Exposing Textbook "Supply and Demand" Ideology:

A "Demand and Cost" Alternative to the "Ghost" Supply Curve*

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I frequently start a class discussion of the "Supply and Demand Model" (SDM) with a simple question to anyone in the class. If you were a pizza producer, how many pizzas would you produce at a price of $15 a pie? Students give me a blank stare. I then elaborate. Consumers will have some idea of how many pizzas they will buy at any given price, assuming other "shift factors" like income, taste, and expectations do not markedly change, but producers can estimate how much they will produce at any given price *only if they know something about demand conditions*. Demand, however, is not a shift factor for the supply curve. Quite the contrary, the supply curve of introductory economics textbooks is supposed to be completely *independent* of demand. Demand is supposed to have *no influence* on the position or shape of the supply curve.

Though ubiquitous in economic texts, an independent supply curve does not exist for most of the economy. Professional economists and economics majors are (or should be) well aware that supply curve exists only in a few specialized markets: such as some agricultural or natural resource markets: where prices are set globally, individual producers are small relative to the global market and can sell as much as they can produce at the global market price, and incremental costs of production rise as production increases; and barter (as opposed to production) markets, such as financial trading markets, where equilibrium prices for offers and bids of financial products or currencies are reconciled. The few specialized (non-barter) markets where conditions such as those described above are approximated are technically known as "Perfectly Competitive" markets.[1] With the exception of these special cases, in the rest of the *production* economy, firms set prices and levels of production based on *demand and costs*.

[1] See any Intermediate Microeconomics textbook, for example (Mansfield, 1994).

Introductory textbooks misleadingly pretend that these, what we have labeled Perfectly Competitive Free Markets (PCFM's), are generally representative of most markets in the economy.

The supply and demand story, that assumes that competitive markets drive supply and demand toward a socially optimal efficient allocation of resources based on "price signals" that result in stable equilibrium prices and output that balance incremental costs and benefits, is a hoax. The major purpose of the story, as noted above often the only thing that people remember from their introductory economics training, is to firmly root the "Perfectly Competitive Free Market" (PCFM) *meme* in the minds of introductory economics students who later become lawyers, judges, politicians, business people, academics in other fields, citizen voters, and economics professionals, who propagate the legal and political implications of the PCFM without thinking too much about what it is based on.[2]

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[2] For example, Rep. Paul Ryan, the current Libertarian Chair of the House Budget Committee, was by all accounts a devoted student of ultra PCFM libertarian economics professor Richard Hart of Miami University, Ohio, Ryan's alma mater (Tanfani, 2012).

judges, politicians, business people, academics in other fields, citizen voters, and economics professionals, who propagate the legal and political implications of the PCFM without thinking too much about what it is based on.[3]

In this paper I will review SDM ideology, and show that simple realism dictates that it should be replaced by a "Demand and Cost Model" (DCM) story whereby output and prices are based on *demand and costs, and competition and firm strategy*. DCM derived output levels and prices will *not* satisfy any of the "incremental cost equals incremental benefit" efficiency outcomes that underlie the supposed social optimally of the PCFM.[4]

The (Mostly Fake) Supply and Demand Story

Ask a women or man "in the street" what they know about economics and, if they've had any formal exposure at all in high school or college, they'll probably mention the SDM. This, I believe, reflects the extent of the systemic social indoctrination foisted upon the public by the (mostly unwitting) acolytes of mainstream, or Neoclassical (NC), economics. In one relatively simple story, with just enough analytical and graphical content to give it an aura of objectivity and science, the fundamental principles of our social *religion* can be hammered home. As virtually every standard NC (and most heterodox) introductory economics textbook begins with

[3] For example, Rep. Paul Ryan, the current Libertarian Chair of the House Budget Committee, was by all accounts a devoted student of ultra PCFM libertarian economics professor Richard Hart of Miami University, Ohio, Ryan's alma mater (Tanfani, 2012).

[4](Baiman, 2016) elaborates further on this theme by also showing that non-introductory economics fall-back applied micro-economic "Ramsey pricing ideology, that supposedly replaces S&D in more advanced microeconomics treatments, is also an ideologically based outcome that has led to "immoral" policy disasters.

this partial equilibrium story derived from Alfred Marshall's "scissors diagram," I will present just a bare outline of the story below (Marshall, 1890, Book V, Chap. 3).[5]

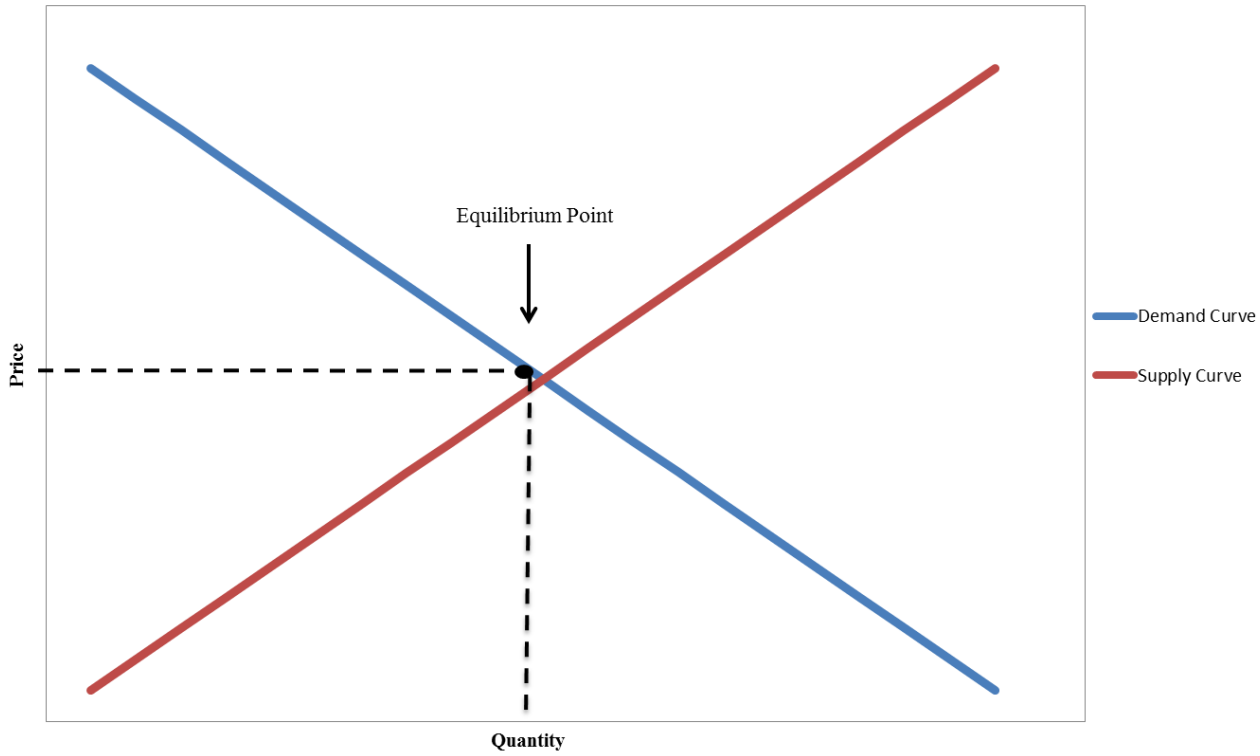
Markets may be generally analyzed though the use Supply Curve and Demand Curves. For a given market the Demand Curve (DC) is a schedule of how much consumers will purchase at different "own-prices" of the good in question. Assuming "all else is constant", or "ceteris paribus", the demand curve will slope down as the own-price declines, since the good will then become relatively cheaper than its substitutes whose prices, by assumption, remain constant. The curve will be stable, or remain in place, as long as exogenous parameters or "shift factors" that affect demand such as: income, tastes, market size, number and prices of substitutes and complements, etc., remain constant. In this case changes in own-price will cause "*movements* along the demand curve." Changes in shift factors on the other hand will cause "*shifts* in demand or the demand curve." Neither the shape nor placement of the DC will be affected by supply factors. The DC is independent of supply.

Analogously, an upward sloping Supply Curve (SC) is a schedule of how much producers will produce at different own-prices of the good in question assuming all other "shift factors of supply" including: prices of inputs, productivity, number of suppliers and their supply quantities, expectations of supply, etc., are constant. The SC will normally be upward sloping as the higher the own-price a producer can get for the product, the more they will produce for the market.

[5] Though heterodox texts also highlight critiques and limitations of the supply and demand story they do not generally present an alternative (Bowles et. al., 2005, Chap. 8 -9) (Riddell et. al., 2011, Chap. 7) (Goodwin et. al., 2009, Chap. 4).

Given stable DC and SC, or constant supply and demand shift-factors, competitive markets will "clear" at the unique equilibrium price and quantity where DC and SC intersect where "quantity supplied" equals "quantity demanded." This is a self-adjusting stable equilibrium that will be arrived at through individual consumer and producer reactions to "price signals."

Figure 5.1: Supply and Demand Model (SDM) Equilibrium



This partial equilibrium is *stable* as it includes a "dynamic adjustment mechanism" whereby individual-agent price signal responses will automatically move the system back to its original

equilibrium or to the appropriate new market-clearing equilibrium, if supply or demand curves shift.

For example if the demand curve shifts to the right due to, say increased incomes, "surplus quantity demanded" will occur at the starting equilibrium price, causing producers to raise their prices and move up their supply curve to satisfy the increased demand. This will then cause consumers to lower their demand a bit and move down the demand curve to a new market-clearing equilibrium *higher* price and quantity point. The opposite will occur if the demand curve shifts down (left) instead of up (right).

Figure 5.2: SDM Demand Increase

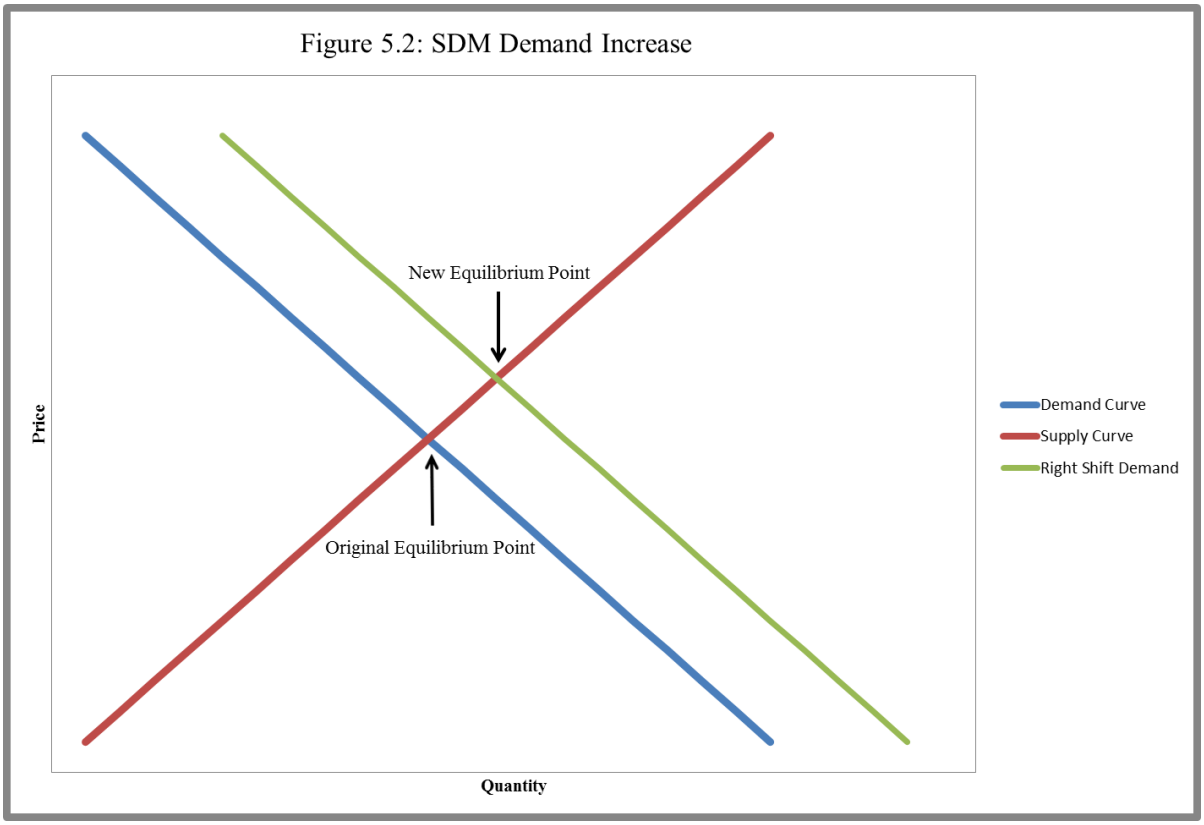
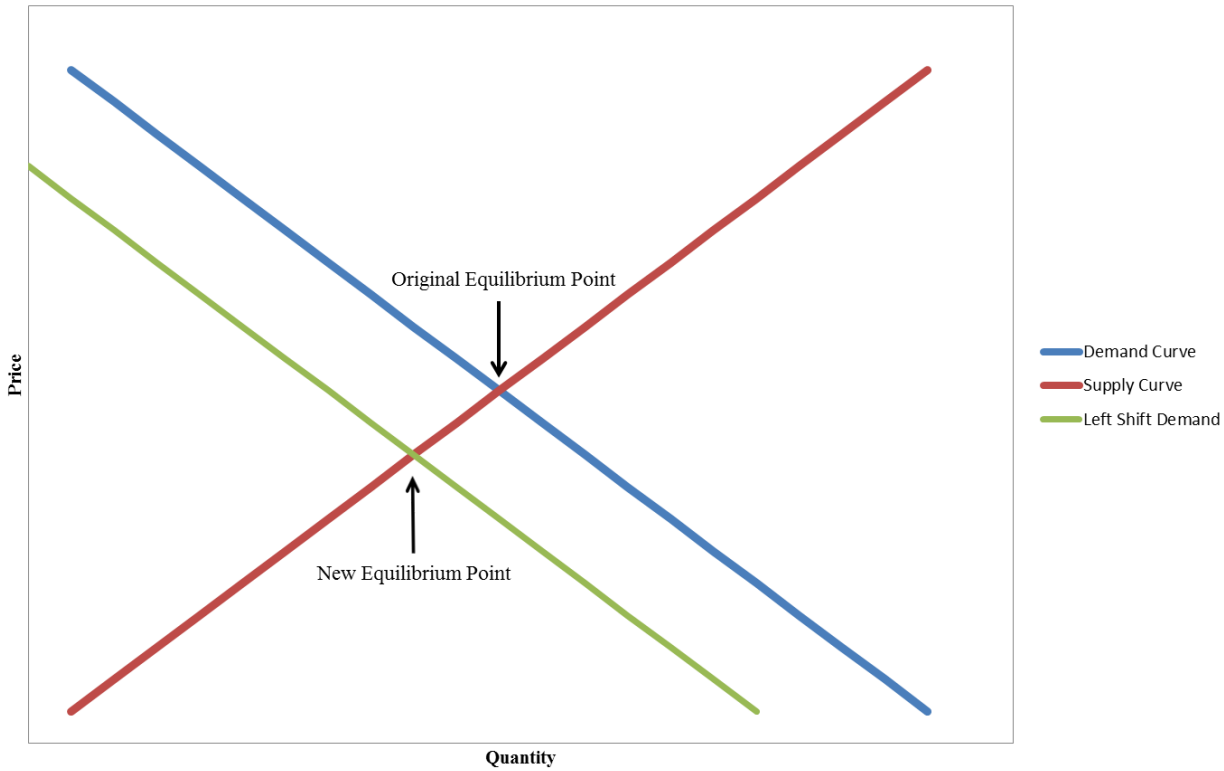


Figure 5.3: SDM Demand Decrease



Similarly if the supply curve shifts right due to say increased productivity, "surplus quantity supplied" will appear at the old equilibrium price, causing producers to lower their prices and move down their supply curve to reduce the unwanted inventory accumulation. This will then cause consumers to move down their demand curve to a new *lower* market clearing equilibrium price and *higher* equilibrium quantity point. The opposite will occur if the supply curve shifts (left) instead of up (right).

Figure 5.4: SDM Supply Increase

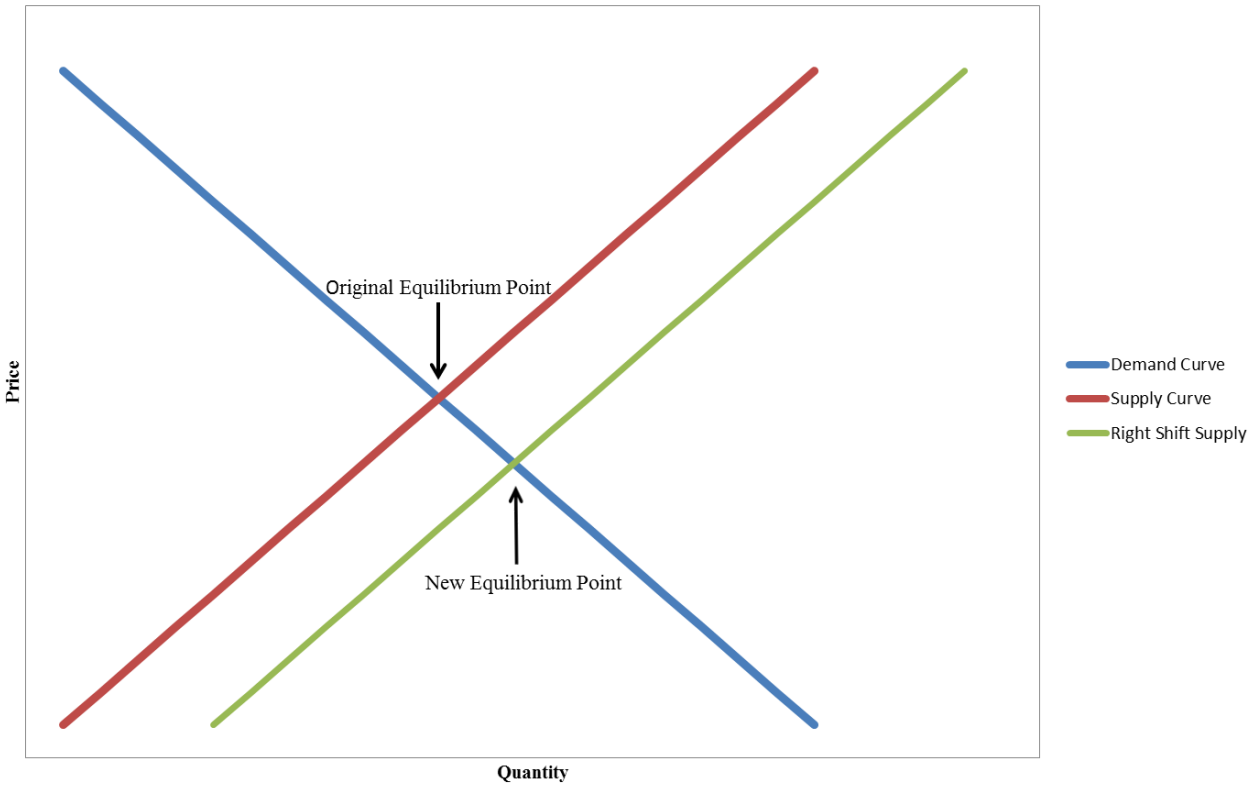
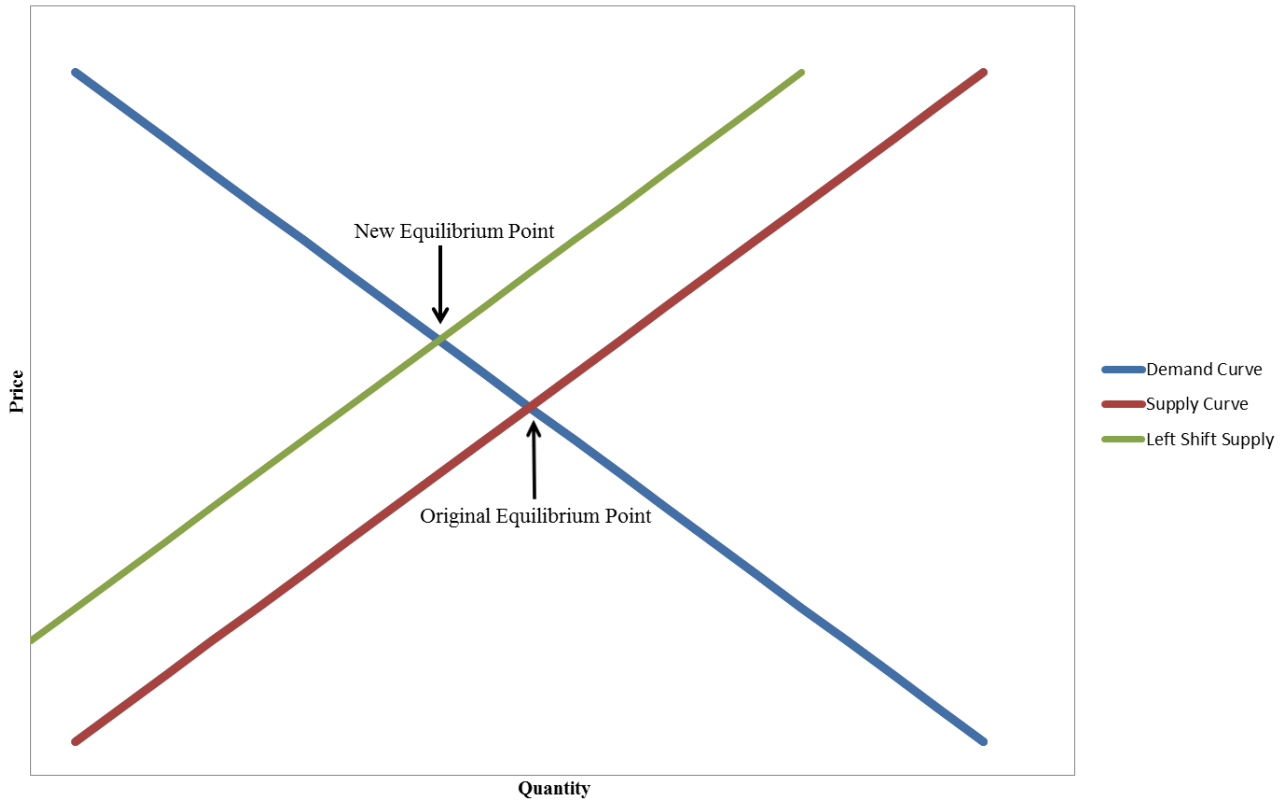


Figure 5.5: SDM Supply Decrease

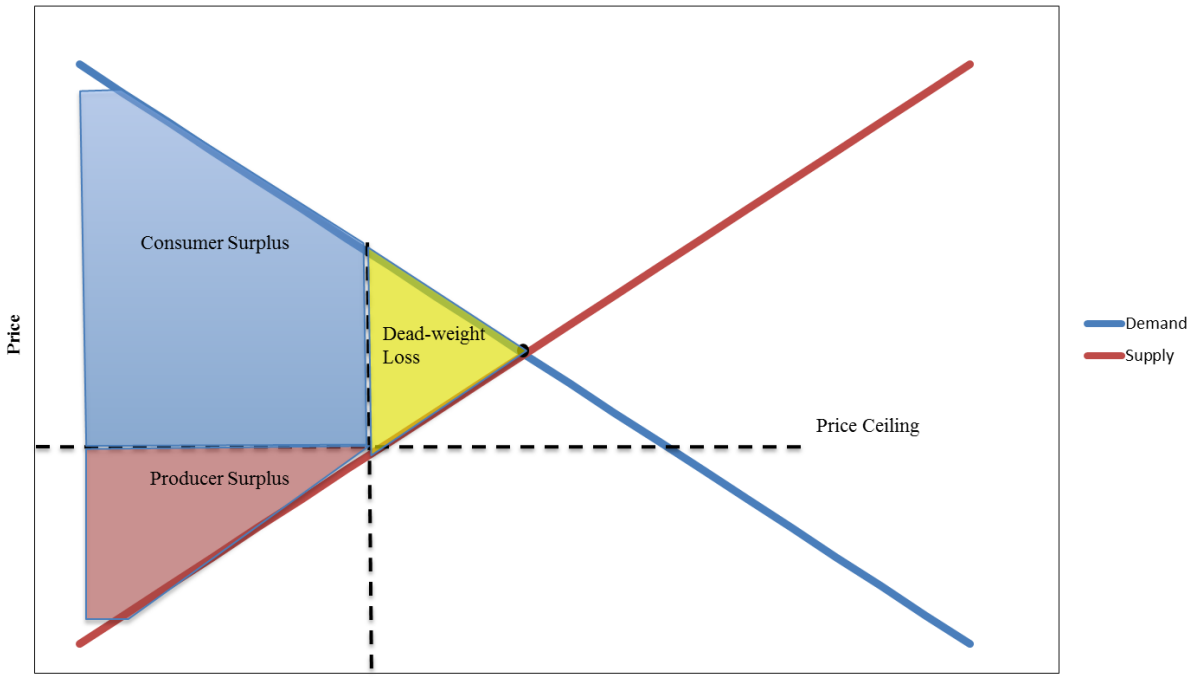


In introductory and applied economic texts, the concepts of "Consumer Surplus" (CS) and "Producer Surplus" (PS) employed to generate a more normative justification for PCFM and SDM equilibriums. CS is defined as the area under the demand curve for prices that consumers would have been willing to pay as opposed to what they actually paid at the (always by definition) lower *equilibrium* price level determined by a horizontal line through the intersection of the demand and supply curve. PS is defined as the (necessarily positive or zero) profit that equals the area above the supply curve and below the horizontal equilibrium price line. Standard NC introductory economic texts then explain that such an equilibrium maximizes the sum of

consumer and producer surplus and that the imposition of any non-market price or quantity restriction will diminish this measure of overall social welfare.[6]

Any "government intervention" into the "free market" that artificially attempts to keep prices low (like rent control) or high (like agricultural price supports) will lead to shortages or surpluses and "dead weight" CS+PS loss relatively to the "Pareto Optimal" or welfare maximizing (unconstrained) market equilibrium price and quantity.

Figure 5.6: SDM Producer and Consumer Surplus Dead Weight Loss From Price Ceiling



[6] See for example the popular (Mankiw, 2008). For a simple critique of CS methodology see (Hill and Myatt, 2010, Chap. 4). For in-depth critiques of CS and PS see Part III of this text.

This fundamentally Walrasian[7] SDM story is presented in introductory texts as a description of the workings of Adam Smith's *invisible hand*. The latter is an automatic feed-back dynamic story explaining how in competitive markets greater demand drives up prices and profits, stimulating increased investment that leads to greater supply. SDM supposedly supplies a rigorous foundation for the rhetorical message of objective market forces coordinating individual self-interest and providing a beneficial and balanced social equilibrium through freely adjusting price signals.

This is that, given exogenous technological and natural constraints (see chapter 1), the SDM model shows that capitalist *market* economies: *gravitate toward a social welfare maximizing, stable, market clearing equilibrium that is perfectly determined by natural conditions and individual choice,* as:

a) "Objective" market forces produced by aggregations of *agent* choices in such a way that no *individual* buyer or seller can significantly affect overall supply or demand curves. PCFM equilibrium prices and quantities are determined by *nature*, *technology*, and (almost as sacrosanct in liberal political thinking) "free and voluntary" *individual* agent *choices* in their own self-interest. These free market equilibrium prices *perfectly and deterministically* balance the objective and inviolate forces of supply and demand so that *quantity supplied* exactly equals *quantity demanded*, resulting in an equilibrium *clearing* of all markets. The SDM thus provides a scientific and objective solution to the central

[7] For a more advanced discussion of the difference between "Walrasian" and Post-Keynesian or "Ricardian" theories of growth and value, or output and pricing, see (Nell 1967) reprinted in (Nell, 1992, Chap. 2).

economic problem of "allocating scare means to competing ends" that is *free and fair* as it properly reflects "consumer sovereignty" and individual choice.

b) *Shifts* and *movements along* these curves not only generate unique, objective and fair equilibrium prices and quantities, but the equilibrium so obtained is a "self-correcting" *stable equilibrium.* In the absence of supply or demand curve shifts, any movement away from equilibrium price or quantity will automatically generate price changes (or "price signals") that will induce individual producers and consumers to make choices based on their own self-interest that will return the system to (the prior existing) equilibrium. The SDM model thus includes a dynamic self-adjustment mechanism that move the system toward its unique equilibrium position and sustains this equilibrium once it is obtained.

c) Finally, the as the SDM equilibrium generated by the individual self-interested agent choice subject only to (exogenous) constraints of nature and technology, *maximizes social welfare*, the SDM is modern and rigorous formalization of the Adam Smith's "invisible hand" doctrine. The SDM thus provides "objective scientific" support for the cornerstone ideology of NC economics: that competitive markets will cause actions motivated by private self-interest to serve the public good. The SDSM thus shows that PCFMs are optimally socially efficient.

Now any, more or less, formal model ignores some aspects of reality so that it would serve little purpose to critique SDM for not *precisely* replicating reality. It is well known for example that SDM cannot determine distribution (*factor* markets play a role but can't set "initial endowments") and disregards *exogenously determined* (in the SDM model) *tastes, nature, and*

technology.[8] The standard NC response to critiques of this approach is that factors influencing tastes, nature, and technology are outside of the sphere of economic science (Baiman, 2016, Chap. 1-3). For example, NC's claim that the proper way to address distribution is through a political reconfiguration of initial endowments (or wealth) that does not "interfere" with the efficient workings of the market as depicted by the SDM. The construct backing up this position is the "Second Fundamental Theorem of Welfare Economics" that proves that a PCFM can provide any desired distributional outcome through an appropriate setting of initial endowments.[9] All of these SDM PCFM outcomes are said to be "Pareto Optimal" – a term that sounds like *optimal* but in fact is defined as a situation under which no agent can become better off through a voluntary market exchange with another agent. An outcome which is pretty much a tautological consequence of the workings of a PCFM defined as the result of individual agents trying to improve their welfare through voluntary market exchanges.

Critiques of both the measure (Why should the welfare derived from PS or profit be considered equivalent to welfare derived from CS?) and its units (Why should a dollar of CS for an extremely wealthy individual like Donald Trump have the same "social welfare" value as a dollar of CS for an average income person?) have been rigorously developed (Baiman, 2001) (Granqvist and Lind, 2004) (Baiman, 2016, Chap. 10). Critiques of these supposedly objective scientific "principles of microeconomics" show that even a presumably more realistic modified version SDM widely used by NC applied microeconomists (used for example to justify the disastrous deregulation of electricity in California) can be shown to rest on *basic assumptions*

[8] For an advanced discussion the role of *tastes, nature, and technology* in the NC model see (Marglin, 1984, Chap. 2). For theoretical proofs and discussions of how endogenizing these factors undermines the "Fundamental Theorems of Welfare Economics," see (Hahnel and Albert, 1990).
[9] See any intermediate or advanced standard NC microeconomics textbook, for example (Mansfield, 1994).

reflecting particular sets of *values*, such as the primacy of *efficiency* and *individual choice* over *equity* and *social choice*, and a mistaken belief that the former can be strictly and scientifically *separated* from the later (Baiman, 2002).

For now it is important to demonstrate the complete (not just approximate) lack of realism of the introductory textbook SDM – a model that, as noted above, most students who have any formal exposure to economics at all, never get beyond.

Supply Curves Generally Do Not Exist

The standard introductory economics SDM model is dependent on *independent* supply and demand curves which in practice rarely exist. For example, in response to our question of the afore mentioned pizza producer regarding how many pizza's they would *produce* at different possible sales prices (i.e what would be their SDM model "supply curve" which by construct is a hypothetical "wish list" that is dependent on "received prices" over which an individual supplier has no influence), if there was a response at all, it would be: "Well that depends on what I thought demand would be." But the answer to this *demand* question, by assumption, plays *no role* in the construction of the supply curve. The supply curve is supposed to give the number of pizza's that a producer would produce based purely on *supply conditions* – that is the cost of producing each additional pizza relative to a given price set by the market. This is based on the assumption that producers will be able to sell every pizza that they can produce at the *market price* and that no individual producer could possibly produce enough pizzas to change the market

price. As far as individual producers are concerned the supply curve is supposed to reflect *infinite demand* at every price.

If this sounds hokey, it is. How many producers do you think construct (necessarily purely theoretical) supply curves to determine "maximum" output that they can produce profitably at any market determined "given price" and determine what the "market price" is and produce this with the expectation that demand for their production at this price will be infinite. They don't need to worry about demand. Just produce as much as you can and bingo – it will be snapped up by the "infinite demand" that will be available at that price.

Moreover, what if, because of economies of scale for example, cost of production per unit *declines* as you produce more? The model obviously breaks down completely in this case, as every producer will produce an infinite supply. The whole "supply curve" hypothetical construction is premised on an assumption that *every* producer will experience increasing costs per unit as output increases, and that these incremental, or *marginal*, unit costs will increase fast enough so that no producer will be able to obtain a large enough share of the market to influence prices (thus becoming an *oligopolist* or *monopolist* instead of a "*perfect competitor*") before this happens. This is a nonsensical assumption in today's advanced economies in which most major sectors are dominated by giant, often multinational, firms whose reach and profitability are based on large scale: production, sourcing of inputs, and marketing.

Ask the same question of a hypothetical pizza *consumer*, and you are likely to get a fairly well defined downward sloping demand curve, provided that nearby pizza shops selling the same kind of pizza are available and that the consumer has a limited pizza budget, i.e that *effective competition* and *income constraint* conditions hold.

The problem here is that though individual, and after adding them up, *aggregate demand* curves, are a fairly well-defined theoretical construct, the existence of hypothetically independent upward sloping *supply* curves for firms and for markets, generally are *not*.

In the short run, assuming some level of *normal* excess capacity *variable average costs* (costs that vary with the amount of output produced) per unit produced are often relatively *constant* so that *average costs* (which includes the *fixed* overhead and set-up costs) per unit produced should *decline* as these fixed costs are defrayed over larger production runs (Lavoie, 2009, Chap. 2).

Thus, total (variable and fixed) short-run average costs, which are by definition supposed to be based *exclusively* on cost-side factors, will generally either be *downward* sloping, or at the very least (if there are some off-setting increases in average costs for *unusually* high levels of production such as over-time pay) *flat*.[10]

[10] Piero Sraffa first raised (a variant of) this critique of the textbook Marshallian microeconomics story in(Sraffa, 1926). It has been reiterated by generations of "Sraffians" and "Post-Keynesians" and other non-NC economists ever since with little apparent impact on NC microeconomic theory. For a comprehensive treatment of this NC attachment to "Household production" as opposed to "Industrial Production" see (Nell, 1998).

When SDM is applied to the long run, a period of time over which plant and equipment (or "Capital") can be expanded, there is even greater reason to believe that total average costs, for most industries, will decline as greater market power and economies of scale (larger plants lowering cost per unit output) and scope (franchising reducing joint overhead costs such as marketing and financing) reduce the costs of inputs and of production. NC economic texts (i.e. almost all economics texts) are forced to resort to dubious claims that "administrative inefficiencies" stemming from large size will inevitably add sufficient costs per unit to off-set all of the advantages of large-scale production, in order to justify a "U" shaped long-run average cost curve assumption.[11]

This is a necessary assumption if PCFM's are to naturally evolve toward an optimally efficient production and pricing configuration at the bottom of a "U" shaped long-run average total cost curve. But this is contrary to the actual experience of most advanced capitalist economies in which larger and larger firms achieve cost, marketing, and financial advantages, and affective oligopoly power over numerous industries and large market segments. Wal-Mart is just the latest example of the efficiencies of scale, including market (and political) power that adhere to the largest and most concentrated units of capital. The "natural" tendency of capitalism in most cases is to evolve toward greater oligopoly a la Marx, rather than PCFM a la Adam Smith, in complete disregard of standard NC textbook microeconomic theory.[12]

[11] See any introductory or intermediate economics or microeconomics text, for example (Mansfield, 1994).
[12] The fundamentally ideological NC "U" shaped cost curve assumption should not confused with the Post-Keynesian "Penrose Effect" that assumes that attempts to increase *growth* will eventually result in a decline in the *profit rate* that underlies the Post-Keynesian long-run theory of the firm (Penrose, 1959) (Lavoie, 2009, Chap. 2). The Penrose effect is a *dynamic* effect which does not stipulate rising costs as firm output increases at any given point in time.

In other words, though "diminishing marginal utility of consumption" which generates "U" shaped indifference (convex) curves and downward sloping demand curves (because consumers derive less and less satisfaction or "utility" as they purchase more of a commodity, they will increase their "quantity demanded" only if relative prices of the commodity decline) arguably makes some sense as describing one aspect of consumption behavior, "diminishing marginal productivity" which generates (eventually) upward sloping (convex) supply curves (since average costs per unit increase, profit maximizing suppliers will only produce more if sales prices increase) does *not* generally describe *any* characteristic of production.[13]

Rather *diminishing marginal productivity* (DMP) is an a-historical and *ideological artifact* based on "fixed" rather than "produced" means of production (Sraffa, 1960) (Nell, 1996) (Lee, 1998). It stems originally from Ricardo's analysis of rent on increasingly less fertile land and became a central principle after Alfred Marshall developed the now standard *increasing costs* SDM formulation, though Marshall himself was careful to specify that this was one possible type of industry cost configuration along with *decreasing cost* and *constant cost* possibilities (Marshall, 1890, Book IV, Chap. 13).

Both Ricardo and Marshall were analyzing 19th century agricultural and manufacturing conditions with limited technology and excess capacity in manufacturing, often dependent on work teams whose output could not easily be expanded without loss of efficiency (Nell, 1998, Chap. 1-2, 9) Of course, even in post-industrial 21st century economies some sectors like

[13] For an outline of a more comprehensive and realistic theory of consumer behavior see (Lavoie, 2009, Section 2.1).

agriculture, natural resource extraction, capital goods production, and *exchange* (rather than production) markets such as financial markets, may have binding short-term supply constraints and consequent upward sloping cost and/or supply curves. "Fictitious commodities" like labor that (like land) are *not produced for the market* may also, *when there are shortages*, exhibit upward sloping and even backward sloping supply curves.

However, most manufacturing and service sectors in advanced economies have excess capacity and *produced* or *slack* inputs (like labor for which an excess "reserve army" of unemployed generally exists) whose supply can be expanded without increasing (but possibly reducing overhead and fixed) costs per unit.

Why then is NC economics so wedded to the 19th century DMP principle?

The answer is clear. Without short-run, or long-run, DMP, there can be no upward sloping supple curve and price setting devolves to a mark-up on production costs. None of the a-fore mentioned a) – c) SDM outcomes will occur.

The (Mostly Real) Demand and Cost Story

As has been noted, though it is ubiquitous in economic texts, an independent supply curve does not exist for most of the economy. Rather, as is well known, supply curves exist only for firms in

so-called "perfectly competitive" markets where normal production occurs where *upward* sloping marginal cost both *exist* and *exceed* total average costs. These are the only cases where a supply curve (equal to the marginal cost curve) can exist. Approximate examples may occur in a few specialized markets: such as some agricultural or natural resource markets: where prices are set globally, individual producers are small relative to the global market and can sell as much as they can produce at the global market price, and incremental costs of production rise as production increases; and barter markets, such as financial trading markets, where equilibrium prices for offers and bids of financial products are reconciled. *With the exception of these special cases, in the rest of the production economy, firms set prices and levels of production based on costs and demand.*

The real demand and cost model (DCM) that characterizes most markets in the economy is as follows.

Almost all firms have some *market power* in the sense that they face a downward sloping demand curve. This implies that the amount of product that they can sell depends on a price over which they have some power to set based on competitive conditions in their market and their long-run marketing and production strategy. "Monopolistically competitive" firms (in markets where a large number of firms compete but each firm has some price setting power, for example in retail trade) may have only *local* market power with very limited price and quantity ranges based on their locational convenience to customers. "Oligopolistic" firms (in markets where a small number of firms have dominant market shares and determine price ranges and major product design for the entire industry, for example automobile or smart phone producers) may

face demand curves with steeper slopes and more flexible price and quantity ranges that are still limited by competition. “Monopoly” firms (in markets with only one producer, for example regulated utilities or drug companies with patents) have complete (hopefully subject to some regulation) freedom to set prices and quantities (Allen, et. al., 2013, Chap. 7).

All firms also face average total cost curves which are generally flat or slightly downward sloping in their normal range of production (Lavoie, Chap. 2) (Lee, 1998). The firm to stay in business these cost curves much be *below* the demand curve in normal production ranges.

How are prices and quantities set?

Firms will generally apply a “mark-up” over costs that will demand on how much they want to sell and on their long term strategy. If they want to sacrifice short-term profits to increase market share over the long run they will keep prices relatively low. If they want to maximize short-term profit and don’t care about market share they will keep prices high. For a useful “heuristic” introductory story assume a linear downward sloping demand curve:

$P = a - bQ$

Where $a > 0$, $b > 0$ are both constant vertical intercept and slope parameters, and P and Q are price and quantity demanded along the demand curve. Assume also a constant Average Total Cost = Marginal Cost curve: C that is lower than P in the normal range of production. Under

these conditions short-term profit will be maximized when (see final section for a simple introductory economics derivation that shows that the D&C model is based on):[14]

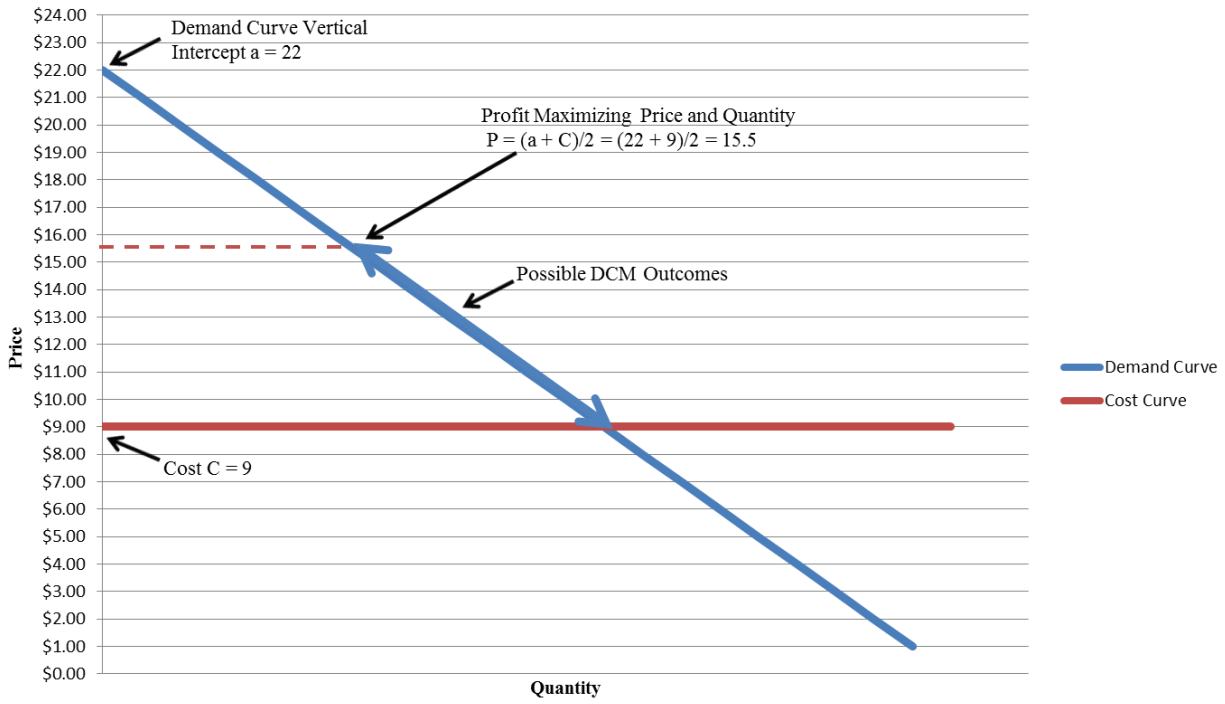
$P = (a + C)/2$

An unregulated Monopoly firm can maximize its short-term profit by setting its price at this level. For all other firms this will be an *upper bound on price* as any higher price will both reduce demand *and* profit. Firms will therefore set a price Q that is between (a + C)/2 and C, with a range of production Q between (a – C)/2b and (a- C)/b.[15] As noted, the exact price that firms set within this range will depend on competition and firm strategy. *The amount that firms produce, or "quantity supplied" will adjust to the level of demand at the price selected by the firm along the demand curve.*

[14] Total Revenue (TR) = $aQ - bQ^2$, so that Marginal Revenue (MR) = a – 2bQ. As MC = C is below P = a – bQ, MR will intersect C from above at the short-term profit maximizing point where MR=MC. At this point a – 2bQ = C, so that Q = (a – C)/2b. (Note that a – C > 0 by assumption that the demand curve is above the cost curve in usual production range.) This implies that the profit maximizing price is P = a – b (a – C)/2b = (a + C)/2. See Appendix for a (no- calculus prerequisite) introductory economics proof of this.

[15] Op. cit. When P = (a + C)/2 then Q = (a – C)/2b. When P = a – bQ = C then Q = (a – C)/b.

Figure 5.7: Demand and Cost Model (DCM) Possible Price and Quantity Outcomes



All of the SDM stories regarding shifting demand and supply curves should more realistically be presented using DCM analysis.

For example if the *demand* curve shifts to the *right* due to, say increased incomes (as with SDM exercises assume a parallel shift) there will be "surplus quantity demanded" at the starting equilibrium price. The rightward shift of the demand curve will cause the intercept term to increase: a' > a. The producers' *upward* bound on *price* will thus *increase*: (a' + C)/2 > (a + C)/2 as will its *lower* bound on quantity produced Q as (a' – C)/2b > (a – C)/2b. Its *lower* bound

on *price* will remain *constant* at C and but the *upper* bound on *quantity produced* corresponding to this price will *increase* as $(a' - C)/b > (a - C)/b$.

Depending on external competition, internal (to the firm) power relations and structure (vis a vis unions, management, shareholders, etc.) and long-term firm strategy, producers will either increase output at the same, or moderately higher, price to gain higher long-term market share in response to the increased demand, or raise prices more significantly so as to obtain higher profits and/or wages but cause quantity demanded to decline back toward its initial starting level as consumers to lower their demand and move down the demand curve in response to the higher price. The shift in demand will thus result in a new *higher* equilibrium quantity *and/or* price. The opposite will occur if the demand curve shifts down (left) instead of up (right).

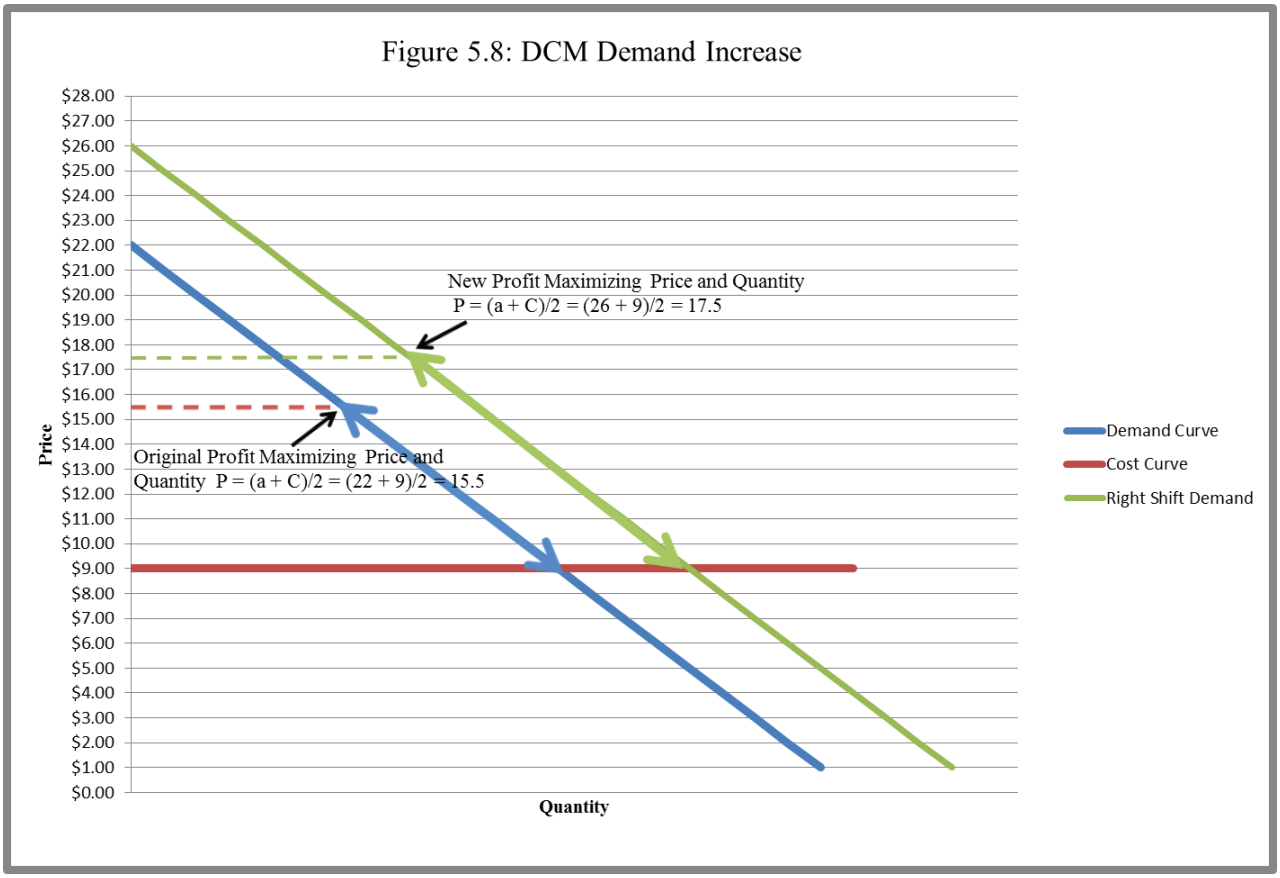
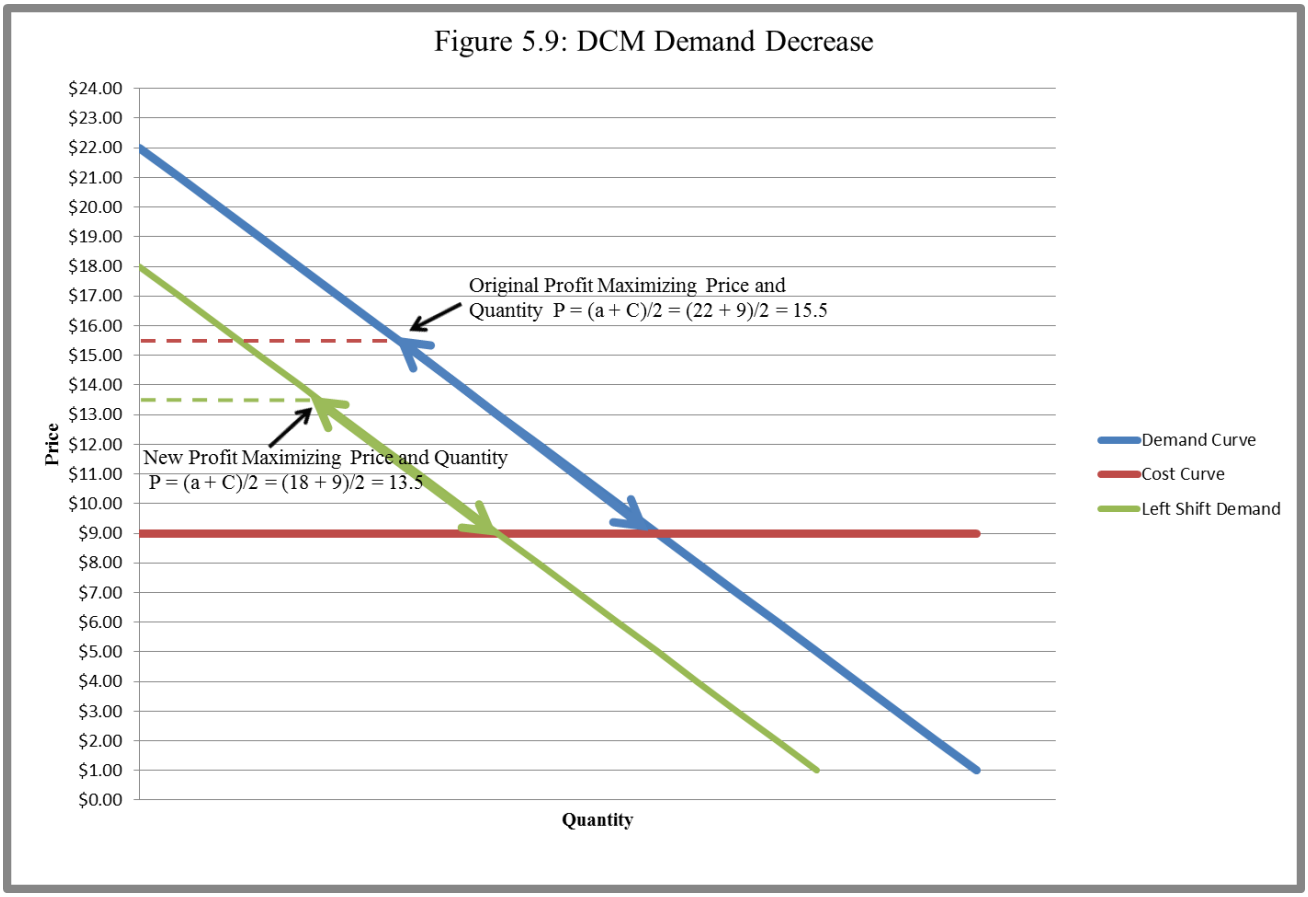


Figure 5.8: DCM Demand Increase
$28.00
$27.00
$26.00
$25.00
$24.00
$23.00
$22.00
$21.00
$20.00
$19.00
$18.00
$17.00
$16.00
$15.00
$14.00
$13.00
$12.00
$11.00
$10.00
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Price
Quantity
New Profit Maximizing Price and Quantity
P = (a + C)/2 = (26 + 9)/2 = 17.5
Original Profit Maximizing Price and
Quantity P = (a + C)/2 = (22 + 9)/2 = 15.5
Demand Curve
Cost Curve
Right Shift Demand



If on the other hand the *cost* curve shifts *down* due to say increased productivity reducing the cost of production C' < C, this will cause the producers' *upward* bound on price (a + C')/2 < (a + C)/2 to *decline*, and its' corresponding *lower* bound on quantity produced to *increase* (a – C')/2a > (a – C)/2a. It will also cause its *lower* bound on price C to *decline* as C' < C and corresponding *upper* bound on quantity supplied to *increase* as (a – C')/b > (a – C)/b. As before, depending on external competition and internal power-relations and structure, as well as long-term firm strategy, producers will either *pass through* the lower costs to consumers in the form of lower prices and *higher* quantity supplied, or lower price less or not at all without increasing production as much. In general, a shift down in costs will could result in a *higher* quantity and/or *lower* price but may not. The opposite will occur if the cost curve shifts up instead of down.

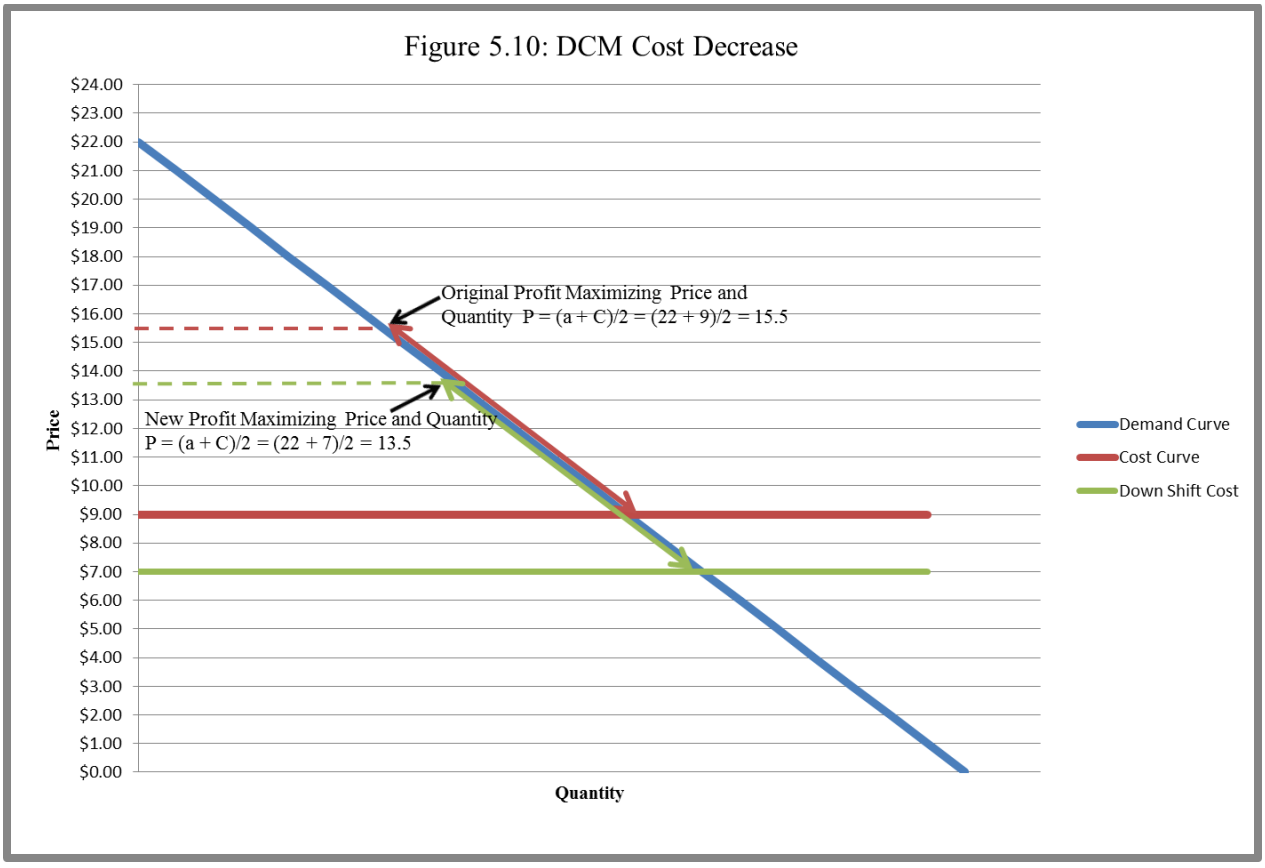
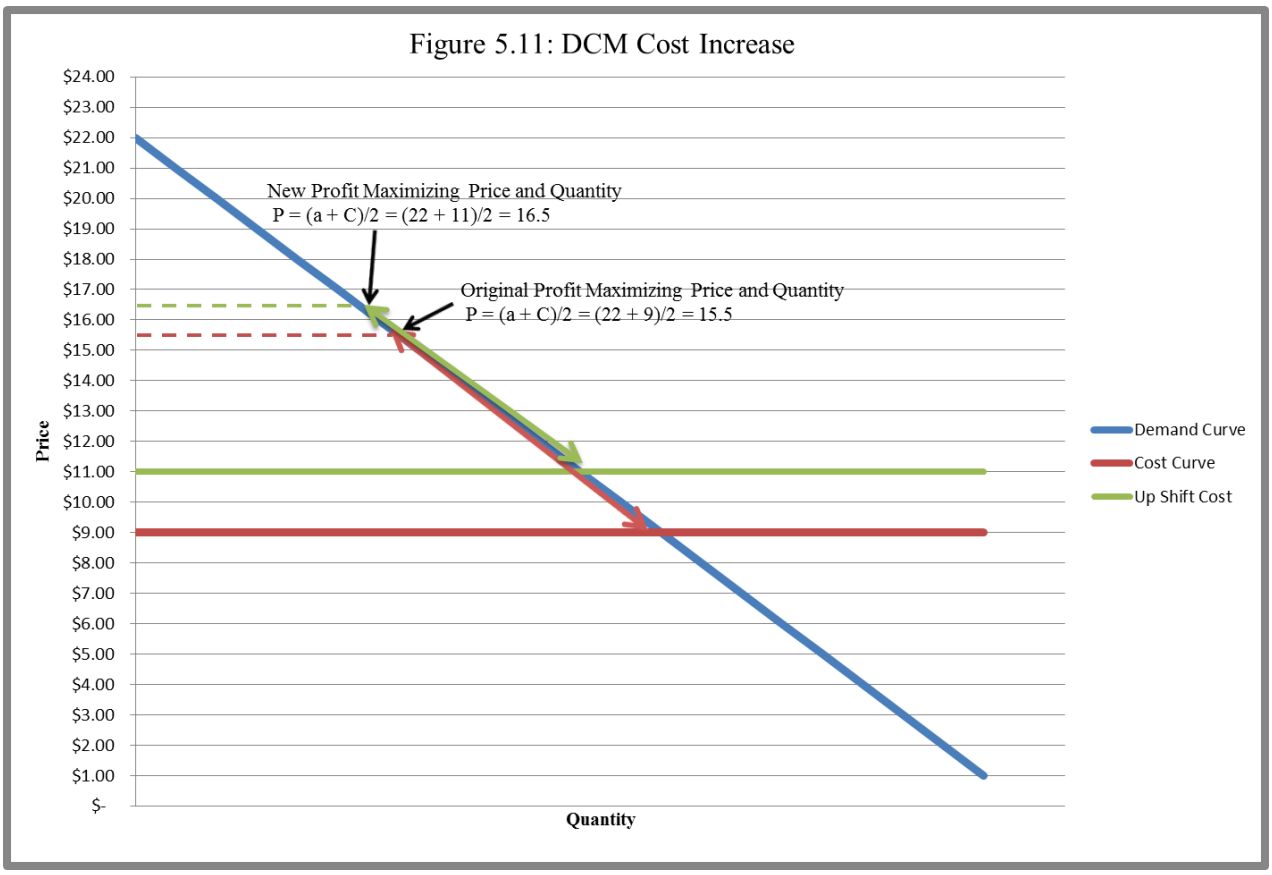


Figure 5.10: DCM Cost Decrease
$24.00
$23.00
$22.00
$21.00
$20.00
$19.00
$18.00
$17.00
$16.00
$15.00
$14.00
$13.00
$12.00
$11.00
$10.00
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Price
Quantity
Original Profit Maximizing Price and Quantity P = (a + C)/2 = (22 + 9)/2 = 15.5
New Profit Maximizing Price and Quantity P = (a + C)/2 = (22 + 7)/2 = 13.5
Demand Curve
Cost Curve
Down Shift Cost



As is evident from these examples, the *qualitative* prices and quantities outcomes of the DCM are the *same* as those of the SDM. But the DCM does *not precisely specify* how much, if any, price change will accompany quantity supplied change when the demand curve shifts, and similarly, whether, and if so how much, price or quantity supplied change will occur when the cost curve shifts. Most importantly, as will be discussed below, the DCM suggests, and empirical data confirm, that market clearing quantity supplied and demanded is fundamentally determined by *demand* conditions, most often by firms simply increasing or reducing output to match demand with no, or very little, change in price.[16] However, for introductory textbook

[16] See for example (Hill and Myatt, 2010, p. 57) note that in a survey of a representative sample of 200 non-agricultural firms in the U.S. (Blinder et. al., 1998) found that: a) almost all of the firms in the sample were "price-makers" (as in the DCM) rather than "price takers" (as in the SDM), and b) though prices were periodically reviewed they were not determined instantaneously by supply and demand as (p. 298):

> "….the median number of price changes for a typical product in a typical year is just 1.4 and almost half of all prices change no more than once annually. Among firms reporting regular price reviews, annual reviews

purposes both models provide and explanation of the workings of demand and cost, or "supply," on price. Admittedly the DCM model does not offer as clean and unambiguous an answer, but *qualitatively* both at least point to the same possible outcomes in terms of price and quantity changes. Given that the DCM story offers a realistic approximation of reality, whereas the SDM is an utter fantasy that posits a curve that in most cases cannot be defined, why do introductory economics textbooks almost universally stick with the SDM? Yes, the SDM story is pedagogically simpler to explain but it's also *patently untrue*, and the DCM model, though a bit more complex, is well within the reach of introductory students. If economics is to maintain its claim to be a "social *science*," shouldn't it be in the business of teaching about *reality* and not purveying *fairy tales*?

It is hard not to conclude that the major reason for the ubiquitous appearance of the SDM in economics textbooks that it legitimates the PCFM ideology of NC economics as discussed at length in previous chapters. Most critically, instead of showing that economic outcomes in capitalist market economies gravitate toward a social welfare maximizing, stable, market clearing equilibrium that is perfectly determined by natural conditions and individual choice, the DCM shows that price and quantity outcomes in market economies are: *subjectively determined, socially embedded, mostly quantity, choices that reflecting institutional and class power constrained by objective conditions, that result in unstable and generally socially non-optimal equilibrium price and quantity outcomes*, as:

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were by far the most common. At the other end of the spectrum, only about 10 percent of all prices change as often as once a week, and about 7 percent of all firms schedule price reviews at least weekly."

a) Equilibrium prices are *not precisely* determined as in a mechanical clock by objective (or exogenous to the model) forces of nature, technology, and individual agent choice, but rather are a product of *external social and market, and internal to the firm, institutional power and strategy*, that results in a *selection* of prices and quantities from a *range* determined by demand and cost conditions. Rather, empirical studies show that firms mostly *change output levels in response to demand* with little change in price, and are unlikely (given that almost all firms in advanced economies have some market power to set prices) to fully "pass through" cost changes to consumers.[17] As Polanyi (1944) long ago was at pains to point out, markets are *embedded in* and *products of* society rather than a natural, or objective, a-political technocratic mechanism to which society must adopt. Market equilibrium prices and quantities are thus *not perfectly determined* but rather *are selected from a range* given by demand and cost conditions resulting in active *firm adjustments* of q*uantity supplied* to *quantity demanded* and occasional price changes. These "equilibrium" quantities and prices are thus not objective but *subjective* products of social governance, class power, and firm strategy that are only partially influenced by cost and individual consumer choices that are themselves constrained and molded by class, culture, and marketing (Hahnel and Albert, 1990).

[17] For example (Hill and Myatt, 2010) cite a comprehensive study of 200 representative non-agricultural firms in the U.S. by (Blinder, et. al., 1998) which finds that:
"…., we took it for granted that almost all the firms in our economy are price-makers rather than price-takers – an assumption amply justified by the survey responses' (ibid.: 12)."
And that:
"First, the evidence gathered in this study emphatically supports the mainstream [*but not the SDM*] view that sticky prices are the rule, not the exception, in American industry. According to our respondents, the median number of price changes for a typical product in a typical year is just 1.4, and almost half the prices change no more often than annually. Among firms reporting regular price reviews, annual reviews are by far the most common. At the other end of the spectrum only about 10 percent of all prices change as often as once a week, and only about 7 percent of all firms schedule regular price reviews at least weakly.(ibid.: 298)." [*brackets and italics mine*]. See also empirical data surveyed in (Lee, 1998).

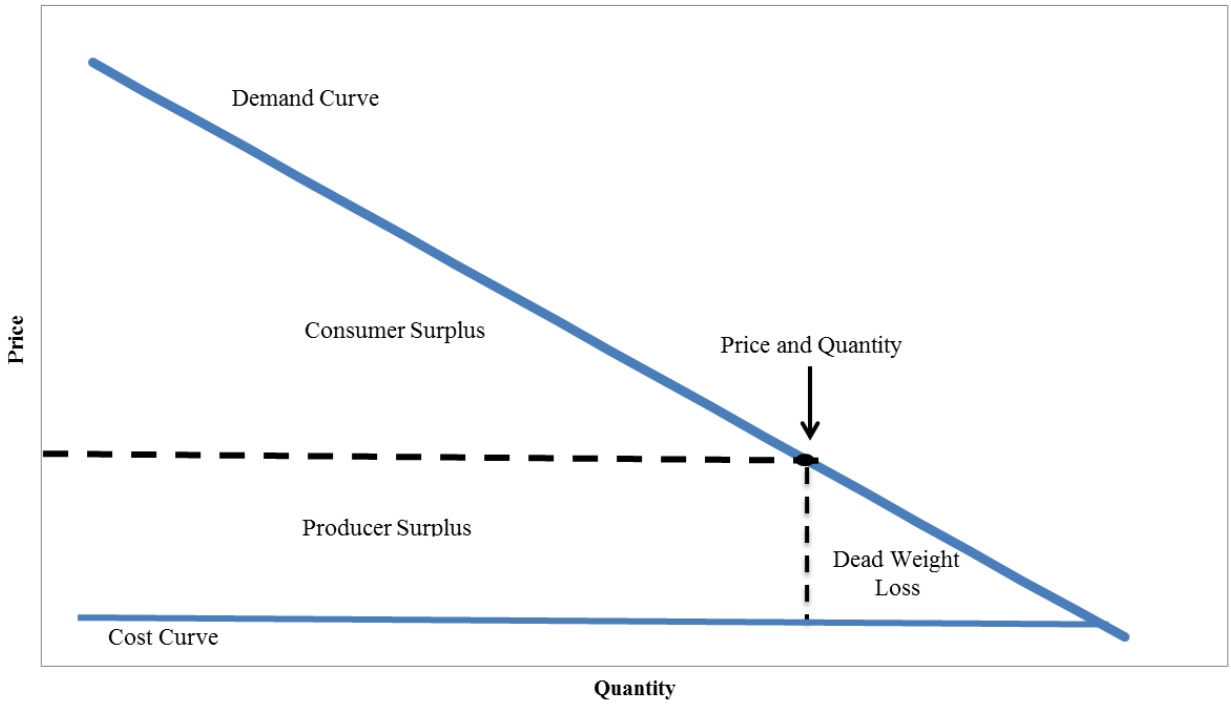
b) The equilibrium so obtained is *not* necessarily a "self-correcting" stable equilibrium as it results from *shifting demand curves* rather than *shifts along fixed* demand and supply curves. If multiple firms adjust output in the same direction, firm output decisions will impact income streams causing shifts in demand curves that will lead to a *multiplied* reduction or increase in output moving the market farther and farther away from its initial equilibrium position. The new equilibrium will clear product markets at the new lower or higher levels of "effective" (backed up by spending) quantity demanded (that, depending especially on income distribution, may have little relationship to actual or optimal levels of *social* output or *needs*) but this new equilibrium, like the old one, will *not* be stable or *clear* labor or capital markets. A "free" market equilibrium is thus fully compatible with high levels of unemployment, unutilized capacity, and unmet social and individual need that could be satisfied if social resources were fully employed.[18]

c) For the reasons discussed above, and because the DCM equilibrium does *not* occur, as in the SDM, at the point of intersection of the supply and demand curves, the DCM equilibrium is *not* generally welfare optimal in either the static NC "Pareto Optimal" sense, or the more general Keynesian sense of fully employing underutilized resources.[19] Thus the DCM supports a Post-Keynesian or Keleckian understanding of the modern capitalist market economy and fundamentally *undermines* Adam Smith's "invisible hand" doctrine and with it "objective scientific" support for the Walarasian cornerstone ideology of NC economics.[20]

[18] This was one of (Keynes, 1936) central points that will be elaborated upon extensively in later chapters.
[19] In the later part of this text we will show that more advanced, and widely used "applied microeconomic," generalizations of the SDM can be similarly shown to be social welfare *reducing* rather than optimizing.
[20] See schools of economic thought discussion in (Baiman, 2016, Chap. 3).

d) For a heuristic demonstration of the point above note that though CS and PS can be defined in a DCM model as in the SDM (see Figure 5.6 above), in the DCM the *optimal* equilibrium point maximizing CS plus PS would be a zero profit price where PS = 0 and CS is maximized as in Figure 5.12 below. Thus the DCM shows that the social welfare of static allocation is dependent on the *relative power* of the final producer. The less power the final producer has to set prices above costs, the greater the immediate social welfare benefits from allocating current production. Of course, immediate benefits from consumption are not the only goal of economic output, but CS and PS analysis using the DCM accurately shows that question of what proportion current resources should be devoted to widespread current benefit (CS) and what proportion should be devoted to producer profit and depreciation, investment and growth (PS), is fundamentally a *social and political* decision.

Figure 5.12: DCM Consumer and Producer Surplus and Dead Weight Loss



Finally, it should be noted that though the discussion above has been limited to showing why the ubiquitous introductory economics SDM should be replaced by the DCM,

Appendix: Introductory Economics (No Calculus Prerequisite) Proof of Profit Maximizing Price and Output with Linear Demand and Constant Costs

Assume a linear demand curve of the form:

$P = a - bQ$

Where P is price, a is the vertical intercept, b is the slope, Q is quantity demanded, and all are positive numbers. Based on this demand curve, any *increase* ΔQ in Q will be a result of a *decline* $-\Delta P$ in P equal to $-b\Delta Q$:

$-\Delta P = -b\Delta Q$

where both ΔQ and ΔP are positive numbers.

The Total Revenue (TR) curve for such a demand curve will be:

$TR(Q) = P \times Q = aQ + bQ^2$

For this particular curve it is relatively easy to calculate ΔTR, or how much more revenue could be obtained from a small increase in $h>0$ in quantity demanded from any existing level of quantity demanded Q_0. This will be:

$\Delta TR(Q_0,h) = TR(Q_0 + h) - TR(Q_0)$

$= a(Q_0 + h) + b(Q_0 + h)^2 - aQ_0 - bQ_0^2$

$= aQ_0 + ah + bQ_0^2 + b2hQ_0 + bh^2 - aQ_0 - bQ_0^2$

$= ah - b2hQ_0 + bh^2$

If we define the slope of TR for any value of quantity demanded Q_0, or the incremental TR that can be obtained from a very small increment in quantity sold h, per unit quantity sold, as Marginal Revenue (MR) at Q_0 for a small increment h in quantity demand, or $MR(Q_0,h)$, then:

$MR(Q_0,h) = \Delta TR(Q_0,h)/h = (ah - 2bhQ_0 + bh^2)/h = a - 2bQ_0 + bh$

So that by setting $h>0$ to very small, $MR(Q_0,h)$ can be close as we want to: $a - 2bQ_0$.

In mathematics this would be described as:

The limit of $\Delta TR(Q_0,h)/h$ as h goes to zero is $a - 2bQ_0$.

Or alternatively, since this is true for every value of Q, the MR curve for any linear demand curve $P = a - bQ$ is:

$MR(Q) = a - 2bQ$

A linear curve with the same vertical intercept as the demand curve, but with twice the negative slope -2b, instead of –b.

This implies that the MR curve will drop exactly twice as fast as the demand curve, meaning that the horizontal side, or "run", of any right angle triangle built on the MR curve, will be exactly half the length of the vertical side, or "rise", of the same triangle. In Figure A1 below, this means that the "run", or side AB, of triangle FAB, is exactly half the size of the "run", or side AC, of triangle FAC. Therefore AB = BC as is indicated in Figure A1.

The MR curve is useful as it gives the incremental revenue that can be made by making and producing one more unit of output. As long as MR is greater than the cost of producing this additional unit of output, profit will increase. In Figure A1 below, the unit cost of production is constant (= $9.00) so that as long as the MR curve is above the cost curve more profit can be made. Since the MR curve cuts the cost curve from above, the profit maximizing quantity occurs at the intersection of the MR and Cost curve, at quantity G, and price D.

Since AB = BC and DE = AB, the triangles FDE and EBC are congruent. Therefore FD = EB, and since DA = EB, FD = DA. The profit maximizing price D (=$15.50) therefore occurs at half the distance between F and A, i.e. P = (a + C)/2 as indicated in Figure A1.

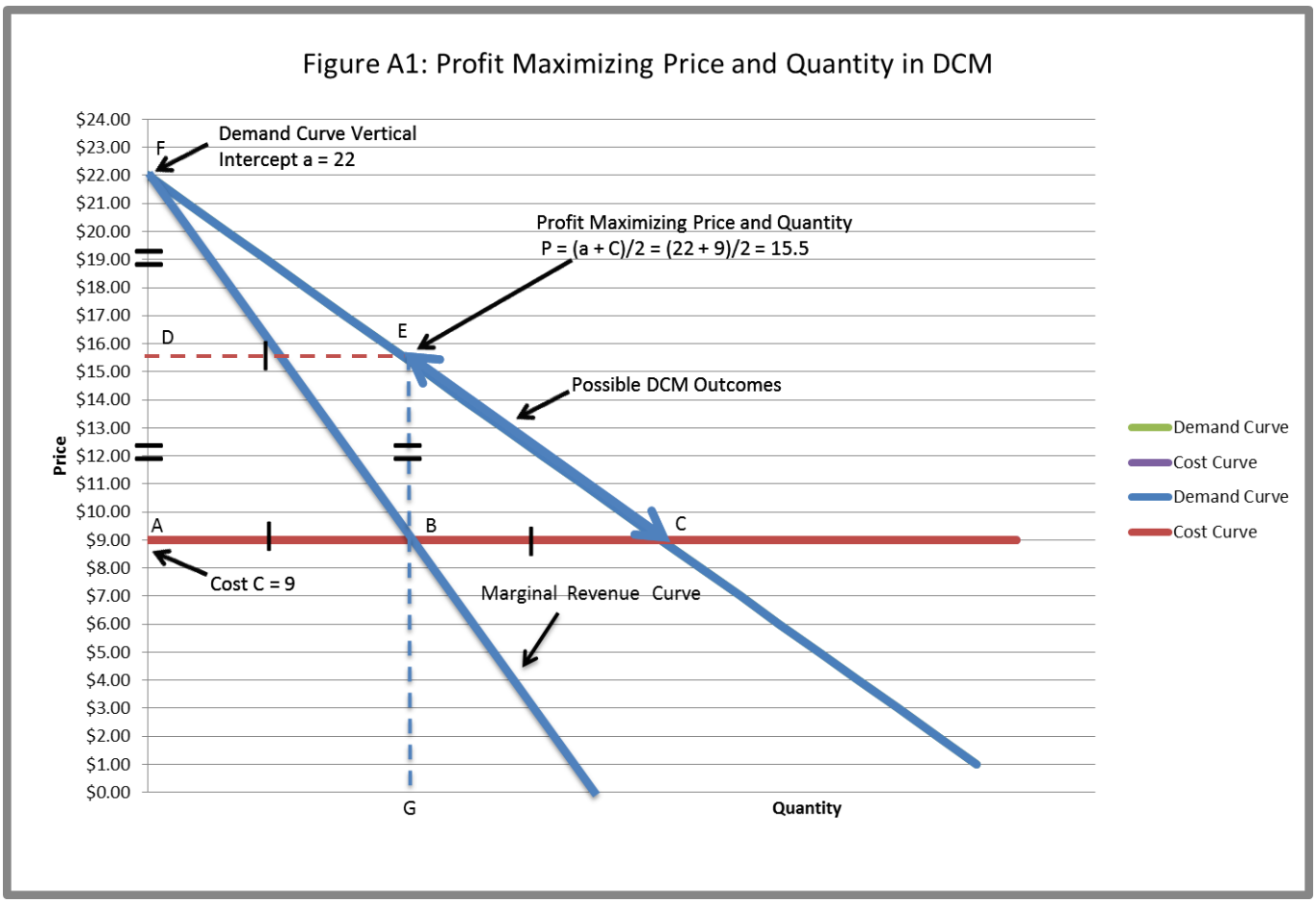


Figure A1: Profit Maximizing Price and Quantity in DCM
$24.00
$23.00
$22.00
$21.00
$20.00
$19.00
$18.00
$17.00
$16.00
$15.00
$14.00
$13.00
$12.00
$11.00
$10.00
$9.00
$8.00
$7.00
$6.00
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Price
F
Demand Curve Vertical
Intercept a = 22
Profit Maximizing Price and Quantity
P = (a + C)/2 = (22 + 9)/2 = 15.5
D
E
Possible DCM Outcomes
A
B
C
Cost C = 9
Marginal Revenue Curve
G
Quantity
Demand Curve
Cost Curve
Demand Curve
Cost Curve

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