

Making Jobs by Changing Factor Proportions

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Introduction

When land and/or capital grow scarce, and labor seems to grow superfluous, one solution is to use the land and capital more intensively by applying more labor. A free market tends to make that happen by changing relative prices. A market is free to accomplish that when taxes are “neutral,” meaning they do not bias the results. In fact there are strong tax biases working against the solution.

There are many other “institutional” biases as well, too many to discuss here. The purpose of this paper is to show the many ways and aspects of substitution, many of which are not obvious until someone points them out.

A major shortcoming of what is now conventionally called macroeconomics is to ignore factor proportions. Conventional macro today seeks to make jobs simply by growing national product and income, regardless of how. Worse, it assumes that a key to that “growth” is to raise the “productivity” of labor, meaning the average product (AP) of labor. That in turn means combining a given labor force with more land and more capital, even though the land supply is fixed and raising the capital supply implies jiggering tax policy to tax labor more in order to tax capital and saving less. We will not repeat those mistakes in this course, but examine how to make jobs by changing factor proportions to use more labor per unit of land and per unit of capital.

I. More intensive use of the capital (K) we already have

- A. More intensive operation. There are thousands of examples, but one of them is to manage traffic better on existing roads instead of building new roads. That includes charging more for curb parking, even though that entails using some labor to enforce the laws. Another is air traffic control, instead of building more airports. This includes charging aircraft for using time slots for landing and takeoff, thus reserving the time and space for planes carrying many passengers (i.e., charge by the time and space taken, not by the passenger). Another example is to allocate water better from existing reservoirs, aqueducts, wells, etc., instead of building and replacing ever-longer lines to acquire more raw water.
- B. More frequent maintenance, remodeling, and replacement. The order of preference is as given. An example is an old car: use it often, maintain it well, replace parts of it as needed, then junk and replace it (rather than let the old junker take up valuable space, as many old buildings do).
- C. Round-the-clock (“24-7”) and round-the-calendar operation, especially of heavy items like roads and dams. This is accomplished by flexible peak-load pricing: diurnal, seasonal, and secular (over the life of a facility).
- D. Allocating more capital to “downstream” operations near the consumer, instead of upstream operations like mining, or cow-calf operations. (Here is an example of where tax policy consistently favors the wrong allocation of capital.)

- E. Allocating more capital to mass systems. Mass systems take a lot of capital, it is true, because they are large. However, they replace a collection of individual units that collectively use more capital to achieve the same end. Some examples:
- mass transit instead of private cars
 - large power-generating stations instead of a put-put for each house
 - public water systems instead of each householder running his own pipe to the river
 - mall signing instead of each store putting its own billboard on the highway
 - sewer systems instead of septic tanks
 - commercial airlines instead of a swarm of private planes
 - car ferries and cruise ships instead of fleets of private yachts
 - a fleet of taxicabs, in constant use, instead of a private limo for everyone (the cab solution lies in between mass transit and private cars)
 - public levees instead of individual levees for each home, dumping the floods on neighbors
 - public flood-control dams
 - common administration of beach erosion, instead of a jetty for each landowner
 - public roads, tunnels, and bridges, instead of each person building his own

Note that using existing K better is a substitute for saving up new K. Saving is good, but it's not the only way to meet a shortage of K.

Within mass transportation systems, it is often better to use smaller units to give more frequent service: buses, trains, commercial aircraft. This means less capital per driver or pilot.

- F. Allocating more loans to carrying inventories, to smaller businesses, to poorer homeowners, etc. This calls for more labor-intensive banking, instead of lazy banking: long-term loans based on real estate collateral. More loans to individual families and businesses, instead of World Bank-style banking, financing massive monumental picture-book dams and reservoirs, and harbors oriented to world trade.

II. Turning capital faster

There is labor-intensity in the OPERATION of given capital, as in (I) above, and also in the production and lifespan of capital itself. To substitute labor for capital, raise the turnover speed of capital. This is an "immanent" principle, so it has thousands of concrete applications and examples, large and small. A large example is allocating more capital to inventories instead of, say, buildings, machinery, land cuts and fills, and infrastructure. Especially wasteful are infrastructure extensions built ahead of demand. The capital in a food inventory turns over and makes jobs nearly daily, while the capital in a tunnel or a landfill may not turn over for fifty years. Indeed, some of it may never be recovered, hence never turn over at all. That has been the fate of all the federal capital invested in irrigation works, for example. When conceived in 1902

it was going to be recovered and reinvested every ten years; but it never turned over the first time.

III. Processing and conserving natural resources more en route to the consumer

Some examples follow:

- A. Refining petroleum to get more higher-valued products (especially gasoline) per bbl of crude.
- B. Discovering and using byproducts, using the whole natural resource.
 - Making, saving, and curing silage (Harvestore silos, e.g.)
 - Using the whole animal that is slaughtered: meat, hides, organs, hooves, bristles, knuckles. The other extreme was the practice of some of our cowboy ancestors of slaughtering a buffalo just to cut out a steak, leaving the carcass to rot.
 - Using wood bark and sawdust for fuel (“hog-fuel”)
 - Using manure for fertilizer—preferably by integrating feeding the animals with growing their feed, rather than segregating the feeding process in feedlots
- C. Storing and preserving and distributing perishables like food crops. Avoiding the “Russian Disease” of losing most of the crops en route to the market, for lack of storage and rolling stock.
- D. Shipping livestock by rail instead of driving them, or droving hogs, as was once common.
- E. Remodeling lumber mills to use more of the tree; to use smaller trees, and all the biomass; chipping and pulping.
- F. Salvaging and recycling used materials, e.g., by rewinding auto generators, collecting and returning bottles, etc.
- G. Converting raw power into electric power. There is always loss in the conversion, but the electric power may be put to much higher uses, and economized on.
- H. Using pot liquor as soup stock.
- I. Controlling heat by thermostats, and more elaborately by Johnson controls in “smart buildings.”
- J. “Co-generation,” funneling waste heat into electric power; using waste heat from internal combustion to heat and cool car interiors.
- K. Controlling and fine-tuning water delivery to trees and crops by use of emitters, “spitters,” drippers, etc., instead of old-fashioned flood and furrow irrigation.
- L. Sharing waste heat from lower stories in multistory buildings; sharing walls in townhouses.
- M. Insulating to conserve heat in winter and coolth in summer.
- N. Painting and treating exterior wood to preserve it from weather.
- O. Processing data more and better, as opposed to gathering more raw data.
- P. In general, fostering more “downstream” processing instead of “upstream” extracting raw resources from the earth and chewing up the land; more husbandry of Mother Earth, if you will, and less rape; better cooking instead of more soil exhaustion. The “Austrian” economists have made an entire philosophy of this. They call upstream

investments “higher order” capital, meaning it is several steps or “orders” removed from being useful to consumers. That means it takes a long time in transit through the “pipelines” of the economy, and thus ties up capital for a long time. The cost of tying up capital is interest, which accumulates and compounds.

IV. Using the third dimension

- A. Multistory buildings with elevators, escalators, stairs, pumplifts, vertical wiring, and plumbing and trash disposal, ducts for heat control and ventilation, etc.
- B. Forklifts and pallets for stacking.
- C. Grade-separated intersections; elevated railways, overheads, etc.
- D. Use of underground space for basements, subways, utility conduits for communication lines, gas and electric lines, storm and sanitary sewers, trash dumps, mines, wells, aquifers, tunnels, septic tanks, roots of plants and trees, earth organisms, foundations, and deep caissons. Use of underwater space for many things.
- E. Trees and their roots for fruit and timber, shade, and wildlife habitat.
- F. Aircraft.
- G. Aerial lines for power, phone, cable.
- H. Transmission towers.
- I. Satellites.
- J. Shelves, bookcases, wall fixtures.
- K. Vertical assembly lines, as in the old American Motors plant on Capitol Drive, Milwaukee (these have not worked out too well, but the idea is there).
- L. Vertical storage of feed in silos.

V. Packing instead of strewing

- A. Infilling cities instead of sprawling. This is analogous to defragging your hard drive, but on an incomparably wider scale.
- B. Recycling old infrastructure by renewing the lots and parcels it serves.
- C. Salvaging brownfields for new buildings instead of invading more greenfields.
- D. Packing merchandise in tight containers instead of packaging in oversized containers with empty space.
- E. Picking up and compacting trash and concentrating it at dumpsites.
- F. Collecting and concentrating pollutants instead of broadcasting them in the air and water.
- G. Cutting pollution by modifying processes and products.
- H. Cutting pollution by maintaining engine efficiency.
- I. Recycling used materials instead of dumping them.
- J. Organizing and filing; storing data electronically.

VI. Modifying farm practices

- A. Using “appropriate technology” (“soft-path” technology instead of “hard-path”).
- B. Smaller machines for narrower rows and less turning space.

- C. More biological pest controls, or Integrated Pest Management (IPM), instead of lavish strewing of pesticides and other biocides.
- D. More hand- or small-machine cultivation instead of herbicides.
- E. More organic methods.
- F. Contour plowing and terracing to conserve soil and water.
- G. Conserving water by close control, as with drip emitters, instead of primitive flooding and furrow irrigation.
- H. More horticulture instead of lower-valued, water-wasting enterprises like alfalfa, irrigated pasture, and rice. The market will see to that, if we just put a price on withdrawing water.

VII. Demand management by pricing use of scarce resources

- A. Parking meters with high charges for curb parking in crowded neighborhoods. See Donald Shoup's new book.
- B. Locational pricing of water withdrawals from surface and ground sources. Higher rates charged for water sources from better locations, causing better usage and thus obviating imports from far away.
- C. "Inverted rate structures" for power use instead of the present "declining block rates." Thus meet demands by using "negawatts instead of megawatts." Many power companies are now finding this is the cheapest way to fulfill their obligation to serve customers in their franchised areas—hence their recent campaigns to conserve power.
- D. Peak-load pricing instead of bigger capital facilities to meet peak demands at low rates. This principle is "immanent": i.e., it applies to many specific kinds of facilities, and to daily, seasonal, and secular cycles. ("Secular" means over the long life of the facility, where you typically build ahead of demand and then, over time, evolve from having excess capacity to being short of capacity.) Highways, like the 91; water rates, where the need is great and the practice is rare; hotels, where the need is minor and the practice is common; toll roads and bridges and tunnels, where common practice is backwards.
- E. Locational pricing of utility service with higher rates for hookups in expensive locations to reach.
- F. Taxes based on the market value of good land, to foster intensive use, instead of taxing the USE of land and so suppressing intensive use.
- G. Gearing road user charges to size (rather than value) of vehicles, and to the use of crowded streets and roads at peak times. (This is technically and practically feasible with transponders, as on the 91; Singapore is the urban model; London is catching up.)

VIII. Moving to products and services that use less land and resources and capital

- A. Chess, billiards, bridge, Scrabble, Monopoly, Ping-Pong, hiking, climbing, swimming, jogging, basketball, foot-racing, skating; even tennis, soccer, baseball, and football, instead of golf, polo, foxhunting, horse-keeping and riding, skiing, racing (cars, horses, powerboats), waterskiing, blood sports, shooting, flying, mega-yachting, etc.
- B. Compact cars and bikes and mopeds instead of SUVs, Hummers, limos, etc.

- C. Townhouses, condos, apartments, and mobile homes instead of mansions with baronial grounds in prime locations (like San Simeon, with 82,000 acres). There is an in-between: a modest detached house with smallish yard, with labor-using social controls to keep neighbors civilized, and noise-terrorists off the streets.
- D. Electronic mail with spam controls instead of hard copy mail, and the flood of junk mail we all subsidize.
- E. Clearing, and electronic fund transfers instead of trucking gold around.
- F. Poultry and veggies instead of beef (hogs are in between).
- G. Use of radio spectrum instead of hard copies, cinema theatres, wire and cable connections, etc.

IX. Pooling resources for shared use

- A. Lending libraries. They use labor to save books and make a huge collection available to all. Our own Ben Franklin started it, as he did the postal service.
- B. Pooling demand and supply in large markets, and large utility systems, to even the flows, cut down the peaks, provide either constant service (water under pressure, power at constant voltage) or more frequent service (e.g., of buses).
- C. Flood control works.
- D. Military protection (military spending is highly capital-intensive and resource-using).

X. Substituting cheaper or more abundant materials

- A. Fiber-optic cables for copper wires.
- B. PVC gas lines for metal.
- C. Synthetic fibers from silicon for cotton, wool, linen, etc.
- D. Bamboo for softwood dimensional lumber.
- E. Hemp, kenaf, sugarcane, maize, sawdust, bark (hog-fuel), instead of petroleum.
- F. Renewable and other alternative sources of energy: wind, falling water, solar, tidal, adiabatic, waves, geysers, etc.—a future career of unlimited demand.
- G. Anything instead of aluminum, the most energy-using material.
- H. Vegetable protein instead of animal protein.
- I. Finding uses for former “weeds” or rejects: turnips, tomatoes, Jerusalem artichokes, hemp, kenaf, etc. George Washington Carver, the peanut man, was famous for this.
- J. Plastic piano keys for ivory.
- K. Plastics instead of metals, woods.
- L. Anything instead of concrete and asphalt, more energy-guzzling products.

XI. Using land more intensively and selectively and wisely

- A. Taxing people for holding land, and not for using it.
- B. When leasing land (e.g., the Federal OCS, administered by an agency in the Bureau of Land Management), either charge lessees by the acre per year or limit the size of their leaseholds, as private landowners do with sharecroppers. Otherwise the lessee has an incentive to lease as much as possible, and lag in using it.

- C. Switching land to more intensive, higher-volume uses: horticulture instead of pasture; canning and freezing instead of farming; housing instead of golfing; subdivisions instead of manors; townhouses instead of detached houses; apartments instead of townhouses; offices and stores instead of apartments; and so on at every margin of change from lower to higher uses.
- D. Foster social synergy, as by having good mutual access of people and materials and tools on tap in well-planned cities. Thus new frontiers arise on old land. Urban land has high capacity to absorb labor in manufacturing, trade, finance, education, research, law, medicine, dentistry, the arts, social and cultural and political activities, and services. Most of these are downstream activities, near the consumer, thus tying up less capital than, say, a gas pipeline that may take twenty years merely to plan, lobby through, and build in stages.
- E. Fully using best land absorbs demand without the capital-intensive development of marginal land, entailing levees, dams, road extensions, utility extensions, new school buildings, fire control, etc., ad inf.
- F. Fostering regional specialization linked by transportation and trade, e.g., importing bananas rather than growing them in North Dakota. Relatively neglected, though, is local specialization on short hauls, e.g., fresh produce from local market gardens instead of importing preserved food over long hauls. This results from biased subsidies oriented to long-distance trade.
- G. Use of greenhouses, and southern exposures, for growing in northern climes. Even in Riverside, avocados do best, and require no wind machines, on slopes facing south.

Summary

To make jobs without pressing on the limits of the earth, and without having to save up more capital, we have explored the following general recommendations:

- I. Use capital more intensively
- II. Turn capital faster
- III. Process and conserve materials more en route to the consumer
- IV. Use the third dimension
- V. Pack instead of strew
- VI. Modify farm practices
- VII. Manage demand by pricing services optimally
- VIII. Consume products and services that use less land and resources and capital
- IX. Pool resources for shared use
- X. Substitute cheaper materials for scarce ones
- XI. Use land more intensively and selectively and wisely