Economics Slides
these slides are at this link
http://cba.unomaha.edu/faculty/mohara/web/BLF-p12-Econ-Slides.pdf

NON-PRICE DETERMINANTS OF

SUPPLY	DEMAND
# & size of sellers **horizontally sum**	**# & size of buyers** **horizontally sum**
costs for inputs	**income**
prices of related goods **substitutes (A or B)** **compliments (A and B)**	**prices of related goods** **substitutes (A or B)** **compliments (A and B)**
taxes	**tastes**
technology	
expectations	**expectations**

Expectations are volatile
(i.e., capable of fast and large changes).

Technology is dynamic (i.e., volatile network effect[1]).

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[1] For b-law-1 it is not incorporated by reference by this footnote, but you will find it helpful in your gaining understanding the concept "network effect" if your peruse the *Systems Handout* at the following link.
http://cba.unomaha.edu/faculty/mohara/web/SYSTEMS-handout-circa-p12.pdf

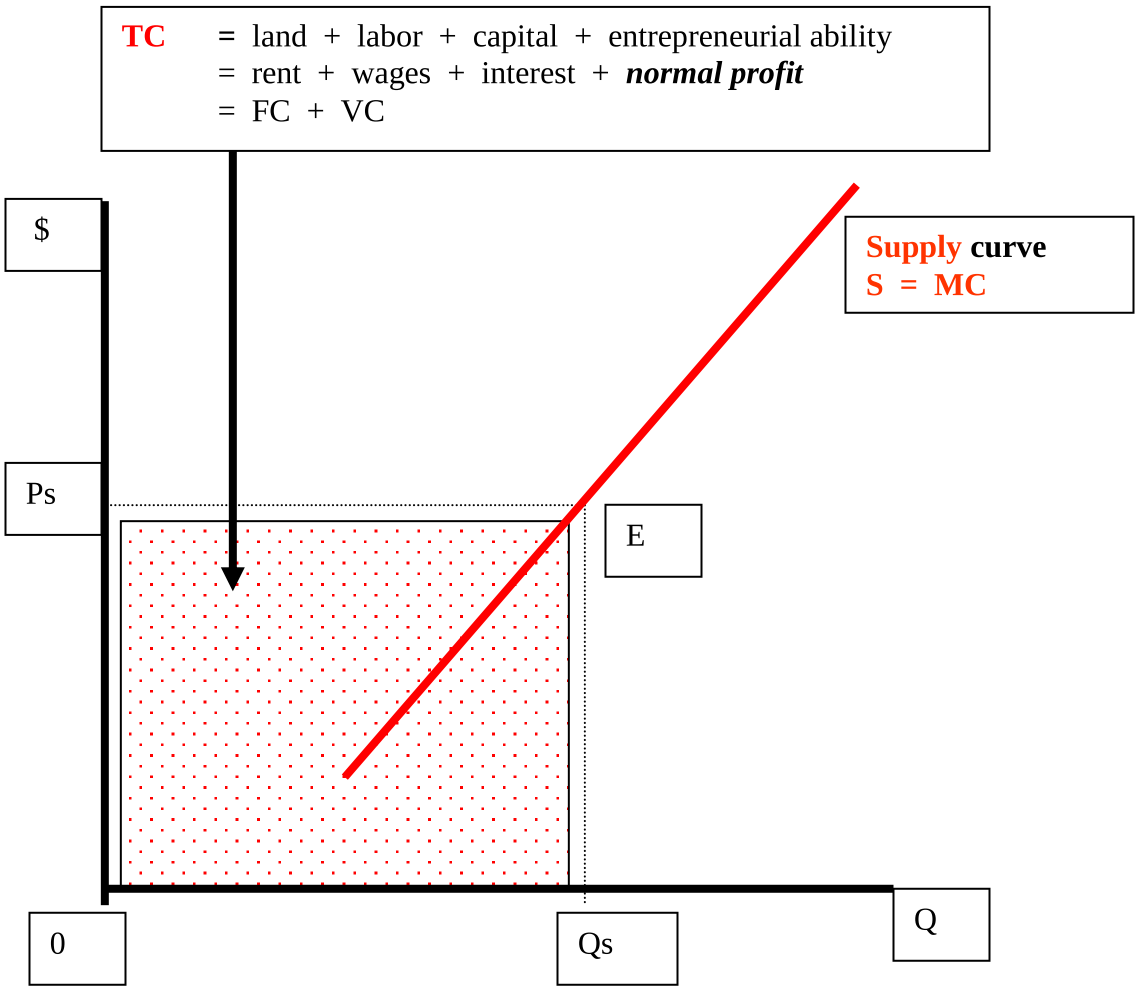
CAPITALISM

ELEMENTS (means)	and	FUNCTIONS (ends)
private property		embody self interest makes your subj. objective
prices		measure self interest voluntary
markets		coordinate self interest knowing (i.e., information)
competition 1. free entry & free exit 2. "large" number of buyers and 3. "large" number of sellers		regulate self interest alternatives = voluntary

. AND .

government		facilitates p.p., p., m., & c. 1. define rights a. private property b. contracts c. torts d. crime 2. set transaction costs

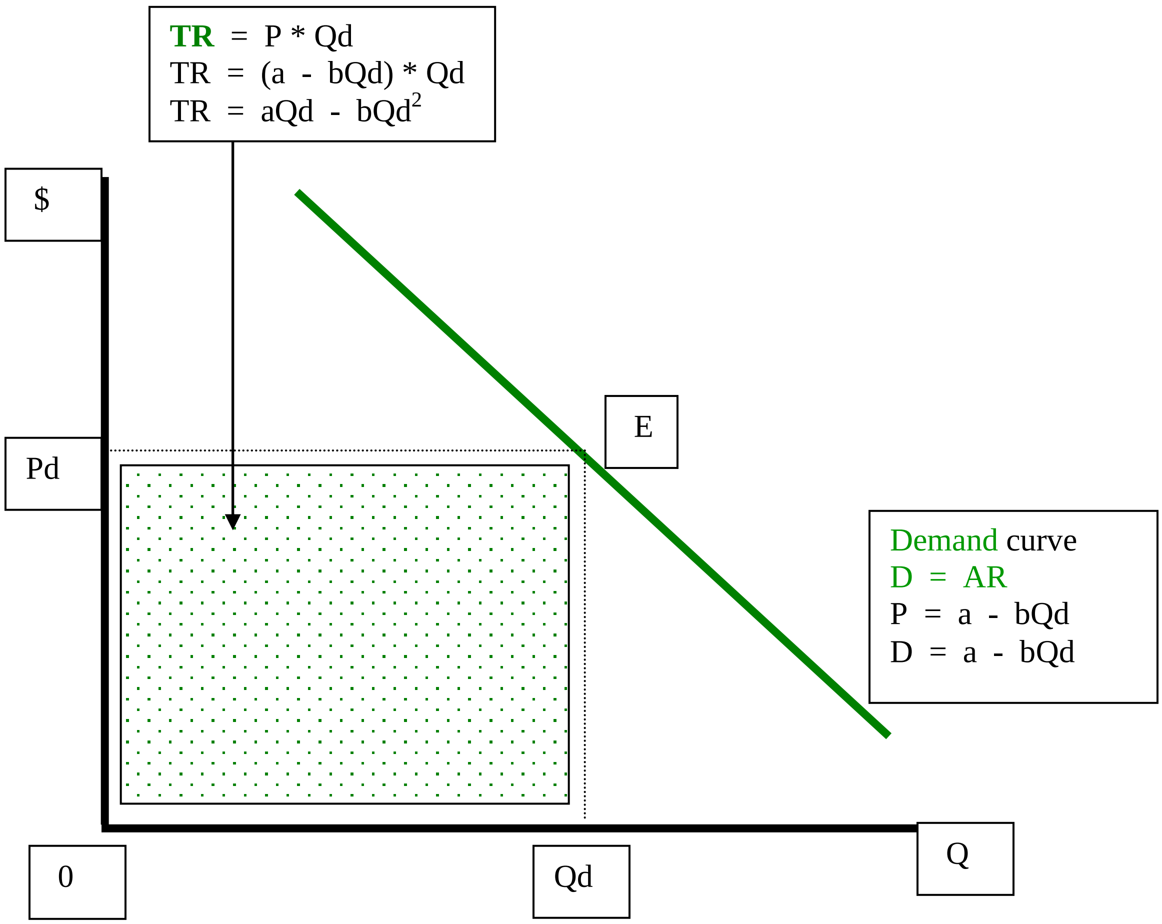
Figure 1: Law of Supply



The Supply Curve shows a ***direct relationship*** between price and quantity. As the price increases, so does quantity the sellers are ***WILLING AND ABLE*** to supply to the market.

With price at Ps and the quantity supplied at Qs, the Total Cost is the rectangle area bounded by 0PsEQs

Figure 2: Law of Demand[2]



The Demand Curve shows an ***inverse relationship***. Initially, at low quantities, buyers are willing to pay high prices; but, as the quantity that must be purchased increases, the price the buyers are ***WILLING AND ABLE*** to pay decreases. Recall, the Demand Curve shows *alternative, not sequential, purchases*. With price at Pd and the quantity demanded at Qd, Total Revenue (i.e., P * Qd) is the area bounded by 0PdEQd.

For those students that know the calculus,
FIRST, what is the first derivative of TR with respect to Qd?

(i.e., $dTR/dQ = d[aQd - bQd^2]/dQ = a - 2bQd$)

SECOND, what is the mathematical proportion of the demand curve to the MR curve?

(i.e., slope of MR is twice the slope D; thus bisects the angle and the axis)

THIRD, why do all of these graphs state S = MC (hint: P > AVC)?

(i.e., MC = AVC sets AVC_{min}; and in turn sets Shut Down Rule of P < AVC)

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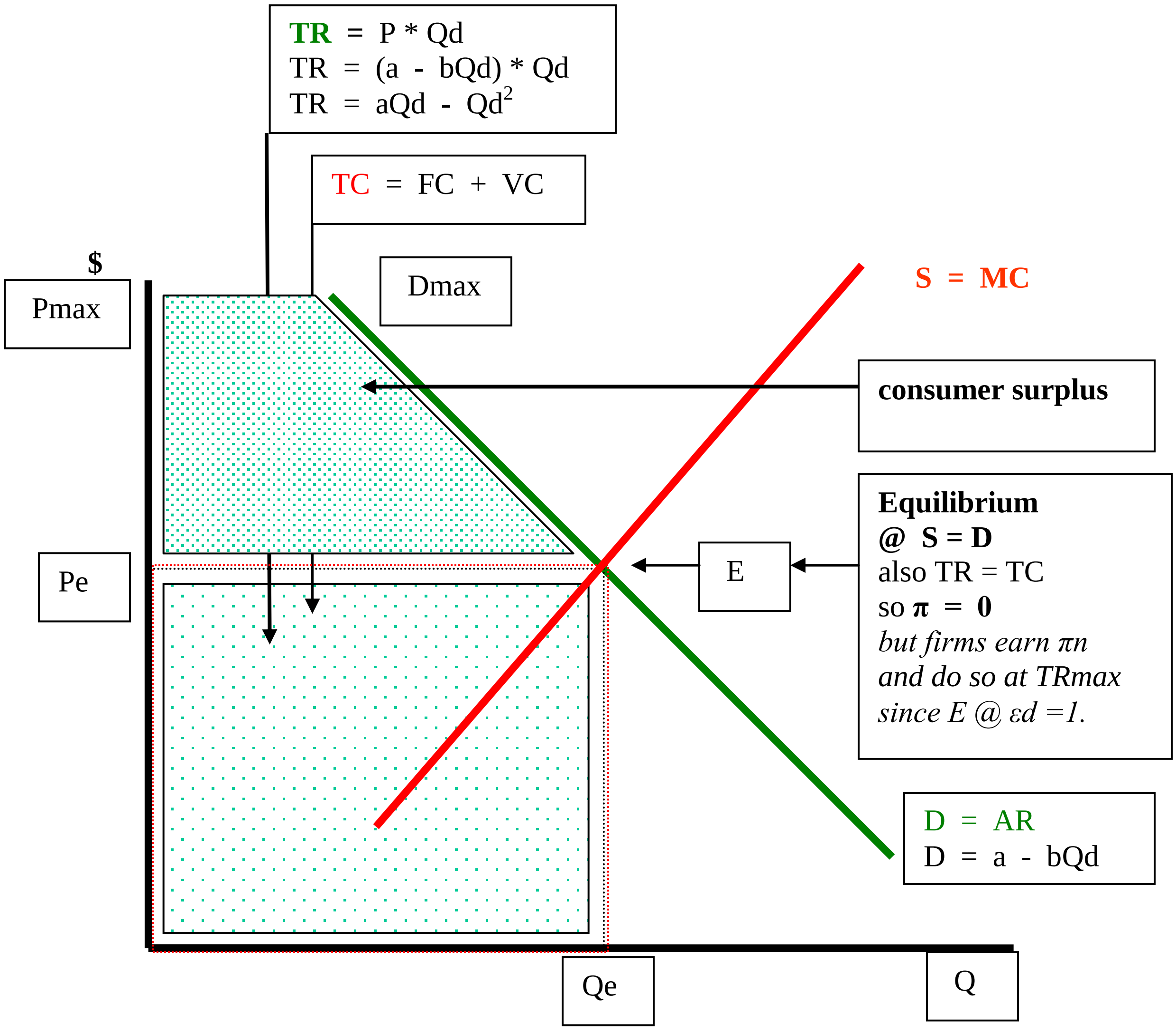
2 Recall the difference between <u>*change in quantity demanded*</u>, motion **on** the demand curve due to a change in price versus <u>*change in demand*</u>, motion **of** the demand curve due to a change in one or more non-price determinants of demand.

Figure 3: Equilibrium



Buyers would have been both ***WILLING AND ABLE*** to pay prices above Pe, but, due to competitive pressures can not be forced to do so by sellers. Thus, buyers obtain the ***Consumer Surplus***, the area above Pe bounded by $PeP_{max}D_{max}E$. The **Producers Surplus** is not displayed, but is a mirror image of the Consumer Surplus below Pe.

Also note, the *market's profit level (i.e., π) equals zero*, **but** *firms* in the market *earn normal profit (i.e., πn) because TR = TC.*

If the market P is above Pe, then there will be market ***surplus*** as sellers will be willing and able to offer more than buyers are willing and able to buy.

If market P is below Pe, then there will be a market ***shortage*** as sellers will be willing and able to offer less than buyers are willing and able to buy.

ELASTICITIES

In economics, elasticity is a general concept. That is, how responsive is one item to changes in another item? For a specific example, on a demand curve, how responsive is quantity demanded to a change in price? As a general concept elasticity can be applied to any two related items; for example, income and quantity, or, prices of related goods (i.e., cross elasticity of demand). In measuring responsiveness the changes are measured in percentage changes.

Two formulas for the elasticity of demand are helpful. The first formula is stated in terms of percentage changes and the second formula is stated in terms of slope. The second formula is helpful in making clear why and how εd does not equal slope. It is a very common error to equate elasticity of demand with the slope of the demand curve.

εd = percentage change in quantity demanded divided by percentage change in price

= **%ΔQd / %ΔP** = [ΔQd / Qd] / [ΔP / P]

The last expression can be rearranged so that rise over run (i.e., slope) of the demand curve is isolated in one part of the formula (note how this rearrangement also flips the Qd and P so their ratio is P / Qd).

εd = [1 / slope] [P / Qd].

Since the slope of a straight line demand curve is constant at all points, and since the ratio of P/Qd ranges over many values, slope can **not** equal εd.

Also, do recall that since the demand curve is downward sloping the sign on the elasticity always would be negative; however, by convention, no negative sign is displayed. Technically, the elasticity of demand, unlike all other elasticities, is stated as an absolute value (i.e., no negatives allowed). For other measures of elasticity both the sign and size have meaning.

The numerical value of the elasticity of demand is important: it can range of zero (recall, no negatives allowed) to infinity. For example, the elasticity of demand determines where the tax liability lands and where the tax incidence lands. For a sales tax sometimes the buyer has both the **tax liability** and the **tax incidence;** but for a perfectly elastic demands the seller has the tax incidence (note Figure 8 competitive <u>firm</u> pricing).

Unitary elasticity is an εd = 1; and here **total revenue is maximized.**

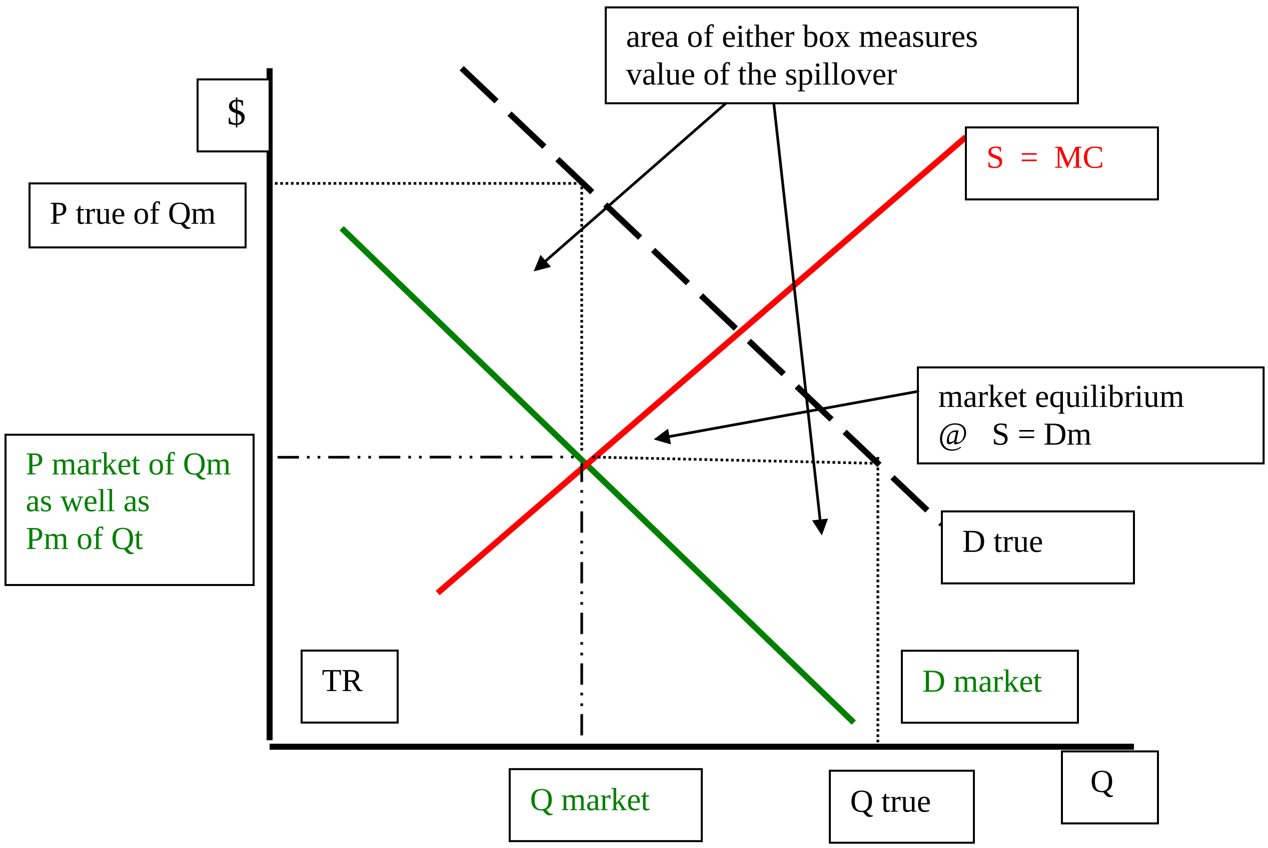
When moving away from unitary elasticity [i] any price increase reduces quantity demanded more than proportionally; and [ii] any price decrease increases quantity demanded but less than proportionally. Recall, εd = %ΔQd / %ΔP. There is a second equation that defines the point of total revenue maximization. Always, a total is optimized where its marginal equals zero. A specific example of this general rule is **TRmax @ MR = 0.** Note especially that in Figure 8, in the left hand graph of the competitive industry, equilibrium of S = D occurs at the quantity demanded where MR = 0. Thus, a competitive <u>industry's</u> equilibrium is at total revenue maximization and is at unitary elasticity.

If the elasticity of demand is less than 1 (i.e., εd < 1 because price is less than Pe), then the demand is inelastic (i.e., quantity is not responsive to price changes). If εd = 0, then the demand is **perfectly inelastic** (i.e., vertical demand curve [i.e., D slope is infinity]). If , εd = ∞, then the demand is **perfectly elastic** (i.e., horizontal demand curve [i.e., D slope is zero {e.g., Fig. 8 <u>firm</u>}]. Clearly, markets do not have the same linkage of price and quantity when either perfectly inelastic or perfectly elastic; or, for many values of εd far from 1.

Antitrust law uses the **cross elasticity** (i.e., , $\boldsymbol{\varepsilon_{xy} = \%\Delta Qd_x / \%\Delta P_y}$) of demand to measure the degree of competition (size of $\boldsymbol{\varepsilon_{xy}}$)and to define the relevant product market (sign of $\boldsymbol{\varepsilon_{xy}}$**)**. Look at the equation and think why:

substitutes have a positive $\boldsymbol{\varepsilon_{xy}}$ while complements have a negative $\boldsymbol{\varepsilon_{xy}}$.

Figure 5: Spillover Benefits



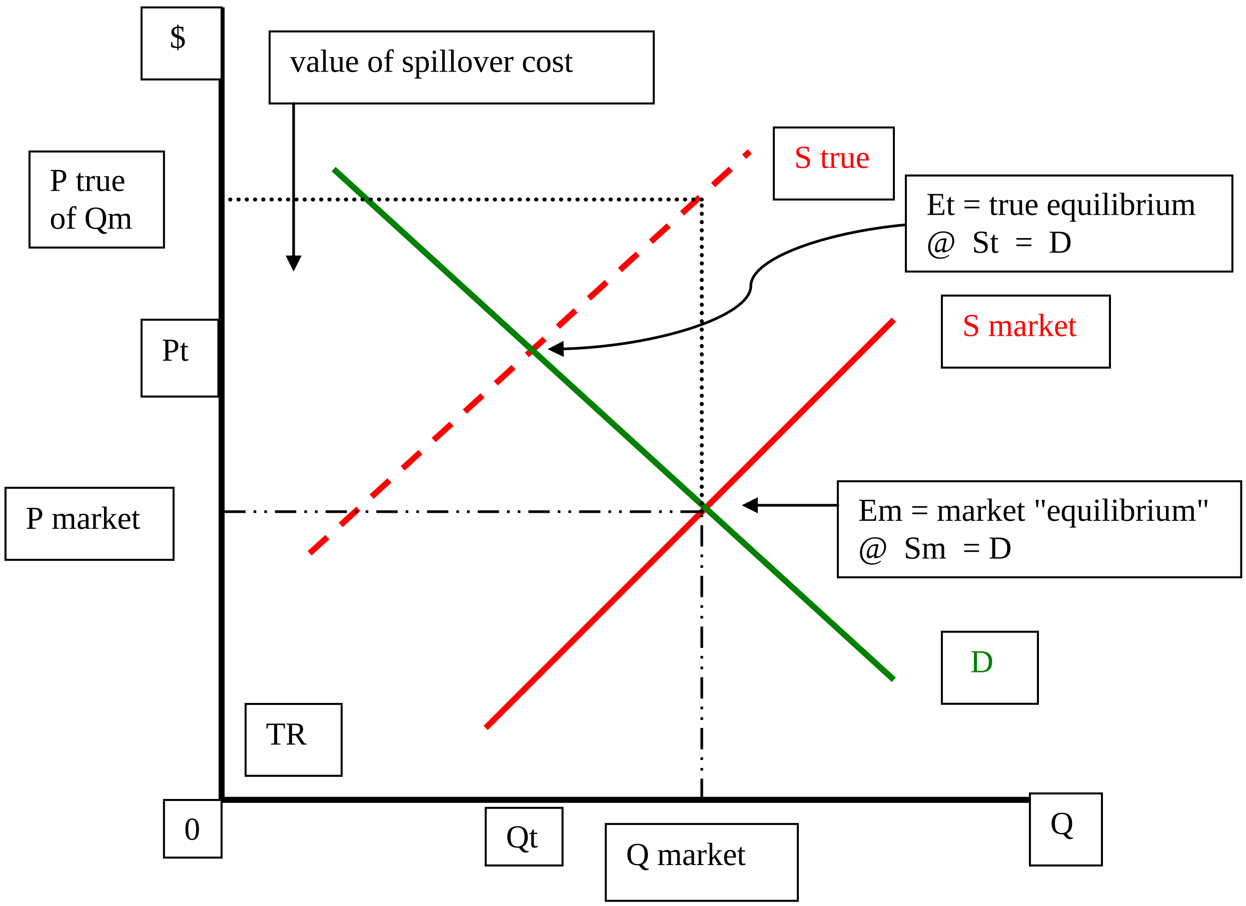
The market result is equilibrium at P market and Q market. Given this market result, there are two ways to view graphs of spillovers. Pick one and use that one repeatedly.
This Figure 5 on spillover benefits shows both ways.
The spillover cost curve, Figure 6, only uses # 2 (i.e., entering from the quantity axis).

1: start with price. Enter the graph from the price axis at P market and a spillover benefit causes too little to be purchased (i.e., Q true minus Q market).

2: start with quantity. Enter the graph from the quantity axis at Q market and a spillover benefit causes the price to be too low (i.e., P true minus P market).

This Figure 5 on spillover benefits shows two ways spillovers can cause value to escape being captured by the market price. That escaped value is *one of the two rectangles* outside of TR (i.e., either the top left box or the bottom right box, <u>but not both</u> boxes).

Figure 6: Spillover Costs



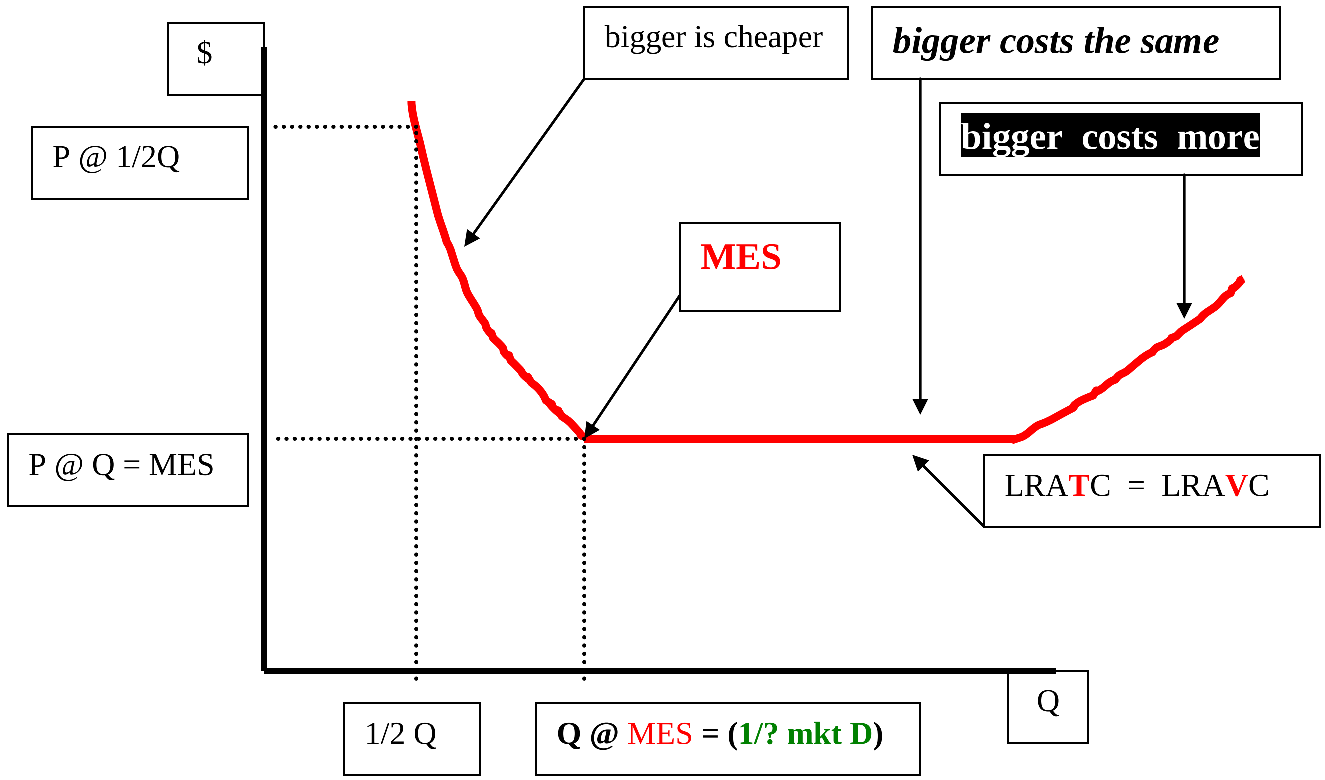
When there are spillover costs, at the equilibrium of P market and Q market there will be excess consumption. If the market moved to an equilibrium at D = S true, then both price would go up **and** quantity would go down. Alternatively, if the market stays at Q market, then price per unit should rise to P true.

All markets **always** have spillover costs and **always** have spillover benefits. **Typically**, however, these spillovers are not material to the transaction.

Thus, the real question becomes: "When a spillover is material, can government improve its facilitation of P.P., P., M., and C.?" Ordinarily, ***just because something is broken does not mean you can fix it***.

The false market "equilibrium" TC is the rectangle 0PmktEmQmkt.
The true equilibrium has a smaller quantity of Qt and higher price of Pt;
as well as a larger TC rectangle (not drawn on graph, please draw it in) of 0PtEtQt.

Figure 7: Minimum Efficient Size (MES)



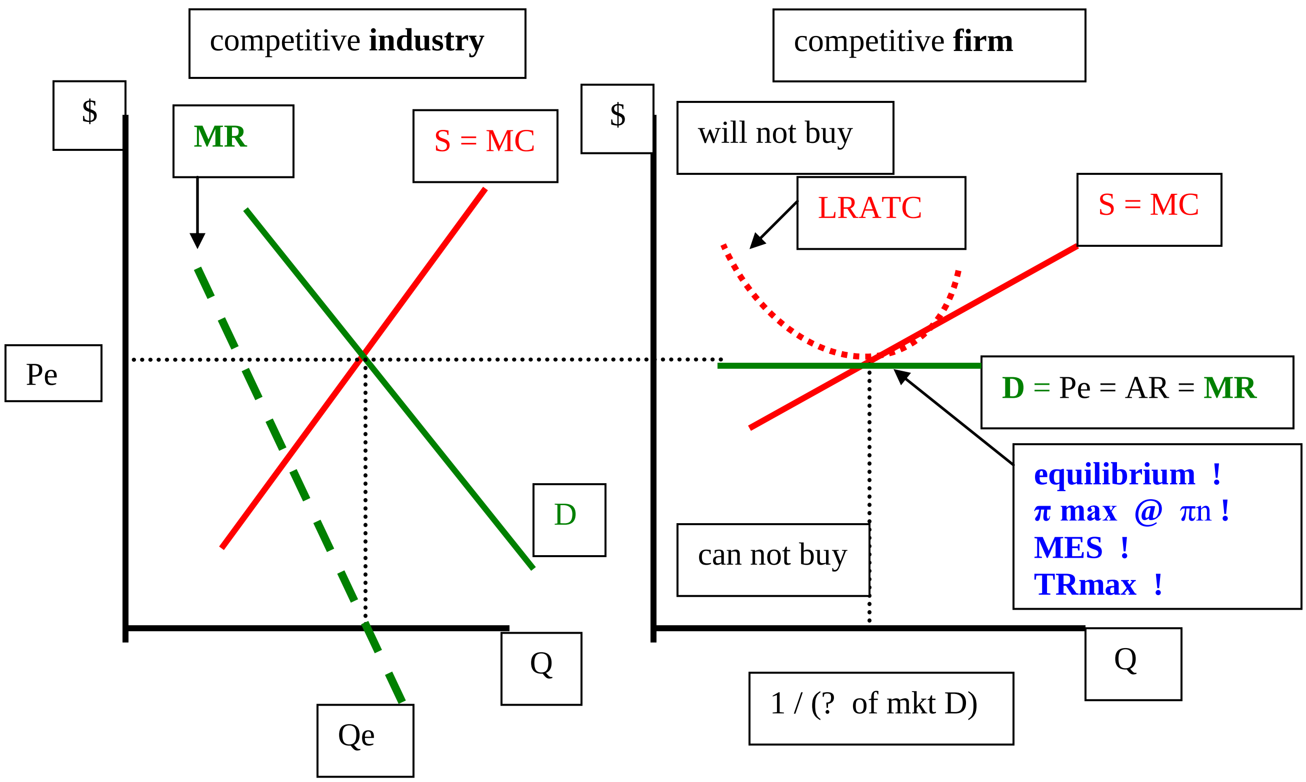
A gross **mis**interpretation of the MES curve is that all firms *must* be large to be efficient. The correct interpretation of the MES curve is that each firm must seek a size consistent with its market demand. Both Rolls Royce and Ford can continue to exist and prosper, but Ford's LRTVC will be less for the larger market demand Ford serves. RR's LRATC is higher than Ford's, but RR is serving a smaller Q, and RR's higher LRATC is better matched to its lower Q.

MES is a feature of a cost function, but MES links back to the demand. The MES sized firm is some fraction of the market demand. If that size is 1/100th, then 100 firms can fill the market, each at MES, and that market most likely will be competitive. If that size is 1/1, then the market demand calls for a ***natural monopoly***. Generically, as MES requires more than 1/8th of market demand the assumption of competition is more and more suspect (e.g., 1/16th tends to be far more competitive than 1/4th). Recall, the market share index
HHI = Σm_i^2;
for which an increase of 100 points is considered a material reduction in competition.

LRA**T**C = LRA**V**C because **in the long run FC = 0**. This means that MES is not a measure of the short run. That is, LRA**T**C = LRA**V**C because in the long run fixed costs are equal to zero; hence, the long run total variable costs equal the long run average variable costs.

Figure 8: Competitive Pricing

Figure 8 and Figure 9 explain pricing and appear complicated at first. There appears to be three graphs of four contexts, but one graph is used three ways. The graph on the left on this page is used three ways: competitive industry in Figure 8 as well as monopoly firm and monopoly industry in Figure 9 on the next page. Here, in this Figure 8, the focus is on the competitive industry (left graph) and the competitive firm (right graph).



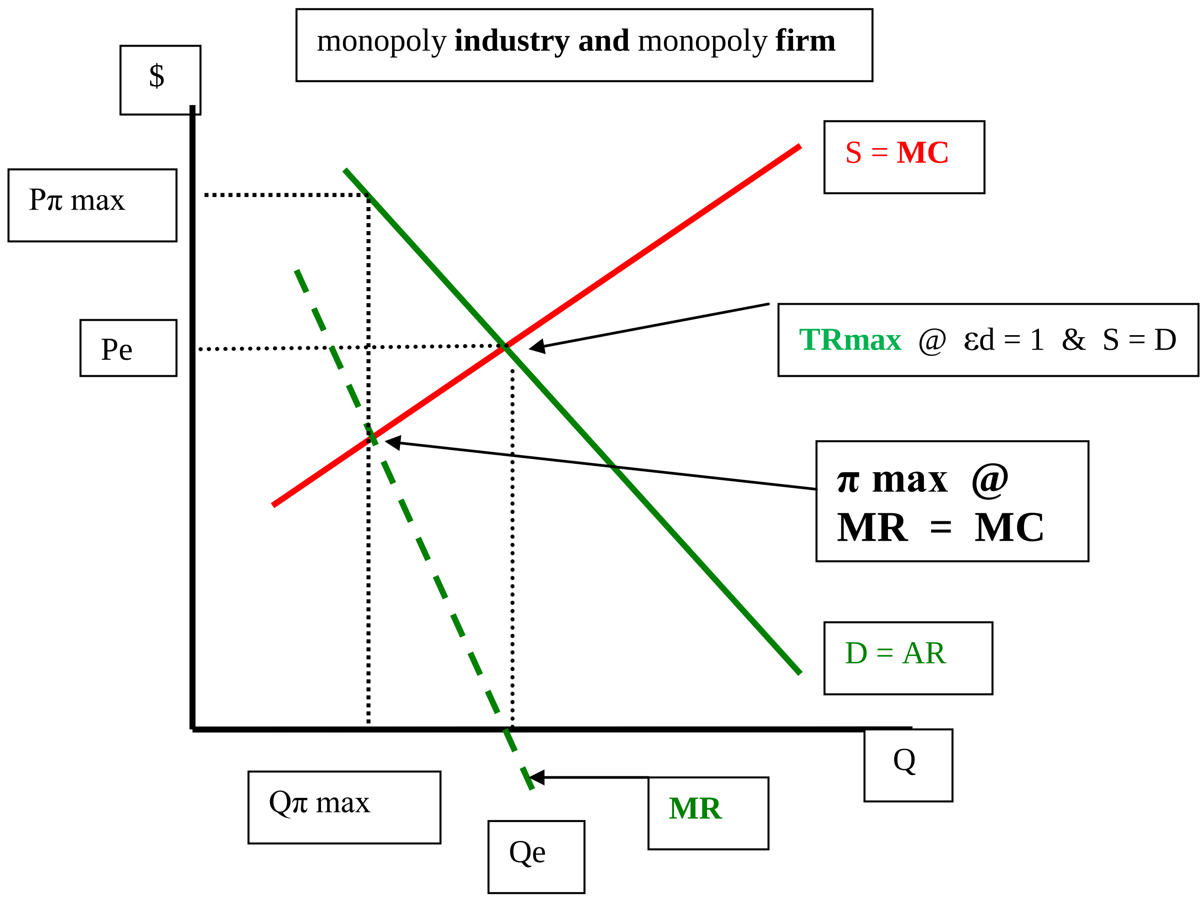
The *competitive **industry** does **not** profit maximize, instead* the competitive industry clears the market at the equilibrium price and quantity (i.e., TR = TC and $\pi = 0$; which also is at TR_{max} since $\varepsilon d = 1$ and since MR = 0) so that the buyer's obtain all of the *consumer surplus* while every firm earns a normal profit and obtains all of the *producers' surplus*.

Every competitive firm in the competitive industry sells at Pe, thus each competitive firm's demand curve is flat (i.e., is perfectly elastic, $\varepsilon d = \infty$). A flat demand curve means **D** = Pe = AR = **MR**. Accordingly, every *competitive firm does profit maximize* while earning a normal profit (i.e., $\pi_{max} = \pi a = \pi n$) Additionally, every competitive firm is at equilibrium (i.e., D = S), achieves TR_{max}, and the LRATC curve reaches MES at D = S.

Competition is good because buyers get the Consumer Surplus and because the maximum number of profit maximizing firms, each of which is both at equilibrium and at MES, provide alternatives. Thus, competition yields the ***greatest good for the greatest number***.

Figure 9: Monopoly Pricing

Other than its interpretation, size, and titles, the graph below is the same as the right graph in Figure 8: Competitive (Industry) Pricing.



The results of the monopoly industry are the same as the monopoly firm because a monopoly is a market with one seller (*monopsony* is a market with one buyer).

The ***monopolist*** profit maximizes by ***controlling its quantity*** supplied to the quantity underneath MR = MC. There are four steps. Step 1, find MR = MC; step 2, drop to the X-axis and set Qπ max; step 3, rise to the demand curve where the ***consumers control the price***; step 4, turn left to the Y-axis to find Pπ max.

Note that the profit maximizing monopolist captures some, but not all, of the Consumer Surplus, but does so at the cost of some lost sales. That is, Πmax ≠ TRmax.

Erroneously, most folks see price discrimination when Pa ≠ Pb. Technically, that erroneous definition is not correct since price discrimination requires Pa/MCa ≠ Pb/MCb. Charging different customers different prices can allow the monopolist to capture more, rarely all, of the Consumer Surplus. Do note, if Pa = Pb that can be price discrimination.

Monopoly is bad *because* *consumers get less* (i.e., Qπ max < Qe)
and *consumers pay more* (i.e., Pπ max > Pe).

EFFICIENCY

The primary goal of economics is efficiency. The primary goal of law is equity.

Efficiency is measured in more than one way. Some measures of efficiency are broad and some measures of efficiency are narrow. A narrow measure of efficiency can indicate a transaction is "efficient" when a broad measure of efficiency would indicate just the opposite.

In theory and in its stylized world of graphs (i.e., where stringent assumptions are accurate by mathematical design and by assumption) economics routinely offers policy conclusions claiming to have proved an efficient design for a process. A broad measure of efficiency can not be accurate in the real world where mathematical design and assumption must yield to the complex array of systems that are the natural world. To accommodate the Bounded Rationality of humans, when moving from theory to reality economists switch to a narrower measures of efficiency.

Total factor productivity is the broadest measure of efficiency. But, total factor productivity is impossible to measure in the real world. The far narrower measure of efficiency that actually can be approximately measured in the real world is single factor productivity. Labor productivity is one example of a single factor productivity measure of efficiency.

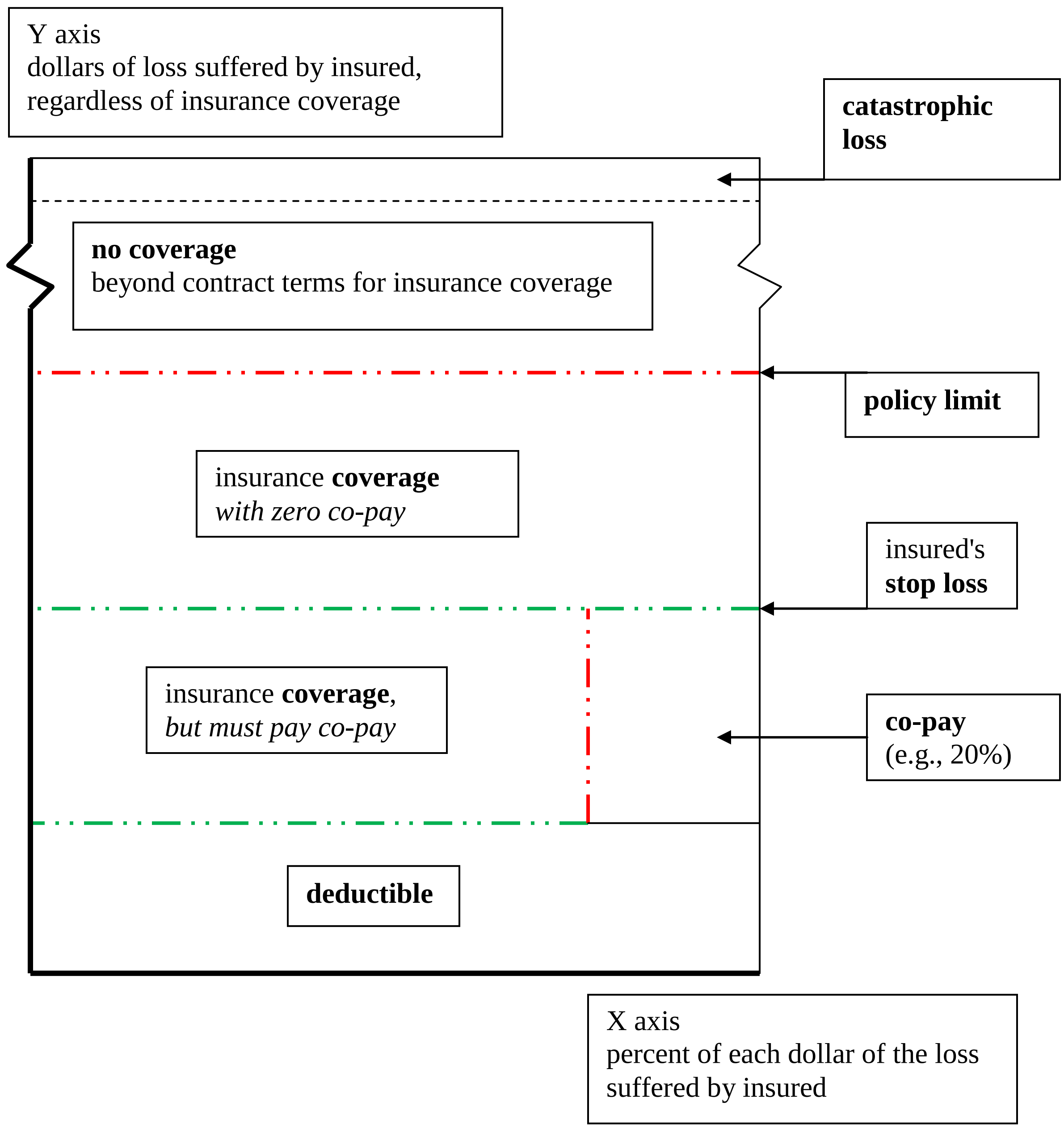
In the stylized world of economic graphs there are two types of efficiency that are important to business analysis: allocative efficiency and production efficiency. In the idealized world of theory it is feasible to achieve both simultaneously. In the real world neither ever if achieved. But, both provide a goal for policy makers.

Allocative efficiency exists if price equals marginal cost ($P_i = MC_i$). When an economy achieves allocative efficiency then the mix of goods is optimized by value of each item. Price discrimination defeats allocative efficiency. **Price discrimination** might or might not exist when $P_a \neq P_b$. For price discrimination to exist $P_a / MC_a \neq P_b / MC_b$. Price discrimination exists when there is not allocative efficiency. It is important to note that treating materially different persons identically is discrimination; just as it is discrimination to treat similarly situated persons differently.

Productive efficiency (a.k.a., technical efficiency) exists if price equals minimum long run average total cost ($P = LRATC_{min}$). When productive efficiency is achieved the economy is at its production possibilities frontier (i.e., maximum feasible output). Take a moment to revisit the page above with Figure 7: Minimum Efficient Size (MES). If the bottom of the MES curve is flat, then it is feasible to have $LRATC_{min}$ achieved without having firms at the MES. However, for that to happen there must be sufficient competitive pressures to achieve P_e in Figure 8: Competitive (Industry) Pricing, so that in turn the Competitive (Firm) Pricing graph has a flat (i.e., perfectly elastic) demand curve.

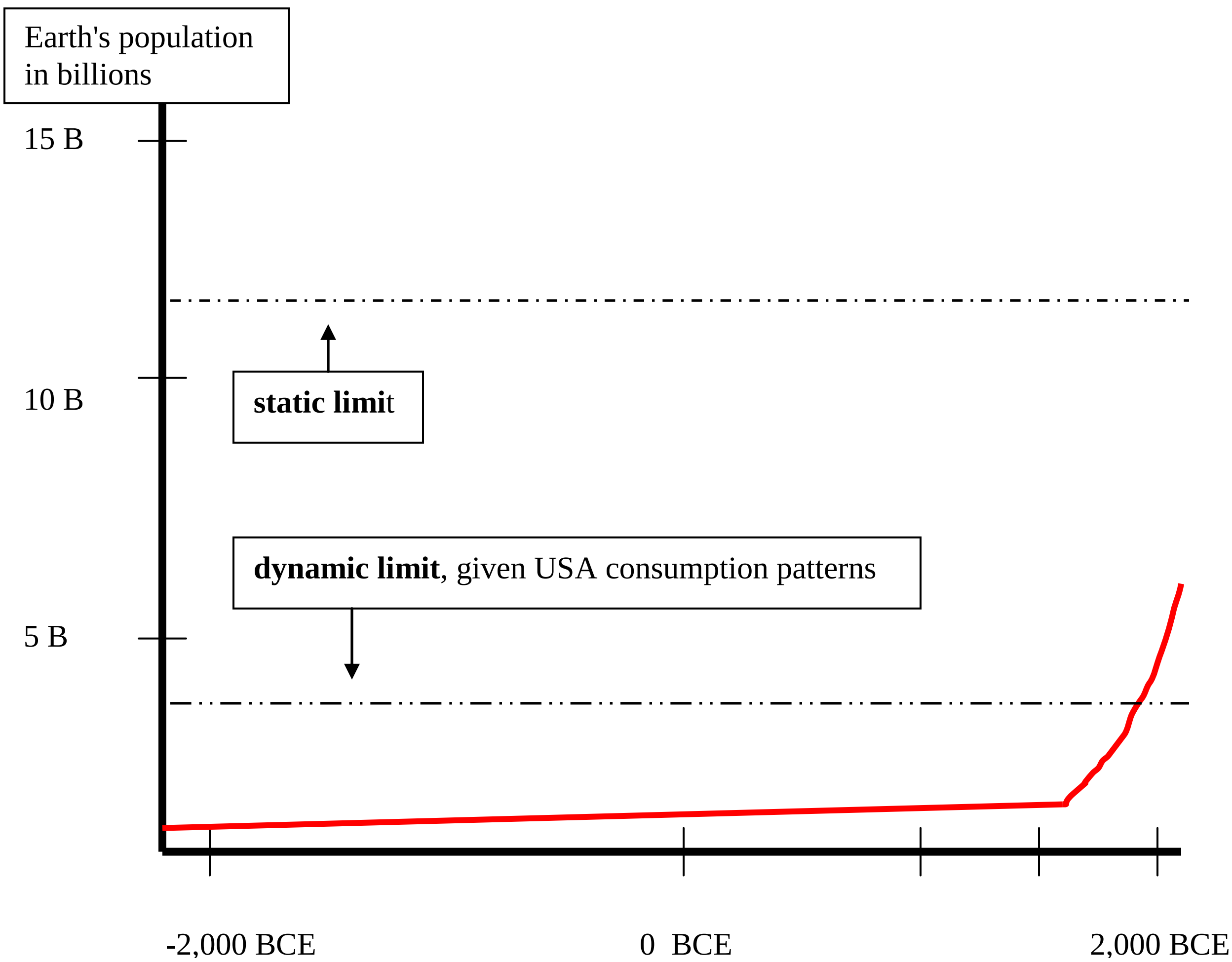
When both allocative efficiency and productive efficiency are achieved then the economy produces the **greatest good for the greatest number** (i.e., Utilitarianism).

Figure 10: Losses Covered by Insurance



NOTE: The 2003 Medicare prescription drug benefit altered this traditional risk allocation with a novel allocation called a "doughnut hole". The ***doughnut hole*** is a cessation of insurance coverage for a fraction of the area of normal insurance covered with a co-pay. That is, above the deductible and below the stop loss a new deductible zone is created that has no coverage. The doughnut hole alters both the financial aspects and the political aspects of the coverage.
http://seattletimes.nwsource.com/html/nationworld/2001797443_medicare21.html

Figure 11: World Population (a.k.a., hockey stick)

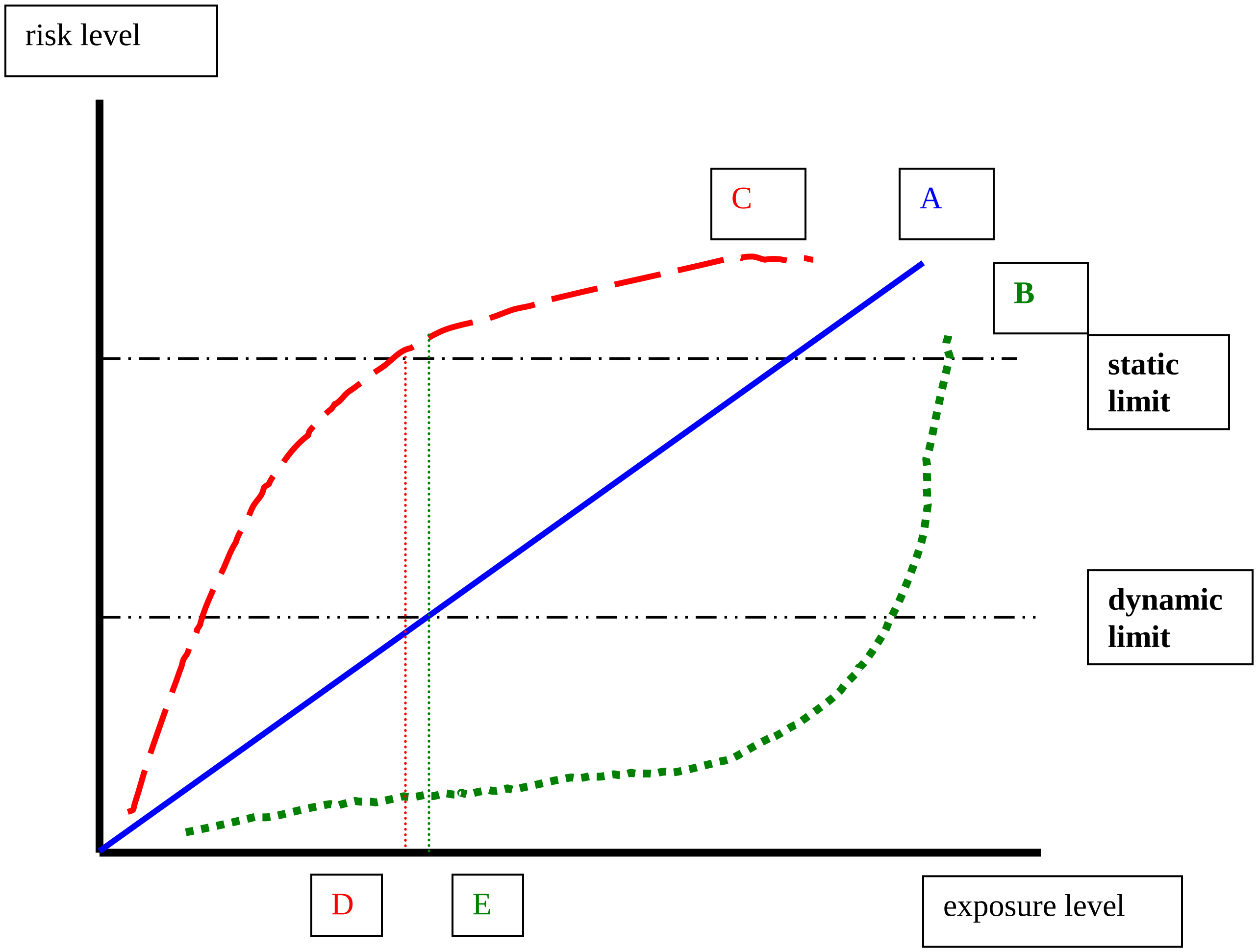


No human born after -2,000 BCE and before 1920 BCE lived long enough to witness Earth's population double. Every human born before 1960 and alive today has witnessed Earth's population at least triple.

The human population explosion is due to a death implosion. The prime trigger of the population explosion is portable energy (i.e., compact energy [e.g., coal] and the steam engine), which in turn spawned the Industrial Revolution, circa 1850. This in turn has generated a **difference in degree** that is a **difference in kind** of both the **quantity and quality** of human pollution.

There are widely varied estimates of the Earth's static limits. Generically, the more intensive the consumption patterns, the lower the maximum feasible sustainable population. If all humans lived like those in the USA, then the static limit is thought to be around 4 billion. In 2011 Earth's population went over 7 billion. However, if all humans were vegetarians, then the static limit is thought to be around 12 billion. In what year will we reach 12 billion? Is this a instance when you can use the Rule of 72? Who is Malthus?

Figure 12: Unpredictable Consequences



This Figure 12 is a very gross over simplification. For example, there would not be this clear of a consensus on any one of this graph's seven lines (e.g., exposure level; static limit); instead each would be seen as vacillating bandwidths rather than lines. That said, this Figure 12 helps us to see the issues.

Line A is what the government's administrative agencies tend to do (i.e., compromise).
Line B is how businesses tend to see the ecosystem's **regenerative ability**
(i.e., very large, with significant risks only reached at very high exposure levels).
Line C is how conservations tend to see the ecosystem's regenerative ability
(i.e., small, with significant risks quickly reached at low exposure levels).

If C is true, but lobbyists get government to adopt A, then we die at exposure D.
If B is true, but lobbyists get government to adopt A, then needless lost output starts at exposure E.
When line A is adopted rather than line B or line C, but when line B or line C is accurate, then what type of error is involved: Type I and/or Type II?
http://en.wikipedia.org/wiki/Type_I_and_type_II_errors

Table 1: Probabilities from Crime to Sentence

Event in Process	Event Probability for Criminal	Joint Probability All Events significant digits *without*	*with*
commit crime	1.00		
victim detects crime	0.90		
victim reports crime	0.60	0.54	= 0.54
police investigate crime	0.90	0.486	= 0.49
police identify a suspect	0.50	0.243	= 0.25
police make an arrest	0.70	0.1701	= 0.18
prosecutor seeks indictment	0.80	0.13608	= 0.14
prosecutor obtains indictment	0.90	0.122472	= 0.09
prosecutor brings trial	0.90	0.1102248	= 0.08
prosecutor wins trial	0.90	0.09920232	= 0.07
judge sentences criminal to max	0.20	0.01984046	= 0.01

To deter crime, how great must a mandatory minimum be? Let's consider a theoretical crime with instantaneous criminal persecution (so there are zero time value of money questions). Now, assume the crime yields the criminal $1.00 at the moment of the crime, and at the very next instant the criminal prosecution due process of law is completed. With a mandatory minimum, using the table above, the judge always sentences to the max upon the prosecutor winning at trial. Thus, the risk to the criminal is 7% rather than 1%. Assuming a 7% risk on a $1.00 gain, to deter a rational criminal the mandatory minimum must cost the criminal $14.29 (i.e., $14.286 = $1.00 / 0.07). Any penalty below $14.29 means crime pays.

Clearly, it is *feasible* for some mandatory minimum to generate an ***elastic*** response from a potential criminal. But, is it *probable*? In the 18th century England executed by public hanging pickpockets; however, one place you were sure to have your pocket picked was at such a hanging. Also, does $14.29 *always* pass constitutional muster under substantive due process?

In order for a mandatory minimum to generate an elastic response, the potential criminal must know of and reasonably expect the magnified sentence prior to the potential criminal making the decision to commit the crime. While feasible, an elastic response is not likely.

Mandatory minimums are likely to generate negligible changes in criminal behavior and thus are certain to generate substantial increases in grossly disproportionate sentences and grossly disproportionate public expenditures dedicated to punishment. From the perspective of efficiency, are costs to be maximized or to be minimized? Which cost is the appropriate cost, from the perspective of efficiency? Is it the cost imposed on the criminal by a mandatory minimum?

If one assumes[3] the criminal is a Rational Person, then the enhanced sentencing of a mandatory minimum is such a remote and low probability that it does not generate an elastic response.[4]

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[3] Can a person --be-- a criminal if that person is not rational? Is the Rational Person of economics the same as a rational person of the law?

[4] Would a politician that is a Rational Person support mandatory minimums? If so, when?