



Introduction to Optimizing

By [Dr. Mason Gaffney]

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Introduction to Optimizing

Note. This is only a Preview and a Survey. It is NOT a full treatment of each of the topics raised. We will be returning to the nitty gritty of many of them. Others you have studied, or will study, in Intermediate Micro.

A. Limitations of economic reasoning

Economic analysis is a tool, not a dogma, creed, or doctrine. It is better than many accusing critics think, but not nearly as good as most economists claim. Beware of *hubris*, and intellectual imperialism. For example, a recent article is called "Expanding Domains of Economic Theory." The writer is a good and modest guy, really, not a braggart in person, but a career dealing mainly with other economists has cost him some sense of perspective on his own craft. Beware the inhumane attitude of some economists who are modern Scrooges, trapped in arid theologies of extremism. Examples:

-- "M&H" write that empty buildings are the same as unemployed labor - to the economist there is no difference;

-- J.B. Clark, father of micro-economics, taught contempt for the environment because nobody owns it;

-- many orthodox economists today write with contempt and disdain for and indifference or hostility to homeless, hungry people;

-- economists follow the ideas of Pareto, a Mussolini Fascist of the 1920s, who wrote you cannot assume that hunger of a starving person is more acute than that of an overfed person, because you cannot compare subjective feelings;

-- a recent Nobel Laureate in economics writes that unemployment is basically voluntary; another writes that people have no more right to breathe clean air than industry has to pollute it;

-- the Chamber of Commerce of Nottingham, England, is agitating to remove the statue of Robin Hood; economists are applauding.

Economics is never an excuse for moral blindness, greed, or cynicism. "Greed is good," said Ivan Boesky, Gordon Gecko, Harry Browne, and Michael Milken. However, that is a perversion of the

basic ideas of economics. The true idea is not just to make money; it is to make money doing something socially useful. You can make money robbing banks: "Some folks do it with a six-gun; some with a fountain pen." Students get infected, too. UCLA business students clamored to learn from Milken after he got out of jail: he made money, so he must be OK. We don't need that.

Some people used to make money capturing slaves, and then using them, and breeding them. The founder of the Chicago School, Frank Knight, said this was ok, so long as there was free competition for the capture of slaves. This kind of attitude has been handed down, and helps account for all the Laureates now being handed out to Chicago economists by the Swedish bankers who have captured the Nobel committees.

Minimizing cost only refers to what we include and measure. Example to be explained in class: misuse of work on forest maturity, ignoring environment, junk bond imperialism, etc.

B. Optimizing

Optimizing is good, but note some limitations;

a, Beware myopic suboptimizing. This means focusing narrowly on some petty local max (best damn drive-in in Yankton), blinding yourself to the wide range of greater global choices

b, Composing or reconciling is sometimes better, if you can work it out. Example: Susan's business career would compete with marriage, so she marries her partner.

c, Many choices are discrete; others are qualitative; optimizing is quantitative. The discrete and qualitative choices are often more important. That doesn't mean they aren't measurable and comparable in economic terms: it just means they don't lend themselves to optimizing, which **after some point** is a kind of fine-tuning, too picky-picky to be important. Before that point, however, optimizing is important, which is why we are studying it.

C. Examples using Multiplication, Division, Subtraction, Addition

Multiplication

1. Multiply Price (P) x Quantity (Q) to max revenues. Show elasticity of demand. To get $MR > 0$, must have $\epsilon > 1$. ϵ means $[\Delta Q/Q]/[\Delta P/P]$. Marginal Revenue: relation to elasticity of demand (ϵ).

2. Another, similar example is tax rate x tax base to max tax revenues. Currently, Gingrich et al. are calling this "dynamic revenue forecasting." Precedents in Laffer Curve of 1980s; in tariff for revenue of 19th Century.

3. A third example is the marginal product of an input, as you crowd more of it into one area. E.g., as you crowd more stems onto one acre of citrus land, you get more stems but less yield per stem.

4. You can raise volume of sales by increasing capital, K, or raising turnover, T. See paper on Baumol Model.

Division:

1. $VC/Output = AVC$

This is often called "efficiency," an intimidating word. Also, its reciprocal is called "productivity," another intimidating word. Don't let them bamboozle you! This is suboptimizing: min AVC is not enough. Must also consider fixed costs. Distinguish AVC, AFC, and ATC.

To co-measure, use the \$, but that is not enough.

a. Be sure to add in non-cash "service flows," e.g. from residential and recreational uses.

b. To co-measure point values and flow values, you need capital theory (a big part of this course). You need to annualize the point values, thus make them commensurable, so you may COMPARE them with flow values.

This is silently assumed to be done in orthodox cost analysis, so you don't even notice.

c. Co-measuring is also needed to weigh land with capital. "User cost" of K a common concept. User cost of K includes interest on basis, plus depreciation, plus maintenance, plus operating costs, plus insurance vs. fire and accident, plus proptaxes. User cost of land is just interest and proptaxes.

Land appreciation needs its own treatment: subtract from cost, or add to "output." Tricky, neglected, but important.

d. But this is still suboptimizing: min ATC is not good enough if $MC < Price$. It shows you have undervalued part of AFC, the part that is price-determined. This part is usually land, because the other values have costs of production. Competing away vs. imputing away excess profits.

e. The safe rule, always right: $MC = MR$. (Beware, though: when $MR < P$, what is right for individual is wrong for society.) Optimizing (or suboptimizing) is finding min value of ATC. Same as where $MC = Demand$, if demand is flat. If demand is not flat, $MC = P$ is still socially best.

2. Discounting, e.g. value of growing tree, divided by compound interest factor. Exponentiation needed.

Max ratio when fractional growth rates of top and base of ratio are equal.

In general, whenever you work with ratios, watch the base: beware of widespread tendency to focus on numerators, ignore denominators. In this case, be sure to add site value (S) to the base of the numerator. This leads to earlier max, because S is constant, which lowers the growth rate of the numerator ($\Delta H / (H+S) < \Delta H / H$).

Subtraction

Revenues less Costs is something to maximize. Optimizing is maximizing "the bottom line." Just make sure you define the bottom line right: a goal of this course.

Addition:

Better than maximizing the DCF of one Generation of land use is to add the DCF of succeeding Generations of discrete land use, to get sum of the value of them all. This is PVP, or S.

1. Let the market determine resale value (R), discount it and add it to DCF of G_1 , thus: $S = PVG_1 + R_n \times DF$. This gets interesting when R is rising with n .

2. Assume repetition of G_1 in perpetuity. Apply the land value multiplier, which is $1/[1-I^n]$.

3. Given a constant annual cash flow (a), you may capitalize in simple way: $S = a/i$.

4. Given a rising cash flow, rising at annual rate of g , you may capitalize by dividing by a by $[i-g]$ (provided $g < i$, as it must be).

Exponentiation

Consider the compound growth factor, $F/P = (1+i)^n$. i is the rate of growth per year, and n is the number of years. F is the Future Value, and P is the Present Value. You double your money when $F/P = 2$.

This looks hairy, but you may reduce it to a multiplication tradeoff by using logs. Take the log of both sides:

$$\ln 2 = n \ln(1+i)$$

Now use your calculator for two purposes.

A, Find $\ln 2$. You'll find the calculator makes this easy as pie: just press 2, then $\ln$ (or reverse the order, depending on the instructions that come with your calculator). The answer begins with .69....

B, Find $\ln(1+i)$ for several values of i . Notice that $\ln(1+i) \approx i$. For most practical approximations you may treat them as equal. If $i=.08$, $\ln I=.0770$, and $[i/\ln I] = 1.039$. That leaves you with $ni \approx .72$. This gives rise to the "Rule of 72": money doubles when $ni \approx .72$.

The trade-off comes when you note that you can achieve doubling either by raising n , or by raising i .

Generally, we would like to achieve the F that corresponds to the highest P . A typical problem is when F grows with n , like a stand of newly-planted timber. You want to select n to maximize P .

$$P = F/(1+i)^n$$

The standard procedure is to find the derivative of P w.r.t. $\underline{n}$, and set $P' = 0$. This looks like a tough derivative to take, though. To ease the task, begin by taking the $\ln$ of both sides:

$$\ln P = \ln F - n \ln(1+i) \approx \ln F - ni$$

Now take the derivative of both sides w.r.t. $\underline{n}$:

$$P'/P \approx F'/F - i$$

$$P' = 0 \text{ when } F'/F \approx i$$

The combination of using logs and calculus and our Rule-of-Thumb approximation makes that one work out pretty easily. We will make use of this finding a good deal later in the course. (However, we've already seen it isn't quite that simple: it's better when you have $F'/[F+S] = i$.)