most other employers were moved to act a little more like them. That which needs doing is already being done, it just needs to be done more. We will identify some of the kinds of firms and employments that use more labor in the mix, i.e., a high $W/(L + K)$. Then we can see how to stop penalizing them, and get more like them.

The goal is not to make work for its own sake. Where the "job-creating efficiency" of wealth is higher, the goods-creating efficiency is higher, too. We will show that one can produce many times more from the same land by applying more labor, and without wasting labor.

The most ancient, basic and self-evident of economic relationships is that between land and opportunity. Tribes and nations have warred over control of rich and strategic land, and we are still at it. But more perceptive observers, of whom few could match Adam Smith, have noted that the value of the resources to labor depends on how actively the owners use it. "In plenty of good land the English colonies of North America . . . are . . . inferior to those of the Spaniards and Portuguese. . . . But the political institutions of the English colonies have been more favorable to the improvement and cultivation of this land. . . . First, the engrossing of uncultivated land . . . has been more restrained in the English colonies than in any other. . . . The plenty and cheapness of good land . . . are the principal causes of the rapid prosperity of new colonies. The engrossing of land, in effect, destroys this plenty and cheapness. The engrossing of uncultivated land, besides, is the greatest obstruction to its improvement."[18]

Henry George gave this theme center stage in his philosophy, attributing unemployment to speculative withholding of some land from use. Labor needed access to land. It had access to some lands, but these were oases in the speculative desert. Today we call this "urban sprawl" or "scatteration," essentially a condition of extremely different intensities of use on neighboring lands, and a common one as we know. Smith and George wrote in black and white contrasts. More generally, land is fallow, "engrossed," or "held in speculation" by degrees, and in this sense sprawl and scatter are the universal condition.

Economists seem well aware that factors blend and mix in a range of

ratios. The principle of variable proportions is well preserved by text writers, if only in formaldehyde. It lives when economists criticize engineers for taking a fixed "requirements" approach to the alleged "need" for some input like water or power by firms or consumers. Economists speak of tradeoffs, choices, and substitution in response to prices and incentives. They publish data on changes over time, as that cited above, (although regrettably one reads twenty times of declining capital to output ratios for once of rising capital to worker ratios). They note the contrast among nations and regions resulting from different relative prices: more labor per log in European than Canadian sawmills; more labor per acre on Japanese than Argentine farms; more capital per acre-foot of water in the citrus groves of arid Tulare County, California, than the rice fields of the Sacramento Valley. They have noted that larger companies and governments tend to favor more capital-using techniques.

They have been less good about attributing some of these contrasts to institutional bias. There is a strong positive relationship between belief in tradeoffs and devotion to the price system, and too often these contrasts of factor mix are adduced to rationalize the price system when in fact they display the bias of institutions like taxation.

They have been no good at all about working all this into macroeconomics, which is supposed to help us make jobs. Labor is treated almost as the only cost, so wage cuts might only lead to "vicious downward spirals," and wage boosts can only be shifted forward in "vicious inflationary spirals." Since factor price flexibility up or down is vicious, the only way to make jobs is by "growth," with a fixed requirement of capital per job (as in Harrod-Domar models). There is no thought of making jobs simply by enriching the mix with more labor—that would be retrogressive, lowering "productivity," or reactionary and unmentionable. There is if anything a sense of predestination that forces us to use ever more capital per worker.

We are left with a theory of compulsive growth.

Worse, when it comes to intensifying the use of land, it often turns out to be other peoples'. We were ready to believe that jobs depended on taking land from the aborigines, and Alvin Hansen integrated Keynesian fatalism with traditional Americana by attributing stagnation in part to the closing of the frontier. Today, many economists sieze on our loss of cheap foreign oil and other primary products as the killer of jobs. In fact, the frontier was a great sink of capital, and the energy industry is, too, both in production and consumption.

Frontier expansionism neglects the inner frontier, the intensive use of labor on the land we already have. The old cowboy and sodbuster heroes

left conservationist agriculture as an afterthought to immigrants and outgroups outside the mainstream. Current United States mercantilism, which has it that United States labor depends on foreign resources, overlooks the fact that cheap energy powers the farm machinery that drives labor off the farms—it combines with capital and land, not labor. Berndt and Wood are finding that energy use is highly related to capital use, not labor,[19] in a comprehensive study of American industry. Note that the "inner frontier" of energy refers not merely or mainly to producing more primary energy domestically, but to combining energy with more labor as we use the energy—otherwise perceived as economizing on energy.

To be sure we have urbanized, which looks like intensifying the use of land. Yet instead of really urbanizing the people we have suburbanized the cities. In forty years past we have halved the density of cities. "Intensification" has meant invading farm land, sinking enormous capital into new roads and pipes and lines. Providing urban water unleashes municipal hydro-imperialism, as cities range far away to capture remote waters rather than clean and develop near sources. Thus American urbanization replicates the continental frontier and global expansion. We intensify the other fellow's land, and use up our capital prodigally as we do.

It would be a mistake, then, to think that making jobs by applying more labor to land, the policy advanced here, would entail more conversion of farm to city land, more new towns, "development," shopping centers, industrial parks, and the like, or more territorial expansion or mercantilism. Those generally are aspects of raising, not lowering, the required complement of land per worker.

Here follow some data to illustrate how widely factor mixes range. 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.

The first data are from California farming. 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. Grazing might gross $15 from the animal units; tomatoes 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 principles are not: the same land yields

TABLE 6.1
Crop Production, Friant-Kern Canal Service Area

Crop	Acres	Value per acre ($)
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, lint (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.

a little or a lot, depending on what you mix 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.[20] Almost every area has several options, and many of them are choices between the highest and the lowest gross. Labor's share of gross rises with intensity, defined here simply as nonland inputs ÷ output.[21] For grazing, this is on the order of $6/$15 = 40%. For tomatoes it is more like $1,400/$1,500 = 93%.

Of course the return to land from 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 tomatoes 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 only

imperceptibly change the returns to land from grazing. Thus a slight drop of labor costs applies great pressure to shift land to 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 farm output comes from a tiny fraction of her good farm land, that which is used intensively.

Of the several million acres of irrigable land in California, there were in 1960 21,000 acres in plums, 36,000 in freestones, and 65,000 in navels.[22] Most of the other land was and is used at lower intensities, using less labor to yield fewer dollars worth of 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 tomatoes 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 thirsty crops, and they yield only $50-$200 per acre, not one-tenth of the high yielders.

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 $900 tomato 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 tomatoes and increase demand for labor on the farm.

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.[23]

Farm land use in general varies so much from farm to farm that "farm sprawl" and "horticultural sprawl" are as common as urban sprawl. But this reminds us that all our cities are dominated by sprawl, which is essentially a condition of extremely different intensities on adjacent lands. Different mixes of land with nonland inputs are not the exception but the rule.

It does not surprise tax economists, of course, to learn about differences of factor proportions, for that is at the heart of the problem of tax enclaves. As everyone knows, localities compete to attract capital-using plants and to repel labor-using ones, and they find large differences among them.

Factor mix also tends to change with size of business and wealth of individuals. As a broad statistical truth, the application of labor to

property tends to be regressive. The larger holdings use less labor per unit of property value.

The United States *Census of Agriculture* ranks farms by value of gross sales. In 1950, "Class I" farms, those grossing $25,000 or more, had 22 percent of the land in farms but 7 percent of the farm labor. The small

TABLE 6.2
Land, Buildings, and Implements and Machinery; Average Values per Acre, by Size of Farm, 1940

Size group (acres)	Land $/acre	Buildings $/acre	I & M $/acre	As percentages of land value	
				Bldgs	I & M
Under 3	728.00	1,618.00	192.00	222.2	26.4
3-9	156.00	225.00	22.00	144.2	14.1
10-19	79.00	69.00	8.85	87.3	11.2
20-49	41.00	28.00	5.00	68.3	12.2
50-99	30.00	19.00	4.59	63.3	15.3
100-174	29.00	15.00	4.54	51.7	15.7
175-259	30.00	13.00	4.36	43.3	14.5
260-499	26.66	8.34	3.44	31.3	12.9
500-999	18.50	4.50	2.28	24.3	12.3
1,000 & over	8.29	1.13	0.64	13.6	7.7
Total, U.S.	21.90	9.81	2.88	44.8	13.1

Source: United States Department of Agriculture, *1940 Census of Agriculture,* vol. 3, p. 80. Percentages calculated by writer.

TABLE 6.3
Profits per Employee, Large and Small Industrial Firms, Ranked by Net Worth

Group	Net Worth ($000,000)	Profit after taxes ($000,000)	Employees (000)	Profits/employee ($)
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 the *Fortune Directory,* 1964.

Note: 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 regression fallacy. (Had I ranked by profits, the top ten would not have changed much, but the lowest ten would all have been firms with negative profits.) Although it is only partly successful in that, the trends shown are strong enough to survive further purification.

producers of course made the figures balance by applying more labor per acre.

The use of labor on land by and large increases with the improvements there—not so much in building them, for they are infrequently replaced, but in using them. Farm machines tend to displace labor. Farm buildings shelter and store outputs and inputs and labor itself, complementing labor. From 1900 to 1940 the United States *Census of Agriculture* reported separately on land and buildings. Table 6.2 supports the thesis of regressive use of land. (1940 is the latest year available, because unfortunately the United States Census then discontinued the series.)

Note that implements and machinery, which displace labor, decline much less with acreage than buildings do.

John Riew presented similar data from Wisconsin farm counties, at last year's meeting of this committee.[24] Other studies finding this pattern are by Morton Paglin[25] and Albert Berry.[26] Don Kanel, Peter Dorner, John Strasma, Philip Raup, and several other farm economists have piled up data showing the point.

Turning to "industrial" corporations, the regressive use of labor on property may be inferred from data in *Fortune* Magazine's yearly report 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 suggests), then their realized profits as an index understate the assets of larger firms compared to smaller ones.

If there is something about size of business that discourages labor use, it would follow that mergers tend to result in reduced jobs on given assets. Jon Udell has found just that in his study of mergers in Wisconsin.[27] A wealth of fragmentary evidence suggests that this finding would be duplicated elsewhere.

The largest organization is government. The public sector is the most property-using of all. It has a reputation for wasting labor, and in some cases conspicuously does. But 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, espe-

cially 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.[28] 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.[29] 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 on 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.

Few city governments have analyzed the costs and benefits of peripheral expansion carefully before plunging outwards. The taxpayers of older areas characteristically finance the development of new areas for years and decades before the newly serviced lands return enough taxes to pull their weight. It is another long span of years before they return the advance of capital, by generating fiscal surpluses above their share of public costs. Such is the lag of private building behind public works that the public capital is sunk for years before payout.

A perfectly analogous case that has received detailed study is the lag of private behind public capital in irrigation projects. The classic is Weeks and West.[30] Public capital flowed into irrigation ten to thirty years ahead of complementary private capital, leaving the public to finance dead capital in the meantime. But that was before the great explosion of state and federal financing, and later problems have grown larger.

Factor mix also changes over time. We often read of declining capital/output ratios, but these do not show declining capital intensiveness because labor/output ratios are declining faster. The data from John Kendrick and the United States Department of Commerce were cited above. As noted, they only cover part of the private sector and omit the public. The public has been freezing up capital in public works, much of it at low productivity at a disproportionately high rate. Ironically, much of this was done in the name of making jobs.

If labor had been scarce, and capital surplus during the period of these changes, the changes would have made sense. But labor has suffered chronic and at times acute unemployment, while the world cried out for capital, and nations have warred over lands and minerals. It would seem

to show a set of factor prices and/or institutional biases that do not reflect the facts. Marxists and other technological determinists have averred that changing techniques are inevitably more capital using, but most economists today would recognize that the course of inventions and their application depend on relative costs. Technology evolves in response to costs, rather than being an autonomous mover of history. We are left with institutional bias as the likely cause of the failure of the economy to soak up surplus labor.

The source of this bias is not far to seek. To enrich the mix with labor we would need to encourage the things that humble folk do, and take the fun out of many things that the rich and mighty do. It is not impossible, but it does call for a more effective philosophy than the poor and needy have embraced in the New Economics.

Let us underscore what the facts just cited imply about the elasticity of demand for labor. On some lands and in some firms labor is 90 percent of costs. Property gets 10 percent. The return to property is here highly leveraged by changes in the price of workers. An 11 percent drop to labor doubles the return to land and capital; an 11 percent rise wipes them out. At the other extreme, where labor is 10 percent of costs, one could cut the wage rate in half and only raise the property income by 5.5 percent.

All of the above may seem only marginally relevant to some readers because of their beliefs (1) that land is a minor input relative to capital and (2) that labor produces capital anyway. In (2), industry employs labor to produce the capital, and such investment is the motor of the economic machine.[31] As to the first belief, I believe it is wrong for reasons I have marshalled elsewhere.[32] As to the second, let us treat it now, anticipating point C. What is the labor-content of capital?

Let us say farm machines displace farm labor. Looking upstream, we see labor helping produce the machines. Is capital displacing labor, or is it merely labor stored in machines displacing onsite labor? We know the machine needs fuel, and fuel is capital-intensive to produce, but that doesn't tell us much until we know what "capital-intensive" means, for refineries too are produced by labor. So let us just focus on the farm machine. Keeping it simple, we ignore marketing costs between factory and farm.

To answer, let us follow one machine through its life. It lasts n years and yields a service flow worth \$1/year. I is the warranted investment to produce the machine, and equals the present value of the future service flow:

$$(1) \qquad I = \frac{1 - e^{-ni}}{i}$$

In equilibrium, as a result of competition, machine costs settle into this

relationship to service flows. The cumulated value of the service flow over n years is $\$n$. The share of investment cost (I) in the total flow is:

$$\frac{I}{n} = \frac{1 - e^{-ni}}{ni} \tag{2}$$

(2) is a decreasing function of n (table 6.4 and figure 6.1).

TABLE 6.4
Investment Cost (I) as a Share of Cumulative Service Flow (n) when $i = 8\%$

n	I	I/n
5	3.99	.80
10	6.71	.67
20	9.82	.49
40	11.92	.30
80	12.47	.16

Figure 6.1 shows the same information graphically.[33]

Now what is labor's share in the service flow? It is no more than I/n—the rest is interest. I/n is the share when I is 100 percent payroll. More generally, labor's share is wI/n (w I), where w is the share of I that is payroll, plus the share of other costs that trace back to labor in the same manner.

If machines are produced at a constant rate, say one a year, there must be n machines out bearing interest for every work crew making them, so again the share of labor in the income is a decreasing function of n. It is not only *a* decreasing function, it is exactly the same function. This is shown in appendix 1.

This simple relation lets us detour all those involved Clark-Böhm-Bawerk and Knight-Hayek debates and generalize that in a going concern, with replacements balancing retirements, the share of labor in the flow of service from capital decreases as the life of capital lengthens. A total economy is a going concern of this kind, better balanced than in-

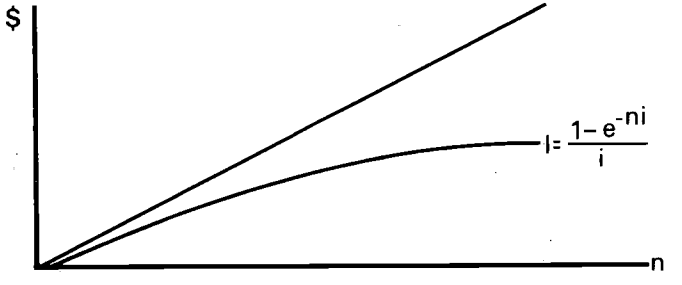

Figure 6.1.—Investment cost (I) and cumulated service flow (n).

dividual concerns, and there is negligible error in saying that labor's share is a decreasing function of the average life of capital.

Appendix 1 also shows that the share of land rises relative to labor with life of capital. Labor is applied less frequently to land where labor is embodied in capital of long life.

There are two kinds of capital: that which is storing up value, and that which is releasing it in the form of service. The one is appreciating, the other depreciating, and for short I refer to the one as "growing" and the other as "flowing" capital.

The above all refers to flowing capital. The same relationship between long life and labor's share also obtains with growing capital, only more so. We follow \$1 through the life of a tree it is invested to plant. The tree is cut after n years and sold for $\$e^{ni}$. I is \$1. So labor's share is we^{-ni}, another decreasing function of n. I omit any table or graph, because growth at compound interest is so familiar. The share of labor in growing capital is less than for flowing capital of the same carcass-life. The labor in flowing capital starts to flow out early on, but that in growing capital is locked in until the product is ripe, and joined by yet more capital which is not produced by labor at all but by land and other capital, the invisible inputs.

With growing as with flowing capital, the basic principle is unaffected by having a going concern. If we have a normalized forest of n cells or patches, and cut and regenerate one patch each year, then we must keep n patches in inventory drawing interest for every one that we put workers on. As before, the function relating labor's share to life is the same, whether we look at one patch of trees over life or at one normalized forest over one year of its life—which is not surprising, considering that the normalized forest is a cross section of the whole life of one patch of trees, there being one patch of every age. Knut Wicksell demonstrated this long ago in his *Lectures.* The mathematics is in appendix 1, and again there I introduce a land input. As before, there is less labor per acre when labor is used less frequently.

Here are some familiar, recognizable traits of capital-using objects and enterprises, a sort of Field Guide to Capital Intensity:

1. The payout is deferred, the benefits are strung out, so that the object has to yield a large surplus over investment to cover interest. This surplus is the value-added by capital, the Austrian "agio".
2. The cash flow when it comes is largely income. Recovery and depreciation are a minor share of cash flow. By the same token, if the object is financed, most of the periodic payments are interest for several years. The installment needed to retire the debt with interest is not much higher than simple interest on the original principal.

3. Demand is very sensitive to changes in interest rates, as with housing and all durable capital. Demand is also sensitive to property taxes.
4. Only a small share of the objects are normally replaced each year.
5. A large share of the objects suffer obsolescence at any given time.
6. If the objects are attached to a site, as the most durable ones are, labor is applied onsite in a bulge, a one-shot payroll. There is no fund quickly recovered to reinvest to sustain the payroll.
7. The services stored up do not flow through to consumers for a long time, so production creates incomes without yielding up the goods to match them.
8. The fund-to-flow ratio is high: a large stock per unit volume.
9. Finally, it is fair to say that the owners and other beneficiaries of these objects often demand relief from the test of competitive interest rates, a test they cannot pass. They also demand special relief from property taxes.

It would be interesting to display examples of the wide range of lives of familiar assets and goods, from a few minutes for a restaurant meal to hundreds of years for road cuts and fills. There is a full range of technical options in most fields. The choice depends on relative input costs, that is, the cost of labor vs. the rate of interest.

Just as with the labor/land mix, there is a leverage effect that makes demand for labor elastic. Where labor is 90 percent of costs, a drop in unit labor cost to employers raises property income with a nine to one multiplier on the percentage change: 1 percent off labor cost adds 9 percent to property income, drawing new investment into labor-using enterprise in the most compelling way. Symmetrically, dear labor screens out labor-using investments, and high interest rates screen out capital-using investments. This means that dear labor screens out shorter ones, and high interest longer ones.

In Figure 6.2 R is ripe value, the value of an object of growing capital when ripe. The solid curve $R = e^{ni}$ is the locus of all values of R which yield i over n years (a straight line on the semilog scale). In equilibrium the value of all growing capital will rise to touch this locus, at which time it is ripe. If we discount any value on the curve at i, its present value is unity.

The two dash lines below the solid one show the effect of discounting at a higher rate than i. The present value of shorter maturities like n_1 falls less than that of longer ones like n_2. At the higher rate, the shorter maturity gains a premium over the longer. Thus the market responds to scarcity of capital by raising discount rates, which screen out long maturities in favor of shorter ones.

This makes sense in the simplest terms when we observe that the cost of producing the long maturities is mostly interest, that is, value added by

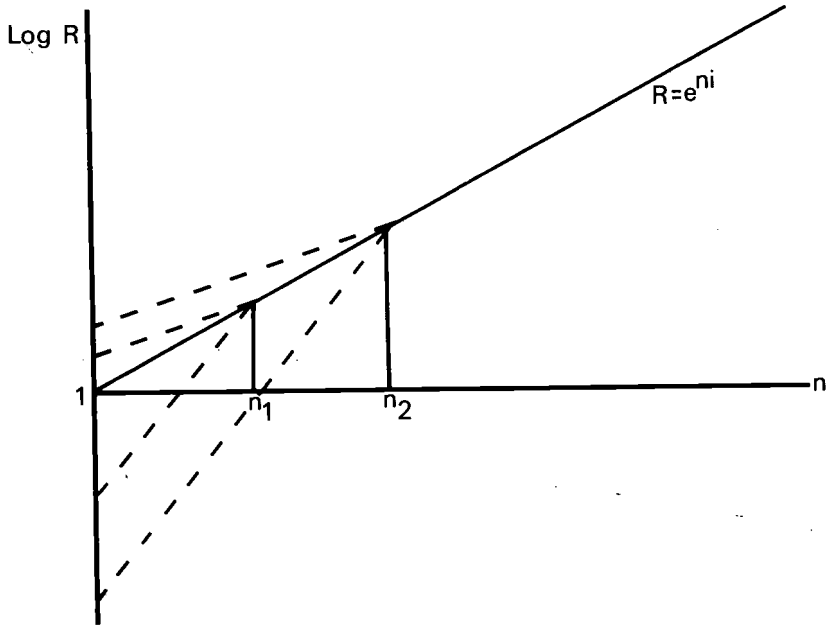

Figure 6.2.—Effect of discount rate on present value, different maturities.

capital. They are prodigal of capital, so naturally a high price of capital screens them out.

Leverage may be observed on the graph. The decline in wages needed to absorb the higher interest rate is slight for short maturities and great for long ones.

The two dash lines above the solid one show the reverse effect when we discount at a lower rate than i. Now n_2 is preferred to n_1. At the lower rate, the longer maturity gains a premium over the shorter. Thus the market solves a glut of capital by letting it be sequestered in long maturities.

The second adjustment was always the ready answer to the Keynesian "impasse" over which so many people fretted not long ago, how to find outlets for surplus capital. Martin Bailey has pointed this out.[34] The first adjustment is the ready answer to our current crisis of capital shortage. *Invest in shorter maturities, deliver the final goods faster to consumers, recover and reinvest the capital faster in payrolls to use the whole labor force.* That is my thesis in a nutshell.

Figure 6.3 shows how high labor cost, conversely, screens out shorter cycles. In the figure, the wage cost of investing in growing capital assets of different maturities is originally unity in equilibrium. Then it rises by 10 percent to 1.1. On the semilog scale, the investor's rate of return is the

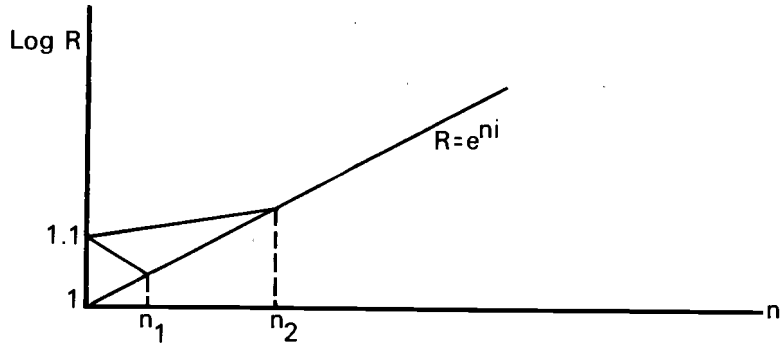

Figure 6.3.—Effect of higher wage cost on rates of return, different maturities.

slope of the growth curve. At the higher wage cost shorter maturities like n_1 are screened out—the return becomes actually negative. Longer ones like n_2 yield higher returns (although not as high as originally).

Thus high wage costs screen out the short or labor-using investments, and direct capital into the long or capital-using investments. Given shortness of labor, this adjustment would combine capital with less labor and cure the shortage.

The models above refer only to growing capital. I omit analogous models for flowing capital redundant here. The same principles apply. Mathematically, a unit of growing capital is the building block from which formulae for flowing capital (like those used for table 6.4) are derived by summation. So principles that hold for growing capital generally carry over to flowing capital as well, with a few minor *mutatis mutandis.*[35]

The key to full employment then is raising the labor-combining valence of capital by turning it over faster. Active capital moves labor, while torpid capital merely occupies land and often displaces more labor than it employs.

The key to activating capital in this way is to let labor costs fall and the cost of capital rise. Conservative economists have long advocated something like that, of course. Those of more analytical bent have stressed "Richardo Effect," the substitution of cheaper labor for capital. Labor of course has resisted that message. They have all, however, failed to observe that we can lower wage *costs* without lowering wage *rates*, or take-home pay, by abating institutional biases like payroll taxes and withholding taxes. Likewise, we can raise capital costs without raising interest rates, by removing income tax loopholes for capital and taxing property more heavily. Thus one can advocate lowering wage costs and raising capital

costs without lining up with the demons in the House of Labor. But neither does this preclude one from faulting excessive wage demands, even as the conservatives do. In short, this is not a gut issue pitting "liberals" against "conservatives" in tired routine combat rituals, but a new issue calling for some celebration and promising a way out of old dead ends.

The capital stock of an economy is a great revolving fund. Each time a unit of it recycles, it combines with workers. To combine the whole great fund with surplus labor, we need only turn the whole faster. This will deliver ripe goods to consumers at a faster rate: growing capital will spend less time growing before harvest, and flowing capital will spend less time frozen in cold storage before thawing and flowing. Reinvestment of the recovered capital will increase incomes with which to buy the augmented flow of goods and services.

Here we collide with one of the firmest biases in our cultural impedimenta, the bias against rapid replacement. To many people that connotes waste, shoddiness, flimsiness, the fast buck, speculation, suede shoes, cultural degradation, demolition of treasured antiquities and cherished memories, tinsel, planned obsolescence, fly-by-night, throwaways, litter, and ticky-tacky. That those are indeed only connotations and perversions of the principle, not the essence, does not placate some people. Long life to them connotes reliability, stability, soundness, trustworthiness, economy, character, respect, and old-fashioned goodness. These values lie deep in the cultural subconscious and will not yield easily. They are indeed part of what sustains the institutional bias that causes unemployment and inflation.

An economist cannot plead against them so well as point to the high price of indulging them: inflation and unemployment, as well as neglecting the positive values of flexibility, adaptability, early embodiment of technological advance, reduced capital requirements and easier entry, replacement of obsolete equipment, stimulus to creativity, mobility, and evolution. To be sure there are those who oppose change and attribute modern malaise to future shock, but fifty years ago we lived with cars, telephones, radios, electric lights, sewers, water works, and elevators, even as today, and Al Capone too, and it makes more sense to trace the malaise back to the fear of unemployment and its derivative evils listed earlier.

It may help some to note that the "life" of flowing capital, as the term applies here, is not carcass life but service life. The idea is not to shorten carcass life, but to speed the delivery of value to consumers, and with it the recovery of capital invested. If the carcass survives that, well and good, it is a bonus.

The purpose in demolishing an old carcass of, say, a house, is to recycle

the site it preempts. This offends the preservationist in many people, but two observations are in order.

Demolishing old buildings and replacing them with new is a way of preserving more old capital than is demolished, just like replacing a car's dead battery, or pulling a sick tooth. Surgical demolition is preservation, in the larger sense. Replace the sick house and preserve the neighborhood; preserve the neighborhood and preserve the city, with all its capital infrastructure and all its valuable land.

Second, the best way to renew many sites is not to demolish but to rehabilitate. "Rehab" is labor-using, compared to new construction. So is operating the older buildings: maintenance and operation of buildings eats up an ever larger share of rent as they age. Shelter from old buildings is a product of labor more than of capital. Thus, our present tax biases that favor capital over labor tend towards premature abandonment of old buildings. The policies advanced herein are in tune with Jane Jacobs' image of the good city life. It may seem paradoxical, but reducing wage costs, which favors investment in capital of shorter service life, at the same time and by the same token favors extending the carcass life of old capital. It is quite consistent though, because one recycles the old carcass by patching it up with investments of shorter life than a wholly new structure would have, and by using more labor to operate it.

We have shown now that the value of land to labor depends on how actively the owner combines it with labor. The value of capital to labor again depends on the same thing. Combining capital with labor turns out among other things to mean recycling capital faster. We have shown that the elasticity of demand for labor is high for combining with both land and capital, owing to the leverage that labor costs exert over returns to land and capital when the factor mixture is rich on labor. We have shown that there is a great reserve of land and capital ready to combine with more labor, in response to small additional incentives. We have hinted at what such incentives might be. Next we look closer at tax bias against labor.

B. Tax Inducements to Displace Labor by Land and Capital

The tax system affords few shelters for the wage or salary earner as such, directly to him or indirectly to his employer. His income tax is withheld, beginning fifteen and a half months before the tax is otherwise due. All his income is "ordinary" and taxed at the full rate. If one has any question that the income tax is largely a payroll tax he need only try to remember when he last heard of an oil man taking salaried work as a tax shelter. Harry Kahn found that labor income rose from 66 percent to 81 percent of the base of the personal income tax, 1939-63.[36]

There was a time when income tax enthusiasts argued that it did not "disincent"[37] work because it was a percentage, and your best choice before tax was the same as that after tax. This neglected the considerable undeductible costs of working, including loss of welfare, and the rocketing rise of welfare from 1960 on shows that there is an alternative which, if not desirable, is preferable to paying taxes on low wages. And in wondering at the growth of crime, we should recall that tariffs always did beget smugglers, and ponder the music-hall wisdom of Fagin: "Better get some untaxed income. You've got to pick a pocket or two."

Those factors, fortified by minimum wage laws, shift some withholding taxes forward to employers. They in turn, naturally look for substitutes for labor.

Besides, of course, employer and employee both pay the O.A.S.I. payroll tax, making labor cost the employer another 10 percent or so more than the employee gets as incentive to work. The employee's tax is not deductible, as property taxes are, from taxable income.

Pension payments are also taken from payroll. If any worker includes them in his motivational income he has not been watching the C.P.I. lately. Employer costs are proportional to payroll. Interest earned by pension funds is tax-deferrable, but that helps the pensioner as a capitalist, not as a worker.[38] Some pension plan deductions (like those of the State of Wisconsin) are not tax-deferrable—the worker pays tax on unrealized income, even though property does not.

Then there are union dues and other little nicks in the paycheck. Some are small, but the sum is large, so that it now costs an employer much more to hire a man than the man ever sees.

The employee finally gets his take-home residual in cash. To convert cash to goods, he is taxed once again on retail sales. But many kinds of property income, like the service flow of one's house, avoid sales taxes.

Thus the tax system says to employers, hire labor, and government will charge you in many ways so that your labor cost is much higher than the worker's real wage. On the other hand, when it comes to holding land, the tax system is geared to make the burdens light and the rewards great. We next examine the tax treatment of land.

The only tax that adds to holding costs is the property tax, the part that is levied on land value. Even this is relieved by assessment practice. Most assessors give a good deal of weight, in valuing land, to its improvements and the gross business conducted there[39]—that is, the "land" tax becomes a tax on using land, not holding it. Preferential assessment laws now require this in many states. A good deal of land is exempt (although hardly any wage or salary is exempt from income tax). Government land is the largest exempt class. Much of it is let to private people for inadequate

fees. Their possessory interests are seldom assessed adequately or at all, and the low fee structure tells them to waste government land to substitute for highly taxed labor. Low grazing fees, for example, let stockmen hold cattle on grass too long, just as low parking rates in cities let parkers hold scarce street space too long.

Turning to the income tax, it bears very lightly on land. The basic abatements for land may be classified and summarized as follows:

1. covert write-off of undepreciated and appreciated land value (as by allocating part of it to an old building or orchard on the land)
2. exemption: imputed income (homes, resorts, hobby farms) coupled with deduction of interest and property taxes: unrealized appreciation (as of advance purchases held until needed); capital gains at death; bequests; capital gains of exempt "non-profit" owners
3. deferral of tax on appreciation until realized by sale; expensing of carrying costs (interest and property taxes)
4. capital gains rate on realized appreciation; ordinary offset for carrying costs and (some) losses
5. deferral of tax beyond date of sale, by several devices
6. deferral of land-use income where there is intertemporal interdependence of income (as by planting orchards)

I have treated some details of these devices elsewhere.[40] Some of these abatements are so gross as to amount to 100 percent exemption from tax, and some of these, like covert write-off, are repeatable, resulting in actual subsidies in lieu of taxes for holding land. This is "double-dipping," triple- and quadruple-dipping much more serious than what currently goes by that name.

While keeping taxes low, government arranges high rewards for landowners by building public works, as well as by the whole complex of allied policies to support and sustain land values. Local works may be charged in part to local property taxpayers, but there are large federal tax favors here, too. Local bonds are exempt from federal income tax,[41] and are repaid from local taxes that are expensible (debt amortization in advance of economic depreciation should really be capitalized).

As to sales and excise taxes, they too bear lightly on land. There are taxes on the *transfer* of land, but these discourage selling as much as buying. They have a net impact on the motive to hold land, by gumming up the market, which adds to the incentive to buy in advance of need (by destroying the confidence one can buy at time of need). The bulk of sales taxes, however, fall on the turnover and exchange of goods and services; on activity, rather than possession. Incomes peculiar to land like ground rents are not taxed as sales. Capital gains and imputed income also escape.

The result of all that is a highly inflated incentive to buy more land than needed, sooner than needed, and to hang onto it longer than needed. This in turn results in spreading people and capital out thin over much more land than needed. And the last, finally, necessitates pumping billions of dollars of capital into stretched-out roads, pipes, lines, wires, and other linkages that tie the fragile web of society and economy together. Localities attract large capital resources to sink into extensions of low productivity, high risk, and deferred or imagined benefits by mortgaging the tax power to general obligation bonds. State and federal governments pour in additional capital, as by the highway trust fund. None of this public capital is subject to any property tax, and he would be an eccentric public accountant who added a shadow tax to the capital to show its real social cost.

But Aha! one might say (had he skipped too fast over the previous section), these inflated infrastructure needs are all investment opportunities, exactly what Dr. Keynes ordered. We can always open up more new land, too, by extending lines out into the great open spaces and urbanizing them, and reclaiming the deserts if needed to replace the farms. So much for your limits of the Earth!

In fact, capital in marginal line extensions creates fewer sustainable jobs per million sunk than it would if invested in almost any other way—as it would have been if not taken for this use. There is a one-shot payroll only. After that, the value added by the facilities is added mainly by the unrecovered capital and land, as has been shown in section A, and the factor input is mainly capital measured by interest, the hire of unrecovered capital. The capital per job is uncommonly, inordinately high above the mean.

The money spent recycles, to be sure, but that is no blessing in these inflationary times The fund of *real* capital stops revolving; active capital is converted to torpid. Ripe goods are not delivered to consumers, and the investor does not recover his capital to reinvest. The real capital advanced to workers now lies buried in the ground, unavailable to meet money demand in the next round of consumption. The policy only makes sense on the premise built into modern macroeconomics that there is a bottomless cornucopia of latent capital formation waiting for demand, and inflation is a remote danger. That premise has proven contrary to fact. These macroeconomics are pursued below in section C.

In addition to tax-induced waste of "land" in the narrow sense, there is the same for minerals. The set of tax subsidies to hype up minerals exploration and production are by now well known, and I merely remind you of the depletion allowance based on a value whose accrual was never taxed as income, use of wellhead value rather than *in situ* value as the base of the allowance, expensing of dry holes and intangibles, and capital gains treat-

ment. When it comes to extracting foreign resources there are the foreign tax credit, tax exemption of ocean shipping, transfer of profit to lowest tax jurisdiction, tax deferral on unrepatriated profits, and the like.

As to the property tax, assessment is at its lowest when it comes to minerals.[42] There is negligible property tax pressure to utilize domestic minerals, nothing at all comparable to the income tax incentives to go after foreign minerals.

The results of the complex of tax measures are of course complex, and as Alfred Kahn has shown, they must be interpreted in terms of the cartelized industries,[43] and to this we should add other institutional biases, like the establishment of tenure through exploration[44] and military pressure.[45] But the broad results are analogous to those for other land. We spread ourselves too thin by overstimulating foreign production relative to domestic, and overstimulating exploration and capture relative to production and conservation. We thus involve enormous extra outlays for pipelines and infrastructure, and the foreign investments involve even greater outlays for military support. Military outlays may be regarded much like the extension of a municipal service such as police protection to new suburbs. The mercantilist metropolis makes the world its suburb. Like other outlays, these tie down capital until the flow of benefits returns the costs. It is symptomatic of the capital intensity of military outlays, if not definitive, that interest on the national debt about equals the armed forces payroll (about $25 billion each). As the debt is rolled over its cost can only go up.

There is a Georgist impulse to think of "production" as always good. But extracting more primary products with a high natural resource content, like oil or aluminum, is the substitution of land for labor, just as much as is spreading labor thin over farm land. In addition, lavish use of materials and energy for labor is the prime source of pollution and generation of residuals, both of which in turn require space and drive away people.

Thus in respect to minerals, as with other land, the tax system induces the use of too much, and requires large capital outlays to do it.[46]

Next we look at the tax treatment of capital. The property tax hits some kinds of capital, and rather hard. But public capital, as noted already, is exempt, and affords a wide avenue of escape.

Much other capital is also exempt, or given preferential low assessment. Timber makes a good example. Timber is almost everywhere underassessed by custom or law. The argument is that the investment would not pay if taxed, because of its long life—that is, its heavy use of capital. Yet when is the payroll tax or income tax abated because a labor-using business cannot survive it?

Preferential treatment of timber is granted in almost as many ways as

there are states. Ellis Williams has summarized these as exemption or rebate, modified assessment, modified rate, deferred payment, yield tax, and severance tax.[47] These preferences are granted on top of rural tax rates, which are low anyway: around 1 percent of market value. Sylvan rates are even lower, because of the low complement of workers, and hence population, relative to inventories of timber. In some areas—northern Maine is an extreme case—voters are systematically excluded, preventing incorporation of local government and holding down the tax rates near zero by separating the people from the tax base. We hear a lot about tax enclaves for industrial plants, but most of the nation's timber capital is in tax enclaves too.

The "modified assessment" listed by Williams is often customary even where not formalized by law. Saplings are overlooked routinely until they approach merchantable age, even though they have a market value for investment. Assessments habitually lag behind the times, a built-in advantage for growing capital over flowing (depreciating) capital. Williams has published a collection of state assessment manuals that show unmistakeable special standards of solicitude for timber.[48] The Washington State manual, for example, specifies that sale prices of land with timber do not measure fair value because they do not take account of carrying costs to harvest. "Assess it low" is the message.

De facto exemption of premerchantable timber is of greater value on slower-growing timber, because it goes through a longer premerchantable life.

A good deal of other capital is exempt too. Anything on legs or wheels or water is hard to catch on assessment day, as are consumer durables, and most jurisdictions have stopped trying. But business inventories, which are short lived, are hit hard.

Buildings, which are durable and capital-using, are hit hard too. This would seem to constitute a bias against use of capital, and it certainly is a bias against improving land. But the effect on the individual building is reversed because the property tax is levied locally, and local governments use zoning and other controls to protect and fortify their tax bases. The thrust of local zoning, building codes, subdivision controls, occupancy limits, condemnation power, and "sewer power" is to raise the capital requirements of residing in a town. The net result is doubly bad. We get more sprawl, raising infrastructure capital needs, and more capital per dwelling unit on the land that is used.

Turning to the income tax, it contains many loopholes and abatements for capital, and these generally are geared to favor capital of longer life. I will itemize basic classes of preferences for flowing and growing capital, beginning with flowing.

1. Fast write-off and expensing. Whenever one writes off an asset faster than it actually depreciates he lowers the effective tax rate below the nominal rate.[49] Expensing is best of all, of course, being the fastest, and it lowers the effective rate to zero. It means the treasury puts up in year one a share of the capital investment equal to the tax rate, and thereafter gets only a return on its own investment.

Some important capital outlays which the Congress lets be expensed are costs of minerals exploration, intangible drilling costs, R & D, advertising, rearing breeding livestock, starting orchards, soil and water conservation,[50] many costs of land development,[51] interest and property taxes incurred to carry growing capital, losses incurred to create goodwill or appropriate resources allocated by user rights (like air routes or water rights), *any* investment of unrepatriated profits abroad, price war losses incurred to capture markets, movie-making,[52] and so on. One can see from the list that expensing is granted more freely to growing than flowing capital. Growing capital is the kind that ties up capital longer before any is recovered.

It is a constant theme of interest groups both private and public that profits are not profits but costs if reinvested in the same business in which earned, and strange as it seems to an economist there is a ready audience for this fallacy.

Almost all income-yielding capital is fully tax-depreciable well before its service life is over. About the only kind depreciated slowly is that of regulated utilities, to maintain the rate base and pass through the higher taxes to consumers.

2. There is double-dipping allowed when capital is sold and redepreciated. The excess of sale price over book value is taxed as capital gains, to "recapture" the excess depreciation, but recapture is several years after write-off and at the lower capital-gain rate. The longer capital lasts, the more dips are possible. Buildings are the main beneficiary. Besides their long life they have the advantage of being confusable with land, and a good deal of land value is written off normally with each dip, even though the land value is rising.

"Recapture" of excess write-off is based on a sliding scale, the lower rates applying the longer the capital is held. This helps limit the number of dips, but adds to the favoritism shown to longer-lived capital.

3. Consumer capital in houses and hobbies yields a tax-free imputed income, just as land does, coupled with deduction of interest and property taxes and indefinite deferral of capital gains taxes. If I am solvent and never move to a cheaper house I can defer the gains until fiscal extreme unction, forgiveness at death. The capital gain may derive mainly from the land, but to claim the land as residential I must have a house.

If I hire workers to build or improve my house, that is not deductible. If I pay out for repairs and upkeep, that is not deductible. The exemption is to the return on capital, the service flow in excess of cost. The more durable and capital-using the house, the greater share of the service flow that is. A cheap house or trailer, a shelter of low capital requirements, benefits little from this exemption. The benefit is to capital.

Here we meet an exception to the rule of no loopholes for labor. Labor on one's own house is tax free. There is even some inverse relationship between the capital in shelter and the labor input required to keep it going. On the other hand, the opportunity for tax free labor requires that one own a house, and the more land around a house the more the opportunity. The greatest outlet for home labor is when combined with land and capital.[53] A material share of the value of country estates and farms doubtless derives from their outlet for tax-free labor. The farther one gets from the exchange economy of cities and the nearer to self-sufficiency, the more labor is tax free.

In addition, it is the relatively wealthy who can afford to keep wives at home who do not work for cash. The tax-free labor of housewives is a bonus for the leisure class, of much less value to the waitress, seamstress, scrubwoman, and maid, who labor in the houses of others.

The income tax is a tax on sale and exchange of labor rather than on home labor—a critic might say on social behavior rather than narcissism. But on larger landholdings there is room to reap the benefits of specialization, cooperation, exchange, and society and still avoid taxes, by internal barter. In the later days of the Roman Empire *patrocinium* became common, evolving into the early feudal system. The overtaxed citizen commended himself to be a "client" of the large landowner "patron" to escape the heavy hand of the publican.[54] Today on large paternalistic ranches we see the same forces in a less-aggravated stage, and in tax-free religious brotherhoods of Hutterites and Mennonites the modern counterparts of old ecclesiastical benefices. There are many reasons why Houthakker found the farms of Texas to report no net taxable income whatever, but one reason is the outlet they offer for tax-free exchange of labor.

Thus the tax loophole for labor is open mainly to those owning land and capital. This narrows the loophole so that it hardly compares in scope with the exemption of imputed income of owned land and captial. The landless proletarian seeking tax relief has to resort to welfare and crime.

For sentimental reasons, tax benefits to homeowners are popular, along with many other subsidies, like cheap credit pumped in via the Federal Home Loan Bank Board and the host of predecessor and ancillary agencies. In result, capital is diverted from commerce and industry (the taxpaying branches at least) to homes. Yet capital in homes complements

labor less than capital in offices, stores, factories, inventories, and so on. It makes no work places, it needs no processing, and it lasts much longer.

4. Deduction of interest and property tax. These costs of carrying capital are fully deductible from ordinary income, even though the income from capital is wholly or partly exempt from tax.

5. Investment tax credit. This on-again off-again device lets investors in many kinds of capital reduce their taxes by 7 percent of the investment. After that, one may depreciate the whole amount as well. This device has the potential of favoring shorter over longer investments. In form it is a premium on replacement, and thus labor-intensiveness. It could be a powerful device for quickly causing capital to combine with more labor. But Congress has forestalled this by permitting the credit only on a sliding scale favoring longer investments. The credit is not fully allowable for investments whose estimated economic life falls short of eight years. The net result is a lower overall tax rate on capital than on labor.

Those five abatements of course move investors to prefer capital-using over labor-using techniques, and combine more capital per worker in all processes.

In addition, the abatements are biased among forms of capital, consistently favoring those lasting longer. Capital cycling in less than a year is treated very harshly. It hardly achieves the status of "capital," indeed, in the eyes of the law. Economists have strung along, letting "investment" refer to buying capital to last longer than a year and appearing quite unconcerned over the logical, definitional, and modeling problem in drawing so arbitrary a line between "investment" and consumption spending.

The investor who recovers capital inside the year reports his costs and revenues on the same tax return, even though they may be nearly a year apart. He might gain by straddling the year ends, but the I.R.S., so careless with intertemporal advantages gained by owners of durables, is vigilant to this and forbids him to deduct the cost of goods not sold.[55] The effect is the same as requiring that increased inventories be reported as income. The Treasury will not help anyone finance working capital as it does durable capital. Eisner v. Macomber, the 1920 case which protects land, timber, mineral reserves, stocks, etc. from taxes on unrealized gains, does not apply to accumulation of inventory. The rules are bent against goods of higher labor content.

There is a concession to phantom inflationary inventory profits in LIFO accounting, but "very complex rules are involved and . . . LIFO is not ordinarily used by small business. . . ."[56] It is tailored for larger business—the ones that need more capital per worker.

As noted before, recapture of excess depreciation is taxed on a sliding scale, the rate declining with years held—another favor to long life.

Improvements to land that add to sale value receive capital gains treatment, with all the many favors that implies. Unlike the cost of inventories, which is not deductible until sale of goods, these costs are often expensible and nearly always depreciable long before sale. Land improvements of course are more durable than inventories.

Depreciable lives are generally based on arbitrary class of asset, regardless of actual service life. The more the service life exceeds the write-off life the lower is the effective tax rate, a clear tax incentive to build in more durability. Depreciation paths are also important. Straight-line tax depreciation is most common, but shorter lived assets like, say, a delivery truck, depreciate like the Blue Book value of cars, faster than straight line. They get the tougher break. Buildings, on the other hand, depreciate slowly at first, along a path like the declining balance of an installment debt. But the I.R.S. allows them accelerated depreciation (double-declining balance and sum-of-the-years'-digits.)

Thus there is a consistent and pervasive tax bias in favor of capital, and among capital assets in favor of the longer-lived. That this is so consistent, and often explicit,[57] points to some sort of conscious intent, or systematic bias.

The above referred to flowing capital. Growing capital, which on the whole ties up capital longer, and admixes more interest input with the original labor input than does flowing capital, is treated even better.

The basic tax subsidy to growing capital is deferral of tax to date of sale. Income, in the meaningful definition of Haig and Simons, occurs when value accrues, that is, each year as the value grows. Thus growing capital is taxed after the income accrues, and the longer the wait, the greater the benefit. A mathematical proof is in appendix 2. In effect, by deferring taxes, the Treasury helps finance growing capital (except ordinary inventories of short life).

Associated with that is a higher propensity of Congress to allow expensing of the capital cost of growing than flowing capital. Agriculture makes a good example.[58] Under the cash-accounting privilege allowed to farm business, a "farmer" can deduct expenses of materials and services that "actually go into or are a part of a final salable product—such as feed, seed, stud fees, and management services." Machinery and building improvements have to be capitalized—they are flowing capital. Capital that falls in a twilight zone between the classes includes costs of raising livestock held for draft, breeding, or dairy purposes, and costs of starting up orchards and vineyards. These too are expensible, even though some

orchards may bear for eighty years. Breeding stock may be depreciated as well—another case of double-dipping—and their sale not be taxed until the "herd" is liquidated, an incredible package of special privilege[59] for the kind of livestock that requires the most land and capital per dollar of value added, to say nothing of per unit of nutritive value.

Some large classes of growing capital are timber, livestock, minerals (the portion of their value added by discovery and development), some kinds of knowledge, orchards and vineyards (for part of their lives), and liquors. Most inventories are growing capital, but the bulk of them turn over within a year and enjoy no tax subsidy. Most of those listed are greatly favored, however.[60]

As Dangerfield points out, the investor will "maximize his tax shelter assets . . . while minimizing his nonshelter assets, such as machinery or buildings." That is, he substitutes growing capital like cattle for flowing capital.

Again we take timber as an example. Although the tax is deferred until sale, the capital costs of timber, interest and property taxes, are expensable as you go. On the other hand, the cost of labor used to reforest bare land is not an expense; it must be capitalized and not deducted until sale.

In addition, timber sales get capital gains treatment, although the interest and property taxes are expensed from ordinary income. The labor cost which had to be carried forward to sale is now deducted only from the capital gain.

Ordinary profit from vertically integrated downstream mills may be shifted to timber and get capital gains rates by the firm's nudging up shadow transfer prices. The I.R.S. watches these prices with some diligence, and it is not certain that fictional internal prices get by. But there is every incentive to raise nonfictional transfer prices by letting timber add more value on the stump at capital gains rates before becoming a log, processed by labor at ordinary rates. In the mills, value added by labor is taxed at ordinary rates, and so is the value added by profit.

Some of the gains subject to tax are illusory results of inflation, and on this basis one might think tax preferences are needed merely to prevent higher effective rates on growth of capital. The undeducted cost basis of ripe timber is however negligible, in any case, next to its merchantable value, so this doesn't amount to much. Carrying costs have been expensed right along. And in general, inflation adds to motives to hold real assets, for these reasons:

1. Inflation of property values has outpaced wage rates. The illusion would be to overlook that wealth holders as a class have gained on tenants, young people, pensioners, and depositors.

2. Inflation is an annual tax on holding money. Taxing the rise of equity values merely redresses the balance, and fails in that by a wide margin, because the inflationary loss is immediate, while the gains tax is deferred. Inflation hurts the most those whose need for liquidity is high relative to their real assets. These are those whose volume is high relative to their capital, because liquidity needs vary with volume. That is, these are those whose capital turns over fast. Lampman's study of the concentration of wealth found that money and near-money as a share of wealth declines with total wealth, so that inflation as a tax has a regressive quality compared to taxes on real wealth.
3. Inflation lowers the real cost of borrowing. Since small savers have few alternatives, and the Fed prevents competition from raising rates and some of this benefit is passed through to borrowers, and owners of real wealth are the major borrowers, and leverage is the name of the game, inflation has advanced them capital at very low real rates of interest, another subsidy to holding capital.
4. In terms of bias between long and short (lived) capital, gains on short-lived capital are equally the product of money illusion but are taxed sooner, and at ordinary rates.

A major compaign is underway to abate the taxation of "phantom profits," articulated by Joel Barlow, Norman Ture, Henry Wallich, George Terborgh, and others. Their proposals are to index cost bases, resulting in larger depreciation write-offs over time. This strikes me as a one-sided and unbalanced view, which overlooks points 1-4 made here. Appendix 4 shows how inflation on balance favors the longer-lived assets. Indexing would only worsen this bias.[61]

Turning to the corporate income tax, it is biased against income from corporate property by double-taxing it, or so it would seem. Yet the corporate form is so useful a device for sheltering property income, regardless, that some wealthy people set up personal corporations for tax avoidance. This calls for a second look.

The point is to avoid the double tax by not taking cash out for a long time, converting ordinary income into capital gains, forgivable at death. Public corporations, too, are moved to plow back profits. This puts more capital each year back in the control of corporate managers to reinvest, whether or not they have any good ideas. The capital does not have to meet the test of the market; it is free of all cost but the range of opportunities of the particular management. Thus the net impact of the tax system is to make internal capital artificially cheap to corporations, and push them into ventures of deferred payoffs.

In addition, of course, they avoid double taxation by financing with debt, and their collateral security rises in step with their retention of earn-

ings. They also finance internally from pension funds, now totalling $170 billion, the income free of income tax.[62] Borrowing requires collateral, and law and custom favor solid, durable capital as the thing to pledge.

As to excise taxes, their impact is like that of income taxes, only more so, because costs are not deductible. Excise taxes in effect tax capital each time it turns over. The busy merchant who turns his capital several times a year is taxed on it as many times. But the same capital in a tree is taxed only once at the end of eighty years or so.

If tax bias were the only institution to favor wealth over labor, we could say it may offset other biases, but in fact there are reinforcing biases, which I will merely list: subsidized low-interest loans; regulatory bias and Averch-Johnson effect; licensing laws which dispose of resources, franchises, monopolies, etc. subject to heavy capital requirements; use of low interest rates in planning public works; ignoring opportunity costs of public land; logrolling, overcommitment, and resulting stretchout of public works; the Highway Trust Fund; the failure to provide any police or administrator-enforced abatement of pollution, leaving the citizen no recourse but the larger lot, farther out; and the price-umbrella effect that builds excess capacity into cartels. There are more, and I know of no comparable set of biases favoring inputs of labor.

C. Demand for Capital Is Not Enough to Make Jobs, because Capital Can Substitute for Labor

We have already laid the basis of the present argument and recapitulate briefly before moving into the macroeconomics.

If there were no capital, the way to make jobs would be clear and simple. We would tax land value as the property tax does, as a regular fixed payment based on value, not varying with use. This would put pressure on owners to intensify. We would not tax them for hiring labor and selling products. They would use more labor on less land and solve our problem. And this is still a big part of any solution, regardless of capital. We must use more workers per acre.

Since there is capital, the problem has a third dimension. We need to use more workers per acre, and also do it more often. The form of capital we create affects both relations—that is, how many and how often.

Just now, with capital short and land dear, we not only need to use less land per worker, we also need to use less capital per worker. It is not that more capital would not be good if we had it. Voluntary saving is splendid, and taxing land will doubtless encourage it by lowering the value of that asset and prompting people to fill the void with real capital formation. But at any time, we want to make do with what there is, and just now we need

to make a short supply go around much further. The market will do it for us if we let it.

Investments differ widely in "valence" for labor, how much labor they mix with capital. So investments which take capital from job-creating uses of high labor valence to sink it into other uses of low labor valence are not helping make jobs. Unrepatriated capital overseas is not making jobs in America, except as Americans emigrate with it. Some capital like cattle has a high valence for land and deprives labor of land, as well as of capital in other forms. Some capital, like that in a giant strip-mine excavator, combines one operator with millions in capital and land, and hardly compares with one sewing machine, which also requires one operator and a few square feet of floor space.

But our ideologies tell us we should subsidize investment to employ labor, and untax capital, and finance tax-exempt public works, and so on. They tell us that labor produces capital anyway, so how can capital displace labor? In effect they tell us that if capital does not always combine well with labor in parallel, it still combines in series, and so the key to jobs is investment. And here they lead us into folly.

We see investment in, let us say, a large storage dam as using workers, but not as freezing up scarce capital. We see the dam produced by workers, but we overlook the service flow from the dam produced by the invisible capital input, that is, interest on the unrecovered principal over life, which accounts for and soaks up most of the cash flow. We see the demand for construction labor and think it is a net increase, but forget that the financing takes funds and thus real capital from alternative uses. We know that construction payrolls don't last, but we think that this is merely a local problem balanced out in aggregate social accounting: but in fact it shows exactly what heavy construction does to the aggregate economy. Each dollar frozen in concrete contributes to shortage of capital reinvestment and reemployment. We pay bread today for stones tomorrow.

It might be thought that I am overemphasizing the life of capital and should consider that capital combines not just with labor that produces it, but also with labor that works with it. Thus a factory "makes jobs." However, the factory produces goods too, which are capital of some life. If we think of an economic matrix in which we match all capital with the labor that produces it, then we have a comprehensive tableau. Further matching would be redundant and might double-count. That is, we can measure factor proportions by vertical integration, as I am doing; or alternatively by horizontal integration, as in a normalized model; but not by both at once.

We think that "intensive land use" must be good for labor, but forget that trees and livestock and farm machines and fully automated plants

and the blank sterile walls of many modern city buildings drive labor off the land and last too long to hire reconstruction labor very often. Appendix 3 shows a mathemetical formula for the exact relation of labor-intensity and capital-intensity of land use. Long life of capital can mean high intensity of land use without much labor.

The problem is that to encourage investment we lower the cost of capital, and move investors to use it lavishly in place of taxable labor. We forget that the job-creating efficiency of capital varies from one use to another, and our measures to promote investing lead capital into the least job-creating uses, where capital substitutes for labor, because we make capital look cheap and labor look dear.

D. Factor Substitution and Replacement Demand: The Microeconomic Basis for a Correct Macroeconomics

The great, the overriding fault of modern macroeconomics is its homogenized treatment of investments. One is as good as another; only the aggregate matters in the New Economics.

We must distinguish among investments. Adam Smith, as so often, gave us a morning star of light on the subject. Smith said, "The quantity of that labor, which equal capitals are capable of putting in motion, varies extremely according to . . . their employment . . . A capital . . . employed in the home trade will sometimes make 12 operations, or be sent out and returned 12 times, before a capital employed in the foreign trade of consumption has made one . . . the one will give four and twenty times more encouragement and support to the industry of the country than the other."[63]

Mill was like-minded. He and Smith saw "circulating" capital as "setting labor in motion," and "fixed" capital as not.

Mill said, "capital may be temporarily unemployed, as in the case of unsold goods . . . during this interval it does not set in motion any industry . . . capital may be so employed as not to support laborers, being fixed in machinery, buildings, improvement of the land and the like. . . . Capital is kept in existence from age to age not by preservation, but by perpetual reproduction. . . . To set free a capital which would otherwise be locked up in a form useless for the support of labor, is, no doubt, the same thing to the interests of laborers as the creation of a new capital . . . all increase of fixed capital, then taking place at the expense of circulating, must be, at least temporarily, prejudicial to the interests of laborers. . . . Suppose . . . a capital of 2,000 . . . half . . . effects a permanent improvement. . . . He (the capitalist) will employ, in the next and each following year, only half the number of laborers."[64]

Unfortunately Smith and Mill never got the bugs out of their wages-fund theory, which never became fully coherent and operative. In spite of the above quotations, it seemed to some that the "fund" could not increase except by slow increments of capital formation. Knut Wicksell corrected this: ". . . a true view of the famous wage-fund theory. . . . Capital in its free form is employed to advance both wages and rent. . . . If . . . a given capital . . . is employed year after year . . . then each year about an equal part of that capital will be set free. That part . . . constitutes the whole production of finished commodities and services (of capital) of the year. When the capitalist class has taken the surplus . . . it must, in order to maintain its capital, reinvest the remainder—which it does by hiring labor and land for new production. This part, therefore, is . . . the annual wage-fund. . . . The wage-fund may undergo considerable changes, in so far as the average *period of turnover* of capital is lengthened or shortened . . . it is only the part (of capital) annually set free which can purchase labor (or land)."[65]

"It is only the part of capital annually set free which can purchase labor (or land)." Here I think we have the basis for a correct macroeconomics, one that can exorcise the fallacy that investment of any kind adds to real demand for labor merely by recycling money. The only kind of investing that purchases labor truly, without the fraud of inflation, is investing which corresponds to delivery of real goods to consumers at the end of the pipeline. These real goods are the "capital set free which can purchase labor." This is what turns paper money into real money.

This device suddenly ties together micro- and macro-economics nicely. The way to use more workers with capital is to turn and recover the capital faster. And this is also the way to increase aggregate demand for labor. By far the bulk of the gross investment that generates payrolls has its source in the recovery of capital by sale of ripe goods and the services of flowing capital to consumers. Recovery and reinvestment of capital are the prime movers of the economic machine.

Wicksell saw capital soaking up any surplus labor. "If . . . more labor is available than can be employed . . . a *shorter* period of production . . . is adopted, and the capital which was before insufficient is now able to give employment to all workers. . . ."[66] He saw social capital as a wage fund, but a fund which can sustain any rate of flow because it revolves. This Great Revolving Fund does not limit wages. By recycling faster it employs more workers up to any needed number, and it speeds up when stimulated by lower wage rates and higher interest. In the idiom of modern macroeconomics, this increases replacement demand. Aggregate demand can fall short of full employment if capital turns slowly, but quicker replacement corrects things and fills the gap. Thus, ". . . the existing

capital must just suffice to employ the existing number of workers. . . ."[67] The greater replacement demand is financed by greater capital recovery, and matched by a greater flow of finished goods, so it is not diluted by inflation.

Let us look at Wicksell's device[68] as a way of meeting the national payroll with a small capital. He was telling us in effect that the economy can do what the small businessman has to do all the time. He has to recover his capital quickly each time he sinks it, if he is to meet the next payroll without dropping workers.

Consider a baker on a busy corner open 365 days a year, with working capital of $200. To keep it simple, assume payments are made daily, and they spend the first day setting up, making no sales, but sinking the $200. Half goes for payroll, half for feed-stock, and we'll ignore overhead for simplicity. Thereafter they sell out each night. The $100 turning daily finances annual payroll of $36,500, and an equal flow of net production above cost. To this he need add only $10 for 10 percent interest on $100 of his working capital.

If it took two days instead of one to sell out, he would have to find another $200 of working capital, or drop half his bakers.

As a rough rule, the flow (F) you can handle equals your capital (K) times turnover (T). The average payout period (P) is the reciprocal of turnover:

$$(3) \qquad \frac{K}{F} = P$$

You must hold down that payout period by scheduling your sales so that your cash flow balances your outgo before you run out of capital. If $K = 6F$ (still assuming daily payments) you must sell the first cohort of goods out in six days, or fail to meet payroll no. 7.

As you get into financing slower inventories, compound interest adds to your capital required and $K > FP$. If your period is seven years,[69] then compound interest at 10 percent doubles the value of each item by the time it is sold. At this time your capital will be ten times your flow, rather than seven times, because the cumulative value of an annuity of one equals ten. 10 percent interest on ten equals one. The memorable thing about this period is that your annual interest bill now equals all your other costs, and takes half your cash flow.[70]

Meantime, your capital has virtually stopped sustaining any payroll. Instead of being 1/365 of volume, capital is now 10 times volume, or 3,650 times as much per job.

The demand for labor does not depend primarily on the amount of capital, then, but on how fast it turns over—how active it is. Each time

capital cycles, it combines with and activates labor. Every investment in payroll creates labor income equal to capital on the first round. But for sustained impact it must keep recycling. Paybacks deferred are payrolls denied.

If you recover capital slowly, you constantly need more money, until you reach an equilibrium with cash flow balancing outflow—which by this time includes very large interest payments on all the unrecovered capital.

Some firms and agencies have gone on for decades without reaching that balance. The Bell Telephone Company is notable. In 1971 it went to the market for $4.5 billion in outside capital, about 20 percent of all the new capital raised from stocks and bonds by American industry.[71] "But it will take another 30 years, according to Bell's plans, for electronics switching systems to displace the older (electro-mechanical) equipment in the telephone network."[72]

The United States Bureau of Reclamation makes another case. In 1902 Congress endowed the new bureau with the Revolving Fund, to be recouped and reused every ten years. By now it was to have completed eight cycles, and might have, except for one problem: it has yet to complete the first. Each new project has drained capital from elsewhere—and frozen much of it tight. Instead of activating much labor, the bureau has deactivated much capital. In the process it has also frozen scarce waters in farm uses in areas where that use is seriously obsolete, so the capital is a public nuisance.

Many companies invest in excess of depreciation. A company can do that—by tapping others. An economy cannot, except by new saving. It is a closed system with a zero sum of capital transfers. To meet the *national* payroll the economy must deliver the goods, or cut the payroll. The national capital is indeed a Great Revolving Fund. The fund receives inputs from labor and delivers to consumers. Labor and consumption set limits on the throughput, as we know. But so does turnover of the fund—and that has been neglected.

Meeting the national payroll has two sides: spending money for work, and delivering real goods to back up the money. Turnover generally balances the two sides nicely. Replacement anticipates liquidation. The keepers of the fund—capitalists—anticipate the maturity and sale of their goods, and pay workers to replace them. This gives workers the income to buy the ripe goods. (Along with turnover there are net saving and investment, but these are small next to turnover—too small a tail to wag so big a dog, as the New Economics would have it.)

The New Economics takes care only of the spending side, the money payroll. Its fault is to assume that delivering the goods then takes care of itself. Turnover is assumed mutable, totally accommodating in response

to the touch of spending. The fact is that turnover itself determines spending, since replacement anticipates liquidation. And turnover has become a bottleneck. The flow of income cannot exceed $K \cdot T$, capital times turnover (plus direct services).

The New Economics cannot address this problem any better than the guns of Singapore, facing out to sea, could turn around to meet the Japanese attacking by land. "Think Spending" is its motif, and discourage deliveries. This is to meet the fundamental macroeconomic problems of underconsumption, oversaving, underinvesting, and liquidity preference. If the problem is perceived as how to remove surplus goods from the market, the doctrines and policies that result will welcome investments with only deferred benefits. These create money incomes and no consumer goods. The result has to be inflation, and has been for many years.

New Economists have mocked Say's Law and taught two generations that supply does *not* create its own demand. Today's problem seems to be that demand does not create the answering supply. Merely spending money is cheap, and easy to arrange when you have your hands on the levers that control money supply and government debt. Delivering real goods is harder.

Smith and Mill sound quaint today when they say the office of capital is to advance subsistence to labor. We should have more such quaintness, rather than doctrines which would advance money to labor without subsistence to back it up, so that it shrinks in your hand. We have traded on the symbol and denied the substance until the symbol has lost its power to command.

The New Economics does not omit turnover from its equations. Rather it buries and obscures it by keeping it implicit. This occurs when one treats "consumption" as an income-creating expenditure. Now really, consumer spending as such does not create much income; it takes off the shelf goods already produced. Replacement is the spending that creates income. There is disinvestment and reinvestment. In macroeconomic logic these two transactions are netted out, so consumption creates income, and only the uncleared balance shows up as net investment—which is what "investment" means in modern macroeconomic logic.[73] The great mass of gross investment is called consumption. The turnover of capital required is assumed to occur passively, automatically, accommodatingly.

Only it doesn't. Turnover has its own set of determinants, including the tax biases we have surveyed. Furthermore, since replacement anticipates liquidation, and the time for liquidation depends largely on the physical character of the capital in question, turnover plays a strong role in determining income and consumer spending, rather than the other way around. It is the pacer, not the paced. Consumer spending is the result,

not just the cause of the ripeness and sale of goods. It is this that keeps balance between aggregate demand and supply.

This is the missing link in the New Economics, enmeshed in its doctrine of consumer determinism. It is replacement, mainly, that determines gross investment which generates most income. Replacement in turn is determined by the schedule of maturity of capital in being.

This analysis would seem to explain better than orthodox New Economics our current predicament. Here, replacement spending falls short because of a *shortage* of ripe goods, not a surplus. If there are not enough jobs to go around it results from too few goods flowing out the pipeline, not too many. A shortage of ripe goods requires that they be rationed, and unemployment is the rationing agent. If there is not enough consumption to employ all workers, it is because there is too little to consume. It sounds very much like Stagflation.

What's happening is that turnover is too slow. A lot of good capital is simply wasted and lost forever too, which is worse in the long run but not very different in the short from freezing it up for twenty years. This means slow delivery of final goods, and slow recovery of capital to reinvest.

Reinvestment demand is not inflationary, because it anticipates or accompanies delivery of real goods. Lacking adequate reinvestment, modern macroeconomic policy seeks to simulate real demand by creating and recycling money faster. But the policy-makers have omitted the second half of meeting the national payroll. They are feeding out paper but not delivering the goods.

How can capital be short when there is so much, and you can buy it so cheap on Wall Street now? Easy. There is plenty of capital stuck in the ground. The shortness is of readily recoverable capital for reinvestment. The shortness raises discount rates and devalues common stock, but cannot transmute concrete into peaches or recycle 'phone poles into sugar. The moving finger has written. We have gone astray by thinking that what is good for capital is good for labor. It is a half truth, and we are now having to face up to the other half.

The microeconomic solution to unemployment also contains a macroeconomic solution. An important aspect of substituting labor for capital and land is to apply labor to land more often and recover and reinvest capital more often. This increases replacement demand, which is almost all of aggregate demand, and does it without any inflation. The key to good macroeconomic policy is not net new investment and growth of capital, but turnover, recovery and reinvestment of capital. Favors to capital are not favors to labor unless they come in such form as to accelerate the cycling of capital, as the investment tax credit could.

Conclusion

What can we now say about how to allocate capital so that its job-creating efficiency will be greater? A number of general rules follow from our analysis.

We need to stop regarding high output per worker as an adequate index to efficiency, when this index mainly reflects overapplication of land, primary products, and capital. Labor's interest is in having high marginal productivity, not necessarily average.

We need to foster things that humble folk do, directing capital where its valence for labor is high, and for land low. This does not call for subsidies, but for neutrality in taxation. There is some truth in the old slogan that the rich can best help the poor by getting off their backs. This calls for a considerable shift in values and attitudes, even on the part of the poor, who often think as their own worst enemies (and so remain poor).

We need to extract less from the earth, and to process and recycle, maintain and service more that we do extract. There is no rigid fixed multiplier, as spokesmen for primary industries allege, by which downstream jobs depend on upstream mining or logging. Cheap logs are butchered; dear ones are cherished laboriously. Cheap wood chips and natural gas are burned off as waste; dear chips and gas are handled with labor and love as feedstock and fuel.

We need to use and improve land more, especially land already within the perimeter of existing streets and roads and utilities. We need to expand less into, and even contract away from, submarginal peripheral hinterlands which soak up so much capital, and return so little, so slowly.

We need to invest capital nearer the consumer, on the whole, and farther from the bowels of the earth, for the labor content of value-added and service flows generally rises downstream, in processing, manufacturing ("making with hands"), services, trade, and so on. Even housing, much of which is lavish of land and capital, complements labor by sheltering it.

Yet I would not legislate on any of the above generalizations, for they are too vague, too exceptionable. That is why we have a price system, to pinpoint more exactly our goals, and help achieve them.

Thus there are sharp differences among extractive industries. Oil is capital intensive, to be sure, and cartelized as well, which makes it more so. But market-gardening is labor intensive, as shown in table 1. Strip-mining is land-using and capital-using, but pit-mining uses labor. We need something more subtle and accurate than a spasm of outrage against primary products. We need pressures that will encourage those primary producers who use more labor, and discourage those who waste capital and land, and will apply the same pressures in the same measure right down the line to the consumer. Again, that is what the market and the

price system are for. We can achieve our goals best by working with them, not by throwing them out. The abstract generalizations of price theory (as in figures 1 and 2) often seem sterile and irrelevant because not clothed in material examples, yet they are more relevant to our actual policy needs than anything else because they deal with universal qualities of specific examples.

A general rule is that we should invest so as to recover capital faster. This means that more of cash flow will be recovery of principal, and less will be net income to the investor. This will cause a faster flow of reinvestment to employ labor, and a faster flow of goods to feed us all. As an example, most investment in drilling oil and gas wells is financed from the cash flow of extant wells on stream; that is, it is internally financed by recycling capital already in the industry. Each time capital goes into the ground it makes jobs. Then we must wait until it comes out again to make another round. The longer the wait, the fewer jobs created per decade by each million of capital. Oil and gas owners happen to carry an inventory of proven reserves whose minimum estimated Life Index is twelve years (and probably ranges much higher), making the job valence of capital here very low. As a corollary, most of the cash flow is property income, not capital recovery.

As another example, we could lower the capital cost of buildings a good deal by shortening their service lives. This might seem like a bad trade, since to reduce the cost by one-third we would reduce the life about two-thirds. But we could then build 50 percent more houses each year with the same capital, increasing the annual service flow by 50 percent. We would increase jobs three times, since each building would be replaced in one-third of the time. This example is highly oversimplified, ignoring maintenance and rehabilitation as alternatives, but gives an idea of how many jobs we destroy by sequestering a nation's capital in forms that pay out slowly.

Long advance inventories and durable flowing capital are not bad in themselves. Deferral of recovery is the bad, and durability is the good that usually accompanies it. The point here is that this good is forced on us beyond our voluntary willingness to pay for it, and part of the cost is involuntary unemployment.

The life span of particular capital items is not to be judged in isolation. Durable capital like that in a barn, a sewing machine, or restaurant furnishings may complement and have a high valence for labor "in parallel," that is, labor applied in using and operating the equipment and short-term investments in maintaining it. And the aggregate capital needs of the overall operation, in a consolidated accounting, may be a modest share, if the material moving through the process is finished and sold quickly.

The point about capital turnover is not that all durability is bad for labor, but that capital which *appears* to drive labor off the land really *does* so, even though labor helps produce the capital. And opening new lands, seemingly so favorable to labor, may actually damage labor by pulling capital into forms where it turns slower than before and so has a low valence for labor.

Or it may be that an operation uses little labor in parallel with capital but a great deal downstream. Thus pulpmills use more capital per man than sawmills, yet paper requires little downstream capital per man, while lumber needs a lot. Newsprint turns over daily, while lumber in buildings ties up capital for decades. Looking upstream, too, pulpmills use smaller logs, and chips, and so require much less capital in timber than sawmills do. It is the price system that weighs these compensating factors in the same balance and lets us achieve an optimal total deployment and mixture of labor, capital, and resources.

Again, some durable capital may help labor by obviating even more durable capital. Thus utility cores and elevators in high-rise buildings may yield back capital slowly, but they use much less (for the functions performed) than one alternative, that of expanding the city laterally by extending streets and utility lines (they return it faster, too, and with taxes to boot). Also, high-rise helps labor by substituting for land, releasing a good deal for other uses. Of course, there may be still better alternatives in rehabilitating older houses, in low-rise garden apartments, and so on, depending on particulars. The price system is what supplies us with these particulars.

The point is not to regard capital as a threat. Labor needs capital, and labor suffers now from the shortage of capital available to invest where its job-creating efficiency is high. The point is rather to mobilize capital and redeploy it so that its valence for labor is higher. This means making it available to small businesses, especially, and others which combine a little capital with a lot of labor. And this means keeping capital out of sinks and traps. Of these, the worst are monuments, frontiers, and wars. Let us survey these three sinks of capital.

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. A large fraction of the working population, 570,000 men, toiled for the Board of Works, while food prices took off like a bird and while half the people died of starvation.[74] The people needed subsistence for tomorrow morning, while public policy directed their effort to the next century.

An unrecognized self-defeating policy is the most dangerous concept imaginable, for its failure will be taken as a sign that more is needed. Could this be why some civilizations left such amazing tombstones as the pyramids of Egypt, the temples of Angkor Vat and the Aztecs and Greece, the Incan canals, and the famous Roman roads, aqueducts, and public buildings? It is grand to amaze future archeologists, but not at the cost of destroying a civilization.

The monument-building syndrome has many aspects. Generally, a monument is anything too far ahead of demand. A great deal of heavy construction and civil engineering is monumental, because tax-financed and tax-free. Advance extensions of transport-utility networks, sized for anticipated higher future needs, show monumental proclivities. They are often financed by cross-subsidy from the central system, and calculated to maintain the rate base, and/or internalize the profits. Excess capacity is often monumental, unless geared to reasonable forecasts of early need. Monumental excess capacity results from the use of capital as the ante in some of life's poker games, where it is used to claim quotas: a share in a cartel, a water right, a bank charter, an air route, an oil lease, or what have you. "Buying business" is the current phrase for it. Inventories of extractive resources are commonly excessive for a complex of reasons.[75] "Master plans" and "fully-integrated development" are usually monumental,' unless carefully staged; splendid examples are the California Water Plan, the California highway system, the U.S. Interstate Highway System, and the sterile city of Brasilia. "Internalizing externalities," "economies of scale," "planning for future expansion," and "foresight" are excellent catchwords for monument builders. Meanwhile, life is what happens while we are making other plans, and obsolescence is what happens to big plans under construction or soon after. Governments, world banks, and Wall Street all tend to favor monuments, for their publicity and promotional value. Hot-house "regional development," often promoted by local unions and contractors seeking jobs, has all the monumental traits. The headquarters and towers of large public and private organizations of every description tend towards the monumental, as do many of their other works. Every large organization seeks to internalize profits and keep the capital under control of the management.

There is massive inertia in all established agencies, so as capital grows scarce they shut their eyes to what the new parameter demands. It is still possible for the breeder reactor's spokesmen to abandon it because of its capital-intensiveness.[76] But FEA Administrator John C. Sawhill wants $500 billion for Project Independence, and does not regard capital as the prime constraint, but labor.[77] Barry Bosworth and James Duesenberry favor still pumping cheap capital into housing.[78] It is hard to plug a flowing drain of national capital.

Turning to "frontiers," these are the imperialistic variation of Henry George, getting access to land via conquest and expansion (a variation which reverses George's purport). There is some truth in the old idea of the frontier as a safety valve for labor, but a generation of revisionist economic historians now have established that the frontier attracted more than its quota of capital per man, much of it prematurely. This led to recurrent crises of capital shortage in the nineteenth century. We tap frontiers by building monuments like the canals of the 1830s, the premature western railroads, and the dams of the Army Corps of Engineers.

The payout from much developmental infrastructure capital comes in the form of increased land values. But to private owners this increment is income, most of which is normally consumed. Thus the capital is dissipated.

Frontiers of Science and Research and Invention are another Lorelei for capital. As Boulding has rhymed,[79] they yield "benefits hereafter." These are tax exempt because the capital cost is expensible. Yoram Barzel has shown that the patent system, too, hyperactivates research in the same way that an open range overstimulates grazing. Research in subsidized Agriculture Experiment Sations has gotten decades out ahead of dissemination and application. We need to embody faster in real capital what we already know, and adapt it more frequently to changing needs and scarcities, prices and costs, by replacing capital faster.

The energy frontier is the current vogue. Incredible figures like a trillion dollars are tossed off as capital "requirements" of pipelines, drilling, breeder reactors, fusion, tankers, ports, etc., requirements that will obviously never be met because the capital doesn't exist or can't be spared and won't be saved.

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. The rise of land values converts flowing into growing capital.

The upper levels of skyscrapers are also land-substitutes of long life, and high capital input. While intensive improvement of the best sites is generally desirable on balance all around, we suffer today from uneven improvement of sites, that is, high-rise sprawl or scattered hyperintensification. This pattern is more capital using, as a total system, than more uniform improvements at moderate densities.

Frontier governments often go overboard competing for seed capital. They put a high value on immediate payrolls from construction—an aspect of their high time-preference. They give away too much to get it: tax holidays, de facto pollution easements, resource leases on giveaway terms, land grants, charters, franchises, special services, and so on. These nonmarket fillips pull capital into premature and marginal development on frontiers. The form of the lure for capital, like borrowing a city's credit, often prompts excessively capital-intensive forms of investment. Granting pollution easements lowers the capacity of surrounding land to house labor and attract people generally.

During a boom, frontiers drain capital from older centers without doing much obvious immediate damage, but when it is time, as now, to renew the older centers, the frontiers do not return the capital. They demand more and more, having fallen into the seed-capital fallacy initially.

Subsidies to tap frontiers make land artifically 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 that it stops cycling and creating payrolls. Abundant land can still be badly used, and centuries of Caucasion 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.

The third 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. It costs money to win land—and one doesn't always win. Someone, indeed, always loses. Policing marginal outposts after they are supposedly "won" can be a continuing drain, as in Viet Nam. If and when land is won and secured, finally, the net benefits of the whole military outlay often accrue to a very few large owners of the land in question, as in California and Hawaii, or to foreign potentates like Mo-

hammed Reza Pahlevi or King Faisal who turn around and exploit us and drain us of more capital, or to multinationals who reinvest mainly abroad and bed down with the foreign potentates. Imperialism has generally been an economic catastrophe for most of the players for the benefit of a few.

To keep capital from wasting into those sinks calls for massive institutional and attitudinal changes. Attitudes are surprisingly adaptable, and we see evidence on every hand of eagerness to adapt life styles to scarcity, even in advance of need. Institutions are something else. They are the stubborn rear guard, shutting out the signals of the times and resisting our efforts to budge them. But this, too, will pass in the coming time of troubles, as the lag of institutions behind current needs creates overpowering tensions. Here, we focus on tax policy. The question is, are we prepared, once the rear guards yield, to budge tax policy in the right directions?

Rule One is to retain and strengthen the price system as much as possible, and be wary of rules couched in other terms. The price mechanism is the only way we have of treating the economy as a total system and applying rules consistently in the same measure throughout.

The best tax on all counts is the part of the property tax that falls on land values. The other part that falls on capital is far from the worst tax. It is the surest way to tax capital without favoring longer lives over shorter. So we should make greater use of the property tax at the same time that we increase the share of it that falls on land.

The property tax on holding land presses landholders to use the land. This employs labor and produces goods and services. It also abates the pressure to waste precious capital developing new lands.

The land tax pressure should be applied with greatest force to land already serviced by extant underutilized capital. There is a hard choice to make when we know that some extant public works, roads and lines are badly placed in terms of long-run good planning. The choice has to hinge on particulars. Today one overriding particular is the crisis of capital shortage, and the choice should often go to pressing into use land presently serviced. As there is a surplus, however, we have some choices and can begin immediately an orderly retreat from the most remote submarginal extensions and outposts. But infilling of some good land bypassed by public works may now wait a while until capital is cheaper. This calls for land assessments more influenced by near than far future income. But then, the high interest rates that signal the capital shortage will push market values that way anyway. There is a lot to be said for having assessors simply follow that most useful of pilots, the market.

Added revenues from land taxes should be used to lower other taxes. But the property tax on buildings and machinery and other capital should

be about the last to go. It is the only tax based on capital standing still instead of moving. It serves much like an increase in the rate of interest, to steer capital into forms cycling faster, with higher valence for labor. Realization or liquidation of capital, the base for income and excise taxes, is what feeds us as consumers and employs us as workers. Passive investment, the base for the property tax, employs no one.

We must prepare to accept the decline in investments of high capital intensity that a less-biased tax system would cause. For that is the whole point, to spare scarce capital and release it for higher uses. Even overmature trees, a form of extravagant monument revered by many otherwise thrifty and ascetic outdoors-persons, must yield, although it consoles some to note that capital shortage also dictates using more labor on each log after cutting, and fewer logs in each house.

The first tax to cut is the payroll tax. The major payroll tax is the personal income tax on earned income (wages and salaries). How far to carry this gets into value judgments beyond our present scope, but some first steps are clear enough. We should forget about revenue sharing, which substitutes federal payroll and other activity-based taxes for local property taxes. This taxes labor to relieve property. Federal grants to local people should go to persons, not governments, and what better way to do this than lower the personal income tax on earned income?

Among other benefits, this would help make localities more hospitable toward workers as residents. Now, central government taxes individuals to subsidize local governments, which turn around and zone out poor individuals because their disposable after-tax income is so low they might dilute local property tax bases. Ideally, central governments would relate to individuals as their net benefactors, instead, and localities would compete to attract persons. Lowering payroll taxes increases the incentive both to work and to hire, and a secure employed worker would be as good a neighbor as one usually finds.

We should decline current proposals to widen income tax loopholes for property. This can only shove more burden onto payrolls and make our income tax resemble more that of England, the sick man of Europe.[81] Labor is supposed to benefit from the greater investment, but our analysis has shown that labor needs faster *re*investment. Ignoring this central truth is one of the truly great and damaging economic fallacies, leading us to think we must spoil capital to employ labor. It is, rather, payroll taxes that slow down reinvestment, by making labor look artificially dear to employers and motivating them to substitute capital and land for it. Special tax favors for capital almost all favor deepening capital and slowing reinvestment. The only exception is the investment tax credit, stripped of the present sliding scale.

Instead, we should plug the loopholes for land and capital so that we can lower the tax rate, relieving payrolls. It would be a good idea to reinstate a generous lower rate on earned income as well, for we will be a long time plugging a hundred clever loopholes, some subtle and others complex beyond easy reform.

We should remove biases that favor long over short investments. It is too much to expect that we could tax accruals and imputed income annually, as the Haig-Simons logic would have it, and the more workable alternative is to strengthen the property tax, which reaches the same end by a different route. But we could remove all explicit biases granting lower rates to longer investments. Capital gains treatment is the greatest of these, with all it implies, and we could also do away with all the sliding scales that apply higher rates against shorter investments.

Although we cannot easily tax appreciation other than by the property tax, we can and do deduct depreciation, and a neutral tax policy here will key tax depreciation to real asset value depreciation, removing biases against shorter-lived capital described in section B, above.

Having turned the income tax back into a tax that includes property income, we could abate the corporate income tax, with its powerful bias for internalizing new capital. A progressive rate might be very helpful to break up the largest corporations which, as we have seen, employ the fewest workers per unit of capital. Undistributed profits should be taxable to stockholders on the same basis as dividends.

Public works are major sinks of capital. They need to pay property and income taxes, and the agencies in charge should show these in the budget, if only as shadow costs, along with interest at full market rates. Here we need tread carefully, remembering the logic of marginal cost pricing, and remembering that the right works in the right place, like subways in New York, can save much more capital than they consume. Let us look last to the subway for revenue, and first to the capital and land in highways, cars, trucks, terminals, gas stations, parking lots, garages, refineries, and car lots.

A decreasing-cost distribution system is ideally priced to yield a deficit, according to a rationale now familiar. The value is imputed to the land served, and that is the proper tax base. The deficit-yielding subsystem has no value and should pay no property tax, but receive a subsidy. That is a good principle in its place, but it is hard to keep it there. Cross-subsidies and submarginal extensions become the rule, wasting capital. Here the solution is user charges, especially peak pricing and area rates, which force users to economize on the capital and serve as substitutes for excess capacity. Fortunately there is a wide literature on this subject to supplement these spare and summary words.

Another needed change is the tax treatment of income from offshore. We cannot suddenly create much new capital, but we can summon back a great mass of it now lost to us offshore by removing the egregious special loopholes for U.S. capital invested abroad.

These are some steps toward a tax system less biased for monuments and frontiers, more geared to help make jobs by mobilizing and activating wealth. If we do this, and like the results, we can go further. Meantime, these steps represent substantial progress.

They will help us find full employment on our present land base, permanently, freed from the compulsion to grow and expand that we inherited from generations of ancestors who had not yet learned the finite limits of the Earth. 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 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.

Appendix 1. Share of Labor in Claim on Total Output as Decreasing Function of Life of Capital: Identity of Single-cycle and Going-concern Models

Flowing (Depreciating) Capital

The text shows (fig. 6.1, table 6.4) that the share of labor in revenues from the service flow of a building or machine (flowing capital) is a decreasing function of life. Here we show the rule, and the mathematics are exactly the same in a "going concern" model where an investment in machines is normalized or staggered.

There is one machine of every age. We build or buy one new machine each year, and scrap another one. The number of extant machines is n, where n is the number of years each machine lasts. As in text equation 1, each one yields a flow of \$1 per year, so the yearly flow is \$$n$.

The yearly labor input is no more than the warranted investment (I) in one machine when new. Dividing this by the yearly service flow (n) we arrive at the same result as when we analyze one machine over life, that is, labor's share is

$$\frac{I}{n} = \frac{1 - e^{-in}}{ni} \quad \text{[same as text eq. 2]} \tag{2}$$

The share going to capital as interest must be the complement of (2), of course. To check this, let us derive it directly.

The capital value remaining unrecovered in each machine at the start of every year, y, is the present value (V_y) of future cash flows from that time until scrapping.

$$V_y = \frac{1 - e^{-i(n-y)}}{i} \tag{3}$$

Total unrecovered capital (K_y) is

$$(4) \qquad K_y = \sum_{y=0}^{n} V_y = \frac{1 - e^{-in}}{i} + \frac{1 - e^{-i(n-1)}}{i} + \cdots + \frac{1 - e^{-i(n-n)}}{i}$$

$$\frac{1}{i}\left[n - e^{-in} \sum_{y=0}^{n} e^{iy}\right] = \frac{1}{i}\left[n - \frac{1 - e^{-in}}{i}\right]$$

Interest on K_y as a share of total output flow is

$$(5) \qquad \frac{iK_y}{n} = 1 - \frac{1 - e^{-in}}{in}$$

Q.E.D.

In the going concern, capital recovery is the excess of cash flow (n) above interest cost (Ki). Rearranging (5)

$$(5A) \qquad n - Ki = \frac{1 - e^{-in}}{i}$$

But the right side of (5A) is I, the warranted investment to build a new machine. So capital recovery from all the machines together is just enough to finance one new machine each year.

Now we add land to the inputs. The capital is a building on a good site. The yearly service flow is now \$1 plus \$$a$, where a is the annual value of the site. Fig. 4 shows the share of land:

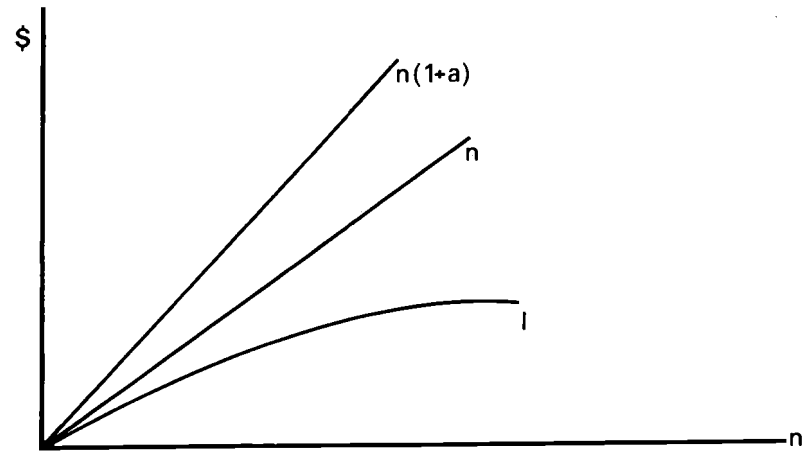

Figure 6.4—Division of value of service flow of n houses of evenly staggered ages among warranted investment (I), rent (a), and interest.

K remains the same as before. So does I. Only service flow is greater. The shares of labor and capital are accordingly smaller.

The share of land is

$$\frac{na}{n(1+a)} = \frac{a}{1+a} \tag{6}$$

(6) is not a function of n, i.e. it is unaffected by life (under the present simplifying assumption of level service flow). Accordingly, the share of land rises relative to labor, and falls relative to capital with increasing life of capital.

The last point seems a little surprising, because in the last years of an old building the cash flow covers little more than land rent. In part, the surprising result comes from my artificial simplifying assumption of level cash flow over "life." In fact, there is a geriatric terminal life of old buildings, after the service life is over, when the carcass survives and yields just enough cash flow to give a return on the site. When we include this terminal period in "life," the share of land rises with life, and more so when site value rises over time.

But that is not the whole story. In the main, the surprising result represents a real phenomenon: to build for long-sustained service flow of capital calls for heavy inputs of capital from the beginning of life, inputs which must be paid from the beginning. Note that we are not here treating what happens from year to year to the individual building as it ages and the unrecovered capital approaches zero. Of course, capital's share then also approaches zero. We are treating of shares over the whole life of buildings, and, what amounts to the same thing, shares generated from a normalized collection of buildings of every age.

The share of labor falls with increasing life. But land tempers this effect by claiming a share of the product even when life is short, like the life of corn plants in rich Champaign County, Illinois; or when there is little capital, as on a parking lot. Appendix 3 develops this aspect further.

Growing (Appreciating) Capital

Assume that we plant a tree on marginal land, at a cost of \$1, and harvest it n years later (when the growth of its stumpage value as a percentage of the base equals the rate of interest). Stumpage revenue (R) is e^{ni}. Labor's share is no more than e^{-ni}, and less if planting cost is not all wages. e^{-ni} is a decreasing function of n. Labor gets a lesser share when life is longer.

This conclusion does not depend on using a single cycle as an example. Let the operation be normalized by staggering the cycles to keep a constant flow of input and output through a going concern. Each year we plant one new tree, and harvest the oldest one. The number of trees in our inventory must equal n, an increasing function of n. In addition, the average tree must be older and contain more capital.

The capital stock (K) is the sum of the value of all the trees:

$$K = e^{i} + e^{2i} + \cdots + e^{ni} = \sum_{n=1}^{n} e^{ni} = \frac{e^{ni} - 1}{i} \tag{7}$$

The share of capital in receipts is

$$(8) \qquad \frac{Ki}{e^{ni}} = 1 - e^{-ni}$$

(8) is an increasing function of n, and of course the complement of labor's share, e^{-ni}, a decreasing function of n. This is exactly the same result as for a single cycle.

Now we add land. Let the tree grow on a good site, of value S. Now growth must cover interest on S as well as on capital in the tree, by reaching at maturity a value on the function:

$$(9)^{82} \qquad R_n = e^{ni} + S[e^{ni} - 1] = (1 + S)e^{ni} - S$$

The share of labor is no more than $1/R$, obviously a decreasing function of n since R grows with n.

The share of land is Sin/R. We will see ahead that this is an arcade function, an increasing and then decreasing function of n. The increase comes first because labor's share drops almost inversely with n for low values of n. The decrease comes later because K increases logarithmically with n so that Ki takes nearly all.

The share of capital is the sum of interest on planting cost plus interest on ground rent, divided by R.

Interest on planting cost is $e^{in} - 1$

Interest on ground rent is $S(e^{in} - 1 - in)$[83]

The share of capital is

$$(10) \qquad \frac{e^{in} + S(e^{in} - 1) - 1 - Sin}{e^{in} + S(e^{in} - 1)} = 1 - \frac{1 + Sin}{R}$$

(10) is also the complement of land's and labor's shares, as we would expect.

To normalize the single cycle, assume a fixed piece of land divided into n cells or tracts. Each year we plant trees in one cell, and harvest another. Payroll to plant one cell is $1/n$. Receipts each year are R/n. Yearly land cost is Si, and for each cell is Si/n.

The capital stock at all times is

$$(11) \qquad K_y = \sum_{y=1}^{n} \frac{(1 + S)e^{yi} - S}{n} = (1 + S)\frac{e^{ni} - 1}{ni} - S$$

Receipts each year are

$$(12) \qquad \frac{R}{n} = \frac{(1 + S)e^{ni} - S}{n}$$

Labor's share is

$$(13) \qquad \frac{1/n}{R/n} = \frac{1}{R}$$

(13) is the same as the single cycle case.
Land's share is

$$\frac{Si}{R/n} = \frac{Sin}{R} \tag{14}$$

(14) too is the same as the single cycle case.
Capital's share is

$$\frac{Ki}{R/n} = \frac{(1 + S)(e^{ni} - 1) - Sin}{R} \tag{15}$$

But (15) is the same as (10), the share of capital in the single cycle case.

So we have normalized tree-growing operations and shown that the shares of land, labor, and capital are the same as when we look at one cycle over its life.

Now let us get a better idea of how the shares vary as functions of life (n). Table 6.5 is an example worked out for assumed values, with $i = .05$, and $S = 800$. Instead of assuming the original investment is \$1, as in the algebra above, it is \$200, assumed to be all payroll (P).

Applying the principle of leverage, it is evident from table 6.5 that a slight rise of interest rates will screen out or shorten long cycles, as we would expect from the simpler earlier demonstration. A rise of wage rates will screen out or lengthen short cycles—we economize on labor by using it less often. For very long cycles, interest cost dominates everything. Such long cycles are, however, unusual outside of forestry, and often pathological there, permitted only by sheltering from real interest costs. For most growing capital, cycles are under fifteen years, and land cost is a powerful force. High land rents screen out or shorten medium cycles. An example that the model partly fits is cattle breeding, a very land-using business. High interest rates are not enough to pry land away from cattle and sheep and feed grain, the great historical depopulators of farm land. High holding costs must be brought directly to bear on the tenure of land.[84]

Historically, farm labor has had to clear away trees to find jobs working the land, and then to push back sheep and range cattle. These organisms of slow maturity create virtual economic deserts for labor. Even the capital in them is mostly geogenic (land derived). Now for some decades forests and livestock have been repossessing land formerly tilled, while farm labor has left for the cities, and food prices have risen. Something is scrambling the market signals; we have seen that tax bias is part of that something.

Aside from the intuitive leverage principle, how do higher rents and interest rates shorten life? It is geometrically obvious that any tree is mature financially in equilibrium when its growth curve touches the R function, where it has the same slope. Differentiating (9):

$$\frac{dR}{dn} = ie^{in}(1 + S) = i(R + S) \tag{16}$$

(16) says that a tree is mature in the year when its growth just covers interest on its achieved value (iR) plus rent (iS). Raising rent and interest thus results in shorter cycles.

TABLE 6.5
Factor Shares as Functions of Life of Trees, Normalized Operation

n ·	Interest factors		Receipts	Wages		Land rent		Interest on cap.	stock	Sum of shares (check)	Intensiveness
				Am't	Share	Am't	Share	Am't	Share		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	e^{ni}	$\frac{e^{ni}-1}{i}$	$\frac{1000\,(2)-800}{(1)}$	$\frac{200}{(1)}$	$\frac{(5)}{(4)}$	40	$\frac{40}{(4)}$		$\frac{(9)}{(4)}$	(6)+(8)+(10)	(6)+(10)
1	1.05	1.00	250	200	.80	40	.16	10	.04	1.00	.84
7	1.41	8.14	87	29	.33	40	.46	20	.23	1.02	.56
14	1.97	19.6	84	14	.17	40	.48	30	.36	1.01	.53
21	2.79	35.7	94	9.5	.10	40	.43	45	.48	1.01	.58
28	3.92	58.4	111	7.1	.06	40	.36	65	.59	1.01	.65
35	5.52	90.3	135	5.7	.04	40	.30	90	.67	1.01	.71
42	7.76	135	166	4.8	.03	40	.24	120	.72	.99	.75
49	10.9	198	206	4.1	.02	40	.19	160	.78	.99	.80
56	15.4	288	261	3.4	.01	40	.15	215	.82	.98	.83
63	21.5	410	328	3.2	.01	40	.12	285	.87	1.00	.88
70	30.4	588	423	2.9	.007	40	.09	380	.90	1.00	.91
77	42.7	834	544	2.6	.005	40	.07	500	.92	1.00	.93
84	60.2	1184	707	2.4	.003	40	.06	665	.94	1.00	.94

Notes by column numbers:

(1) Life.

(2) Amount of 1 at compound interest, 5%.

(3) Amount of annuity at 5%.

(4) $\frac{(P+S)\,e^{ni}-S}{i}$

$P = 200$

$S = 800$

(7) $Si = 800 \times .05 = 40.$

(9) $Ki = .05 \cdot 1000 \cdot \frac{(3)}{(1)} - .05 \cdot 800 = 50\,\frac{(3)}{(1)} - 40.$

(11) Discrepancies due to rounding.

(12) Intensiveness.

Appendix 2. Investor's Rate of Return after Tax on Realization of Income from Growing Capital[85]

The rate of return after tax, (r), is an increasing function of life, (n).

$$e^{rn} = e^{in}(1 - t) + t = \theta \tag{17}$$

where t is the nominal tax rate.

To prove: $dr/dn > 0$

$$g \equiv \frac{d \ln \theta}{dn} \text{ is } \frac{\theta'}{\theta}, \text{ the growth rate of } \theta(n) \tag{18}$$

$$\ln \theta = \int_0^n \frac{d \ln \theta}{dn} = \int_0^n g \, dn \tag{19}$$

but from (1), $\ln \theta = rn$, so that

$$r = \frac{1}{n} \int_0^n g \, dn \tag{20}$$

By inspection of (4) and the Theorem of the Mean, r must be rising if g is monotonically rising, i.e., if $dg/dn > 0$.

$$\frac{dg}{dn} = \frac{d}{dn}\left[i - \frac{ti}{\theta} \right] = \frac{ti\,\theta'}{\theta^2} > 0 \tag{21}$$

$$\therefore \quad \frac{dr}{dn} > 0$$

Q.E.D.

Appendix 3. "Intensity" of Land Use and "Labor Intensity" of Land Use

"Intensity" of land use and "labor intensity" of land use are two different things. Capital on land may displace more labor than it requires to produce it. Much capital is partly geogenic (earth-derived), by the operation of compound interest.

We will compare the overall Intensity Quotient (Q) and labor-intensity (Q_w). We begin with a point-input-point-output (PIPO) model, and easily modify it to cover all cases.

We invest $\$I$ at the beginning of year one, on land worth $\$S$, and realize $\$R$ after n years.

In equilibrium

$$R = Ie^{in} + S(e^{in} - 1) \tag{22}$$

$$\text{Labor input} \leq I \tag{23}$$

$$\text{Land input} = Sin \tag{24}$$

(25) Capital input $= I(e^{in} - 1) + S(e^{in} - 1) - Sin$

(26) Labor intensity, $Q_w \leq \frac{I}{R}$

(27) But total intensity, $Q = \frac{R - Sin}{R}$

$$= 1 - \frac{R - Ie^{in}}{e^{in} - 1} \frac{in}{R} = 1 - \frac{R - Ie^{in}}{R}\left[\frac{in}{e^{in} - 1}\right]$$

The coefficient on the right in (27) (in brackets for easy reference), is the ratio of simple interest to compound interest. Call it θ. For low values of n, $\theta \rightarrow 1$, and $\therefore$ $Q \rightarrow Ie^{in}/R$. But $e^{in} \rightarrow 1$ also, so $Q \rightarrow I/R$. That is, $Q \rightarrow Q_w$ and intensity and labor-intensity are the same, virtually, for short lives.

But for higher values of n, i.e. longer lives, $\theta \rightarrow 0$ and $\therefore$ $Q \rightarrow 1$, even if labor-intensity, I/R, is low. This reflects the buildup of geogenic and autogenetic capital that occurs whenever recovery of principal is deferred.

To adapt this definition of intensity to flowing capital, we need only date all inputs, discount them to year 0, and add these present values to I. Similarly compound all revenues to year n and add them to R. Most investors above the lowest level of sophistication go through some such analysis whatever they may call it. Cash-flow analysis, annualizing, present value analysis, land appraisal, etc., all involve this kind of intertemporal commensuration.

Normally w, the share of I paid out for onsite workers, is much less than one, so true labor-intensity

(28) $$wI/R < \frac{I}{R}.$$

There is on a priori grounds a strong negative relationship between w and n, because building durably calls for heavy materials, of high resource content.

(27) is based on deriving site value, S, from the current use, which is to assume the site is in its highest use. Often it is not, in which case (27) overstates intensity. If we have reason to put an opportunity cost value on S higher than $R - Ie^{in}/e^{in} - 1$, then we should not substitute this in (27), but stop at

(27A) $$Q = 1 - \frac{Sin}{R}$$

(27A) gives a lower value which can easily even be negative when R fails to cover simple interest on S, or rent.

The only good reason for managing land this way would be to save it for a higher future use. Yet the foregone revenues of these n years must then be regarded as plowed back into the site as "intangible geogenic capital." The present property tax is biased by virtue of failing to tax such capital, thus favoring it over buildings.

Landholders, like some government agencies and corporations who are sheltered from social opportunity costs, are doubly disinclined to turn over their capital

fast enough. The land cost itself is a pressure to shorten cycles; but so is interest on the intangible geogenic capital which they do not feel. The last point has been entirely neglected and is very important.

Appendix 4. Inflation, Phantom Profits, and Tax Bias against Shorter Investments

We compare two PIPO investments, one maturing in one year, the other in ten. $i = .07$, and there is annual inflation at 7%. $t = 50\%$.

	I	R	$R - I$	$R - Ie^{.07n}$	$(R - I)t$
$n = 1$	100	114	14	7	7
$n = 10$	100	400	300	200	150

When $n = 1$, half the profit of \$14 is phantom, and the 50% tax rate consumes the the other half.

When $n = 10$, only one-third of the \$300 profit is phantom, so the tax leaves \$50 of real profit after tax.

More generally,

(29) Taxable income $= R(n) - I_0$

(30) Adjusted basis $= Ie^{jn}$

where j is the rate of annual inflation.

In equilibrium

(31) $R(n) = Ie^{(i+j)n}$

Income adjusted for inflation is

(32) $R(n) - Ie^{jn} = Ie^{(i+j)n} - Ie^{jn} = Ie^{jn}(e^{in} - 1)$

Taxable income as a multiple of adjusted income is

(33) $$\beta = \frac{I[e^{(i+j)n} - 1]}{Ie^{jn}(e^{in} - 1)} = \frac{e^{(i+j)n} - 1}{e^{(i+j)n} - e^{jn}}$$

β is a decreasing function of n, ranging from a high of $\beta = (i + j/i)$ when $n = 1$, to a low of one when $n = \infty$.

The case is often made that it is the opposite, that inflation hits the longer investments harder. The argument is that the short investment lets principal be recovered at a lower price level, while it is worth more. It is an unbalanced argument, overlooking the larger fact that the long investment lets revenue be taxed later, in softer dollars. That is, when $n = 1$, the \$7 phantom profit is taxed in year one and paid in dollars worth twice as much as those of year ten. When the phantom profit merely *accrues* in year one it is not taxed until year ten, when the dollar is worth half as much.

As we have seen, most long investments are written off faster than they actually depreciate. The intertemporal bias here is magnified because costs are deducted from hard dollars and taxes are later levied on soft ones.

Notes

1 *Business Week,* Sept. 9, 1972, p. 114, citing data from U.S.B.L.S. Wage rates have risen faster in Japan, Italy, Germany, Britain, and France. The data are for wages before taxes. U.S. payroll taxes have also risen in this period.

2 Paul A. Samuelson, *Economics,* 3rd ed. (New York: McGraw-Hill, 1955) p. 336.

3 Ibid., p. 350.

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

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

6 *New York Times,* Dec. 1970.

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

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

9 "Resharpening the Tools," *Business Week,* Jan. 5, 1974, p. 56.

10 "Capital Shortage, or Glut?" *Newsweek,* Aug. 1974, p. 73.

11 John Kendrick, *Productivity Trends in the U.S.* (Princeton: Princeton University Press, 1961), pp. 148-49, table 39.

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

13 Jack Stockfisch, "Investment Incentive, Taxation, and Accelerated Depreciation," *SEJ* 24 (1), 28-40 (July 1957), p. 38. Since land is not depreciable, these tax preferences theoretically do not apply to land income. In practice, however, land income is as sheltered as capital income. (Mason Gaffney, "The Treatment of Land Income," *Economic Analysis and the Efficiency of Government* [Joint Economic Committee, Congress of the U.S., 91st Congress: 1st Session, part 2, 1970], pp. 405-15.) Keynesians have not been at all alert to this problem.

14 They are simply financed with owned instead of borrowed capital. The relevant "term" is how long the capital sunk is tied up before being fully recovered. "Recovery" is the residual after deducting interest from cash or service flow, and may be very slow and even negative when interest rates are high and cash flow low.

15 Norman Ture, *Tax Policy, Capital Formation, and Productivity* (New York: National Association of Manufacturers, 1973). The whole case made by Ture rests on assuming that capital complements labor, an assumption built into the Cobb-Douglas function. See his p. 14, "The Law of Diminishing Returns."

16 Knut Wicksell, Lectures on Political Economy, Trans. E. Classen (New York: The Macmillan Company, 1938), pp. 194-96.

17 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.

18 Adam Smith, *Wealth of Nations* (New York: Random House, 1937), pp. 538-40.

19 Ernst R. Berndt and David Wood, "Technology, Prices, and the Derived De-

mand for Energy," preliminary draft, December 1973, 28 pp. A most perceptive and more general treatment is Sanford Rose "The Far-reaching Consequences of High-priced Oil," *Fortune,* March 1974, pp. 106-12, 191-96.

20 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, 75 ff. See also Irvin H. Althouse, "Water Requirements of Tulare County," Report to Tulare County Board of Supervisors, January 1942 (mimeographed), map in back pocket.

21 This is simplified. The commensurable combining of labor and capital inputs is formularized in appendix 3.

22 G. W. Dean and Chester O. McCorkle, *Trends for Major California Fruit Crops,* California A.E.S., Extension Service Circular 448, 1960.

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

24 John Riew, "Assigning Collection of a Statewide Uniform Rate Land Tax," in R. Lindholm, ed., *Property Taxation and the Finance of Education* (Madison, Wis.: University of Wisconsin Press, 1974).

25 Morton Paglin, "Surplus Agricultural Labor and Development," *American Economic Review,* September 1965, pp. 815-33.

26 Albert Berry, "Presumptive Income Tax on Agricultural Land," *National Tax Journal,* June 1972, pp. 169-81.

27 Jon Udell, *Economic and Social Consequences of the Merger Movement in Wisconsin* (Madison: Bureau of Business Research, 1969).

28 Richard Muth, "Capital and Current Expenditures in the Production of Housing," in L. Harriss, ed., *Government Spending and Land Values* (Madison: University of Wisconsin Press, 1973).

29 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. Government Printing Office, 1969).

30 David Weeks and Charles West, *The Problem of Securing Closer Relationship between Agricultural Development and Irrigation Construction,* University of California, College of Agriculture, Agricultural Economic Service Bulletin 435 (Berkeley: University of California Printing Office, 1927).

31 An example of such thinking unrelieved by any apparent doubt of its adequacy is Bert G. Hickman, *Investment Demand and U.S. Economic Growth* (Washington, D.C.: The Brookings Institution, 1965). Nor could I name any Brookings economist who takes a different view. Close to power and the application of economic ideas to policy, Brookings plays a central role in defining the orthodoxy that has dominated policy to date.

32 Mason Gaffney, "Adequacy of Land as a Tax Base," Daniel Holland, ed., *The Assessment of Land Value* (Madison, Wis.: University of Wisconsin Press, 1969).

33 If the buyer pays on the installment plan at 8% interest over n years, he pays the full n, the entire service flow, because

$$n \times \frac{i}{1 - e^{-ni}} \cdot \frac{1 - e^{-ni}}{i} = n.$$

34 Martin Bailey, *National Income and the Price Level* (New York: McGraw-Hill, 1962), p. 111.

35 Hans Brems, *Output, Employment, Capital, and Growth* (New York: Harper & Bros., 1959), pp. 212-26.

36 C. Harry Kahn, *Employee Compensation under the Income Tax* (Princeton: Princeton University Press, 1968).

37 If this word doesn't exist, it should.

38 It often helps the fund manager most of all. Companies can, for example, borrow from their own pension funds, as the U.S. Treasury borrows from the Social Security fund. The borrower gains from inflation, while the pensioner is exploited. Pensioners are also exploited by managers taking bad risks, and some funds are unable to meet their obligations.

39 There is a wide literature on this, including Holland, ed., *Assessment of Land Value.*

40 Mason Gaffney, "Tax-induced Slow Turnover of Capital," *WEJ* 5 (4): 308-23 (September 1967). An expanded version ran in *American Journal of Economics and Sociology,* from January 1970 to January 1971. The material on land income is in vol. 29 (3): 409-24, and is much more fully treated than in the *WEJ.* A more institutional approach is used in Mason Gaffney, "The Treatment of Land Income," *Economic Analysis and the Efficiency of Government* (Joint Economic Committee, Congress of the U.S., 91st Congress: 1st Session, part 2, 1970), pp. 405-15.

41 Before World War II, *salaries* paid by state and local governments were free of federal income tax. Then salaries became taxable, while the cost of hiring capital remained exempt.

42 The best source on this is in a series of studies sponsored by Ralph Nader, available from the Tax Reform Research Group, Washington, D.C.

43 Alfred Kahn, "The Depletion Allowance in the Context of Cartelization," *American Economic Review* 54 (June 1965), pp. 286-314.

44 Gaffney, *Extractive Resources,* pp. 391 ff.

45 Mason Gaffney, "Benefits of Military Spending," unpublished MS., 1973.

46 Rose, "Far-reaching Consequences."

47 Ellis T. Williams, *State Forest Tax Law Digest,* 1967, U.S.D.A. Forest Service, Misc. Pub. No. 1077, 1968.

48 Ellis Williams, *State Guides for Assessing Forest Land and Timber,* U.S.D.A. Forest Service, Misc. Pub. No. 1061, 1967.

49 A proof is in Gaffney, "Tax-induced Slow Turnover, p. 318, and a more general one by Vickrey and Consigny is appendix 2 of the same title, AJES 30 (1): 107-8 (January 1971)

50 For more detail see Robert Evenson and Finis Welch, "Taxation of Farm Income," MS., n.d., 22 pp., available from authors.

51 Dale Hoover, "An Economic Analysis of Farmland Development," *Agricultural Economics Research* 22 (April 1970), pp. 37-44, p. 42. See also "One Man's Poison," *Forbes,* Aug. 15, 1965, p. 27, showing how housing builders can expense water supply systems. William Condrell, writing in the *Timber Tax Journal,* October 1970, also discusses how Section 175 of the Internal Revenue Code lets "farmers" expense soil and water conservation, and Section 182 lets them expense land clearing.

52 Via defaulting on non-recourse loans. *Forbes,* Aug. 15, 1974, pp. 40-41. "The Numbers Game."

53 "Combining with capital" refers to producing durable improvements. These might be for personal use or for later resale with capital gains treatment. Both are common.

54 James W. Thompson and Edgar N. Johnson, *An Introduction to Medieval Europe* (New York: W. W. Norton & Company), 1937, pp. 293-95.

55 An exception may be poultry. That is, however, very unusual. It is part of a general bias for agriculture inherent in cash basis accounting allowed for livestock.

56 I.R.S., Tax Guide for Small Businesses, Pub. No. 334, (1965 ed.), p. 26.

57 There are several points in tax law, besides those already noted, where excess depreciation is recaptured using a sliding scale where the amount recaptured declines with the number of years before sale.

58 A good popular summary is Jeanne Dangerfield, "Sowing the Till," *The Congressional Record* 119 (1974); 59247-55 (May 16, 1973). A more establishmentarian but less forthright statement is National Planning Association, *The Effect of Federal Income Taxes on the Structure of Agriculture* (Washington, 1972).

59 Hendrik Houthakker, "The Great Farm Tax Mystery," *Challenge,* Jan.-Feb. 1967, pp. 12-13, 38-39.

60 Liquor of course is highly taxed outside the income tax, by excises, but the excise tax levied upon sale has a bias for longevity, and greatly favors Scotch, maturing in 10 years, over Vodka, which can age in the bottle in as little as 10 days.

61 In fairness to Terborgh, many of his writings advocate faster replacement.

62 *The Warren, Gorham and Lamont Report,* Sept. 9, 1974, sec. 2, p. 3; "Pensions: The Reformation Begins," *Newsweek,* Sept. 24, 1974, pp. 98-99.

63 Adam Smith, *Wealth of Nations,* pp. 338, 341, 349.

64 J. S. Mill, *Principles of Political Economy* (Boston: Lee S. Shepard, 1872), pp. 41-63, passim. See also J. S. Mill, *Essays on Some Unsettled Issues of Political Economy* (London: Longmans, Green, Reader, and Dyer, 1874), pp. 55-59.

65 Wicksell, *Lectures on Political Economy,* pp. 194-96.

66 K. Wicksell, *Value, Capital and Rent,* trans. S. H. Frowein (London: G. Allen & Irwin, 1954), p. 127.

67 Ibid., p. 160.

68 He credited it to Böhm-Bawerk, who however expounded it very roundaboutly, if not obscurely.

69 7.273 years, to be more exact.

70 Instead of K = FP, the proper formula is now

$$K = F \frac{e^{Pi} - 1}{i} > FP$$

71 "Why Ma Bell Constantly Needs More Money," *Business Week,* March 25, 1972, pp. 57-58.

72 Ibid.

73 In Practice, "investment" is used very loosely by macroeconomists for spending on durables, without careful distinctions of net and gross, as the logic would require. No careful effort at all is made to estimate real depreciation, the problem being buried by using GNP instead of national income.

74 Cecil Woodham-Smith, *The Great Hunger* (New York: A Signet Book, 1964), pp. 137-60 and passim.

75 These are covered in Gaffney, *Extractive Resources and Taxation,* pp. 391 ff.

76 "Second thoughts that threaten the breeder," *Business Week,* Aug. 24, 1974, p. 21.

77 "Project Independence Will Cost a Bundle," *Business Week,* Aug. 24, 1974, p. 24.

78 "Why Housing Still Feels the Crunch," *Business Week,* Aug. 17, 1974, p. 50.

79 In modern industry, Research
Has become a kind of church
Where rubber-aproned acolytes
Perform the ceremonial rites
And firms spend funds they do not hafter
In hope of benefits hereafter.
—K. Boulding

80 Yoram Barzel, "Optimal Timing of Innovations," *RE&S,* 50(3):348-55 (Aug. 1968).

81 Ironically, the data come from Joel Barlow of Covington and Burling that British taxes bear lighter on capital than do those of other major capitalist nations. Joel Barlow, "The Tax Law Bias against Investment in Production Facilities," NTJ 26 (3): 415-31, at pp. 432-33.

82 (9) may be derived from $(1 + S)\, e^{ni} = R + S$, which simply says we put in land at the beginning and get it back at the end, along with the mature tree.

83 Note in passing that when *S* is large relative to planting cost (here equal to one), most of the capital is geogenic (land-derived). Some reforestation is entirely voluntary and geogenic, representing no labor at all.

84 The lives of cattle are foreshortened in the U.S.A. as compared with Argentina, where rangeland and cash grain are cheaper, for example. But in Western Europe and Japan, lives are even shorter, if cattle are grown at all.

85 Matthew Gaffney, Jr., John Hoven, and Steve Hanke helped refine this proof. Further discussion of this and related points are in the writer's "Tax-induced Slow Turnover of Capital."