Epsilon and Ecotones.

Mason Gaffney, Working Paper

Here is a compact summary.

The table below indicates how the various key terms relate to each other.

Rent of land is determined by assuming that labor is the variable factor, and the manager applies it to the point where the value of its MP = the wage rate.

MP and AP and TP are measured in $ terms.

ε (epsilon) means the % increase of output resulting from a given % increase of the variable input. Thus, if a 5% increment of labor results in a 3% increment of output, ε=3/5, or .6. By simple algebra, ε = MP/AP – I showed that on the blackboard, and am not repeating it here (if you have any problems with this, see me or Amanda Trussel or some other math whiz).

Stage #	MP/AP	ε	Description	Rent/TP
I	>1	>1	Increasing Average Returns	Negative
Cusp	1	1	Constant Average Returns	0
II	1>MP/AP>0	1>ε>0	Decreasing Average Returns	Ranges from near Zero up to 1
Cusp	=0	=0	Constant Total Returns, or Zero Marginal Returns	1
III	<0	<0	Decreasing Total Returns, or Negative Marginal Returns	1

To repeat, we assume the manager applies the variable factor, labor, to where its MP value = the wage rate.

In static terms, ε ≅ 1 is characteristic of "marginal" land, meaning land near the outer edge or fringe of what is usable; and ε near zero is characteristic of rich land, land near the inner fringe of what is usable. Note, however, that even in static terms, marginal land means marginal <u>for a given use</u>. Land that is marginal (high ε) for growing corn may be, and often is, rich land (low ε) if used for growing small grains. Land that is marginal (high ε) for small grains may be, and often is, rich land (low ε) if used for dryland pasture.

Higher product prices and/or lower wage rates make all land "richer" in the sense that ε goes lower, and rent commands a higher fraction of the TP.

To visualize that best, view the hierarchy of land uses from above, as though on a map, as a series of concentric zones, spreading outwards from the highest use at the center to lower uses at the periphery. Land at the outer edge of each zone is marginal (high ε) for that use – i.e. this land is being worked pretty hard, and used intensively, relative to its capacity. Land near it, at the inner edge of the next lower zone, is rich land (low ε) for that lower use, and is not being worked hard. It may well be underused. In the higher use, at the outer edge of the inner zone, rent is a smaller fraction of the TP, ($\varepsilon \rightarrow 1$) but a larger absolute amount, because the TP is much higher. This is the "Quantum leap" over the ecotone.

In dynamic terms, the concentric circles tend to spread out over time, as population rises, and per capita demands for land rise (as they do). ε near zero, on land at the inner edge of its zone, may indicate land that is underused, relative to its new capacity, as the higher zone spreads outwards. This land may be ripe, or overripe, for conversion to a higher use, e.g. from pasture to berries. In berries, rent/TP will be less, but absolute rent will be more because TP is so much higher.

There is a lot of inertia about switching to a higher use of land – a lot of resistance. A big part of that resistance here and now is the reservation of water, at subsidized low prices, for the lower uses. An effect of higher water prices would be to switch water to the higher uses, thus raising production of higher-valued products at the possible expense of the production of lower-valued products. I say "possible" expense because there is so much sheer waste in the system that there may be no net loss of production of any product; but even if there is, it would be giving up a little to gain a lot. The gains would be not just in output, but also in job opportunities, and opportunities to invest in real capital in productive enterprises.