Introduction

Now that we have discussed scarcity, production possibilities, economic interactions, and market equilibrium, we now turn our attention to what happens inside the business sector. This chapter explores competitive markets; chapter 6 discusses monopoly. We will explore the workings of the household sector in chapter 7. The business sector is composed of **firms** that purchase the services of factors of production owned by the household sector through **factor markets** and transform flows of land, labor, capital, and entrepreneurial services into **final goods and services,** which they sell in **the product market**. The goal of the firm is to maximize **profit**, which is the difference between the revenue earned from selling goods and services, and the **opportunity cost** of the input services used to produce those commodities. Business firms can be organized as **proprietorships** (the owner is responsible for all costs and receives all profits), **partnerships** (each partner is liable for all costs and receives a share of profit), and **corporations** (entities which can incur their own costs, limiting the liability of owners (shareholders) who share profits (in the form of dividends).

Production and Cost

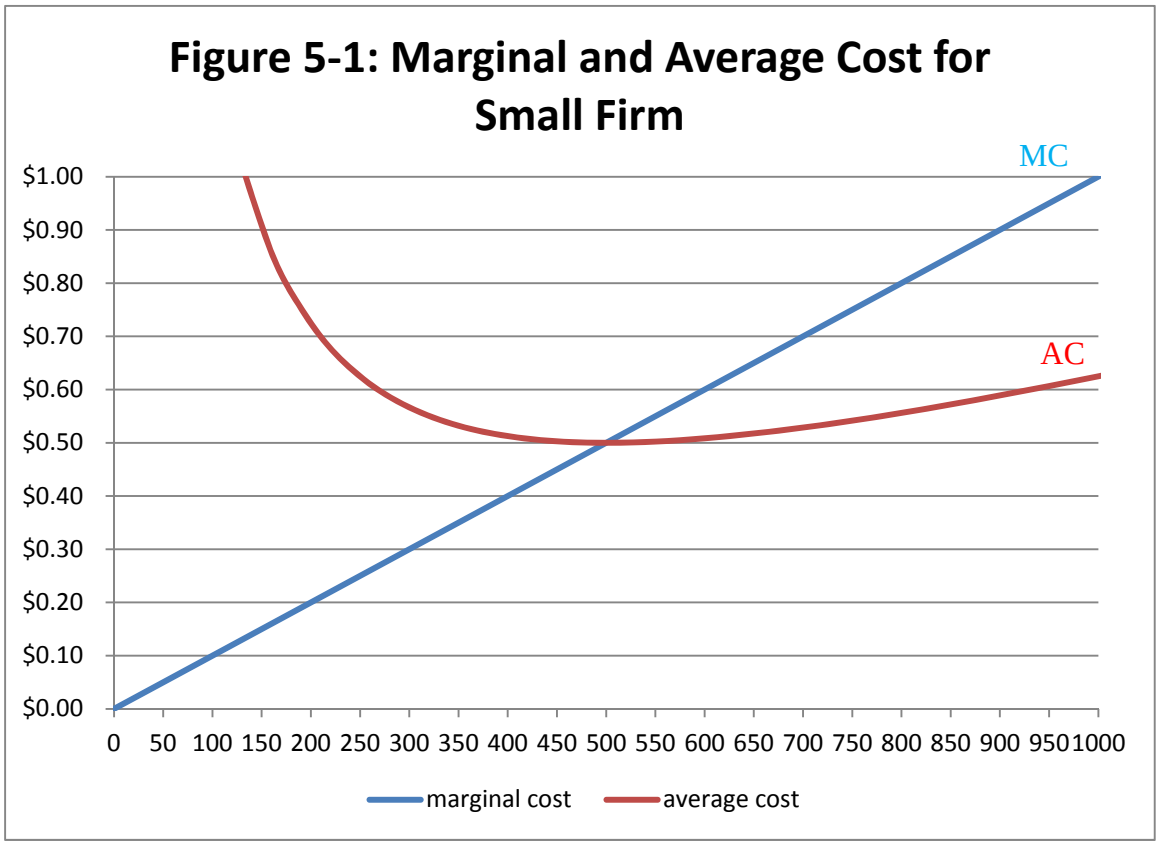
In chapter four we derived the firm's supply curve from its attempt to maximize profit. The *price-taking* firm maximizes its profit by producing that rate of output for which marginal cost equals price. Marginal cost is the cost of producing the last unit of output. In Table 5-1 we return to the apple orchard example of chapter 4. The marginal cost of apples is given by the linear equation $MC = 0.001q$, where q is the daily harvest of apples. The variable cost is the sum of the marginal cost for all the apples produced. Since marginal cost begins at \$0, the shutdown price is also zero. In addition to the variable cost of labor we add the overhead of \$125 per day, to cover the mortgage (\$50/day) on the orchard and Johnny Appleseed's foregone wage (\$75/day). Producing nothing would produce zero revenue and zero variable costs, but having to pay overhead means a loss of \$125 per day. As output expands, average costs decline as overhead is spread over more units, even though marginal cost rises with output. Producing 50 apples generates variable costs of only \$1.25. Fixed costs and variable costs generate total costs of \$126.25. Dividing total cost by 50 yields the average cost of AC = \$126.25/50 = \$2.53. Since fixed costs occur even if output is zero, the cost of *producing* 50 units of output is only \$1.25, not \$126.25. As output expands, average costs decline as overhead is spread over more units, even as marginal cost continues to increase. When output reaches 500 units, average fixed costs have reached \$125/500 = \$0.25, and average variable costs have risen to \$0.25. Average costs (the sum of average variable costs and average fixed costs) reach their minimum at this rate of output. This is no accident, because when $q = 500$, $mc = ac$. Since marginal cost is the change in the last unit, average costs decline when $ac > mc$; marginal costs pull average costs down. On the other hand, above $q = 500$, marginal cost exceeds average cost ($mc > ac$) and marginal cost pulls average cost up. It follows that when marginal cost equals average cost, average cost is neither increasing nor decreasing; when $ac = mc$, ac achieves its minimum value.

Rate of Output	Fixed Cost	Variable Cost	Marginal Cost	Average Cost
0	$125	$0.00	$0.00	∞
50	$125	$1.25	$0.05	$2.53
100	$125	$5.00	$0.10	$1.30
150	$125	$11.25	$0.15	$0.91
200	$125	$20.00	$0.20	$0.73
250	$125	$31.25	$0.25	$0.63
300	$125	$45.00	$0.30	$0.57
350	$125	$61.25	$0.35	$0.53
400	$125	$80.00	$0.40	$0.51
450	$125	$101.25	$0.45	$0.503
500	$125	$125.00	$0.50	$0.500
550	$125	$151.25	$0.55	$0.502
600	$125	$180.00	$0.60	$0.51
650	$125	$211.25	$0.65	$0.52
700	$125	$245.00	$0.70	$0.53
750	$125	$281.25	$0.75	$0.54
800	$125	$320.00	$0.80	$0.56
850	$125	$361.25	$0.85	$0.57
900	$125	$405.00	$0.90	$0.59
950	$125	$451.25	$0.95	$0.61
1000	$125	$500.00	$1.00	$0.63
1050	$125	$551.25	$1.05	$0.64
1100	$125	$605.00	$1.10	$0.66

Table 5-1: Production and Cost for Johnny Appleseed's Orchard

Figure 5-1 shows the unit costs for this example. The average total cost curve is U-shaped, declining until MC and ATC intersect, at which point ATC and MC both increase. The point where marginal cost intersects the average cost curve identifies the firm's *break-even* price. Recall from chapter four that when p = $0.50, this firm maximized profit by producing where **marginal cost** equals **marginal** revenue, in this case, 500 units of output. At that output, total revenue equals $250 (price times quantity), variable cost equals $125 (the sum of marginal cost over all units produced), generating a producer surplus of $125. When we subtract overhead from producer surplus, we obtain economic profit. When p = $0.50, overhead exactly absorbs producer surplus, implying an economic profit of zero. This does not mean Johnny Appleseed is destitute. Part of his overhead is the opportunity cost of time; if the market wage for orchard managers is $75 per day, Johnny is able to pay himself exactly what he would earn by working for another employer. Given that Johnny has already passed up jobs with other employers, whether he is able to cover the opportunity cost of his time is irrelevant to his output decision. If the price of apples fell to $0.40, he would reduce his apple production to 400 apples per day. His revenue would fall by $90 ($0.10 less for each of the 400 apples he does produce and $0.50 each for the 100 apples he no longer can afford to produce), while his

(variable) costs decline by only $45, causing an economic loss of $45. Now, after paying his $50 mortgage, he has only $30 to pay his own wage.



The Firm, the Household, and the Market

Figure 5-2 presents a stylized diagram of a typical firm operating in a **perfectly competitive market**. Economists refer to perfect competition as a market in which firms can freely enter a market and produce a standardized or homogenous product. Apple production is a fairly good approximation of a perfectly competitive market. Grocery shoppers rarely inquire about the identity of which orchard produced their apples, although they may distinguish between organic and chemically produced apples.[1] Hence, all apples sell for close to the same price. Further, anyone willing to incur the costs of growing apples can truck them to market and sell them to produce whole-sellers. So we will continue to assume that apple prices are set by the impersonal forces of supply and demand.

In Figure 5-2, the market supply curve and market demand curve for apples intersect at price p_0. Johnny Appleseed, like other apple producers, sets output where marginal cost equals price. In this case he is lucky, since price $p_0 > ac$ at q_i^*, Johnny's profit-

[1] Unless they bring a chemical testing kit to the grocery store, most produce buyers cannot determine if the produce they buy is organically grown. Without government or equally effective private regulation (Wal-Mart often enforces truth in labeling), non-organic producers, who incur lower costs, are likely to fraudulently claim that their chemically grown produce is organic.

maximizing rate of output. His producer surplus (area p_0p_{min}**B)** more than covers his overhead, generating a positive **economic profit.** Because the market is in competitive equilibrium, the Adams family, like every apple-consuming household, is able to purchase as many apples as they want (which is q_j^*), they maximize their consumer surplus (area p_{max}-p_0**A).** In fact, the *perfection* of perfect competition comes from the prediction that when buyers and sellers allocate resources through a competitive market, the market equilibrium price, by maximizing the quantity exchanged, maximizes the sum of total consumer surplus ($p_{max}p_0$**C) plus total producer surplus (**$p_{min}p_0$**C).**

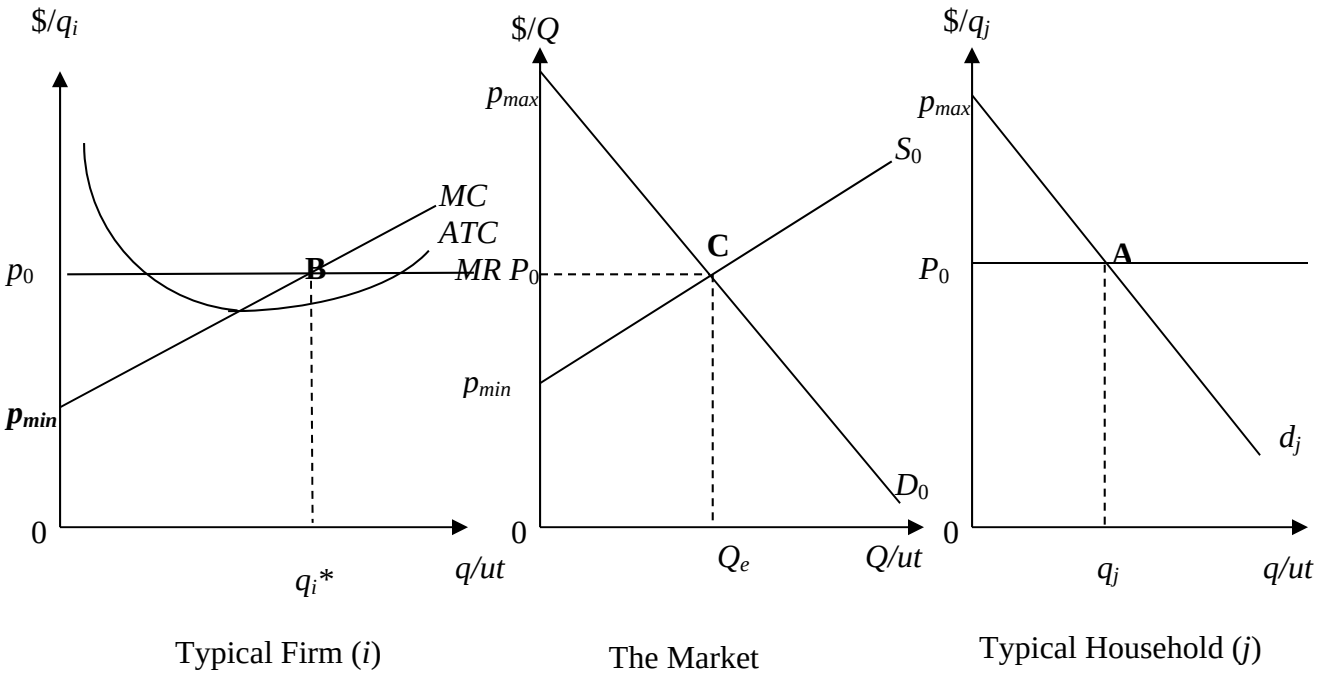


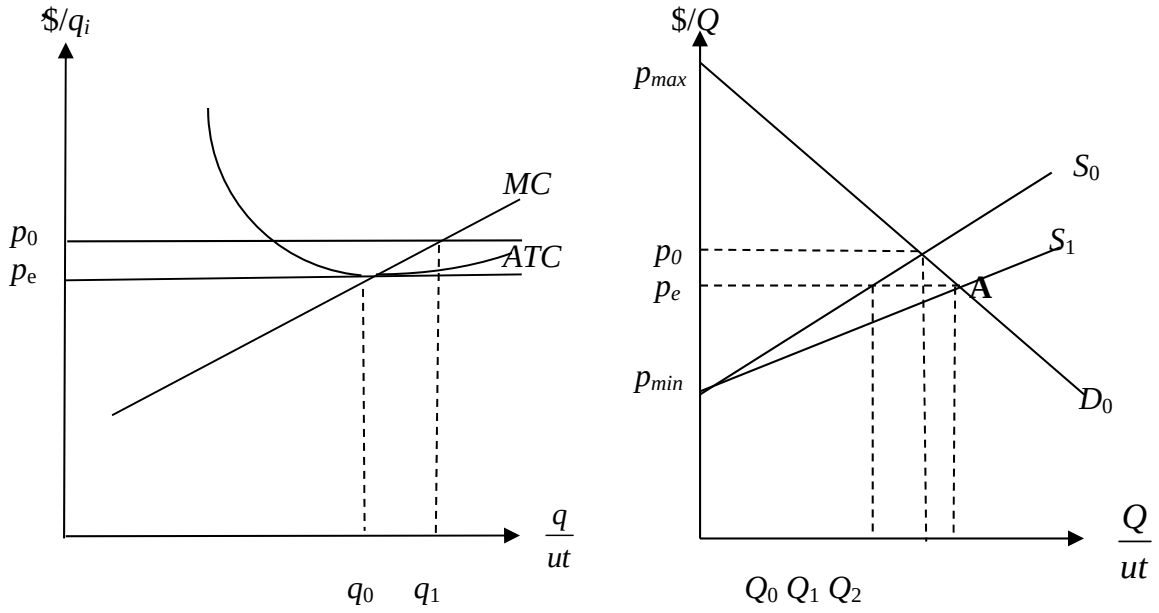
Figure 5-2

Profit Maximization and Market Equilibrium

Long-Run Competitive Equilibrium

Figure 5-2 shows the short-run outcome of a competitive market. In Figure 5-3 we plot the transition to long-run market equilibrium. As in Figure 5-2, the typical firm is earning a positive economic profit at price p_0. However, this outcome cannot last forever. One important characteristic of a competitive market is the free entry of new firms. Recall from Chapter 2 that potential entrepreneurs are always casting about looking for ways of shifting resources to more profitable areas. Positive economic profits in this market mean that the typical firm owner is receiving a higher net income from the resources he or she owns that would be possible in any other market. So it is only a matter of time before proprietors in this market begin to brag to would-be entrepreneurs cruising cocktail parties to find profitable ventures. The result will be an influx of firms into this market, so that the rate of birth of new firms exceeds their rate of death, increasing the number of firms over time.

The short-run equilibrium price p_0 reconciles quantity demanded and quantity supplied for the number of firms in the market at that time. The existence of economic profit signals new firms to enter the market, which has the effect of reducing price to p_e, which is the *efficient* firm's break-even price. Competitive markets use the lure of economic profit to maximize consumer surplus, equal to the area $p_{max}p_eA$**.** The resulting producer surplus, $p_{max}p_eA$**,** equals the sum of all firms' fixed costs.



Typical Firm The Market

Figure 5-3

The idea of long-run equilibrium explains how technological advances spread throughout competitive markets. In Figure 5-4, we start with a competitive market in long-run equilibrium. Suppose the product in question is accounting services and the firms in question are small-scale consulting firms. Initially, the equilibrium price is set at p_0, which is just sufficient for accounting firms to cover their fixed and variable costs in a world of pen-and-ink accounting ledgers. Along come computers, which substantially reduce the cost of accounting services.

If a company does not innovate, its costs of production remain at MC_0 and ATC_0, and the firm receives zero economic profit at price p_0. However, there will be some firms whose supply of pen-and-ink ledgers are fully depreciated and are investigating innovative accounting techniques. If they discover that their average total costs of the new technology are less than their average variable costs with the old technology, the innovation will appear to be a profitable venture. They scrap their ledger book technology and adopt the computerized accounting software. Each (computer-literate) accountant becomes more productive, and the marginal cost curve shifts down from MC_0 to MC_1. At the output q_0, the firm finds that p_0 exceeds the new, lower marginal cost, and so the firm expands output to q_0'. Accounting entrepreneurs flush with new profits expend their

newfound fortunes on throwing parties during which they brag about their fortunes to their stodgy colleagues.

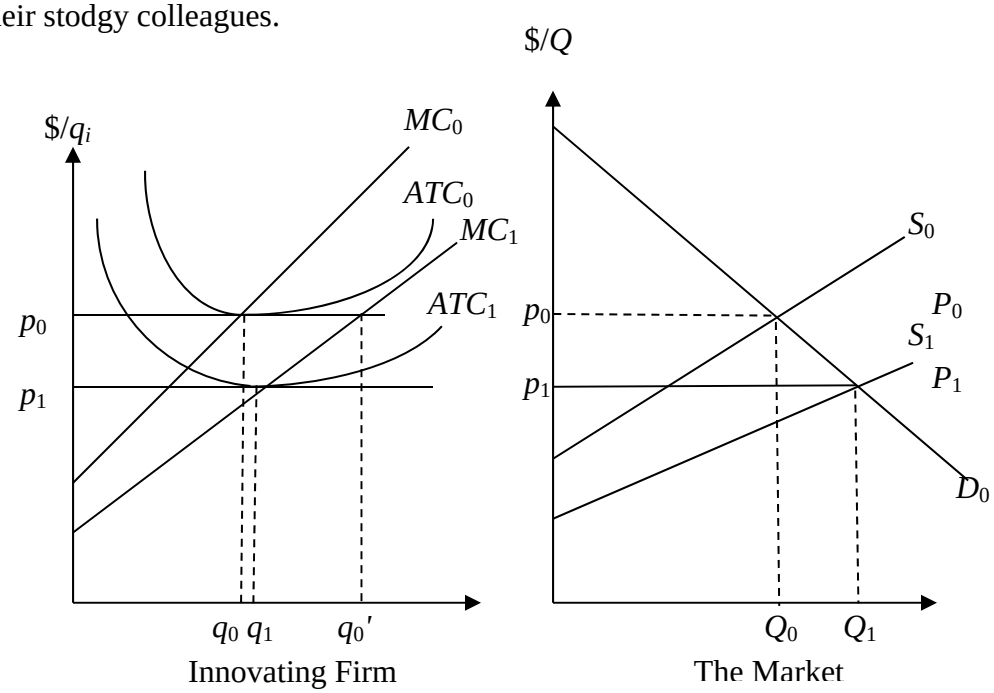


Figure 5-4

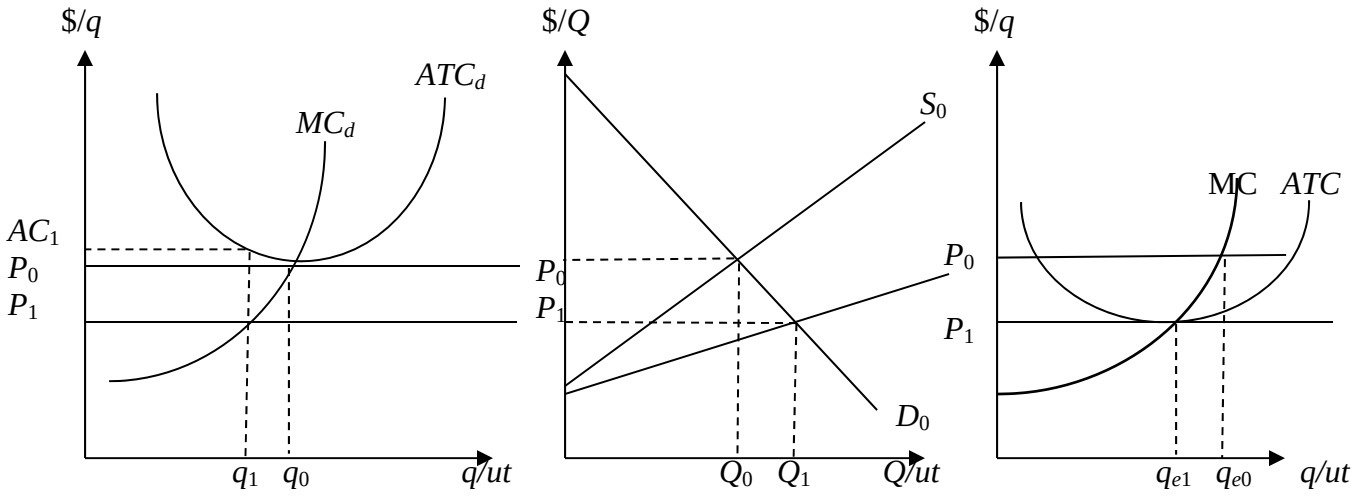
Before long, all firms either adopt the new technology or face extinction. As more firms expand their rate of output, a market glut of accounting services develops. Price begins to fall. Those firms who do not innovate find that price is less than their average costs. Eventually the market supply curve shifts from S_0 (composed of old technology firms) to S_1 (composed of new technology firms). But if long-run equilibrium is to be achieved, then economic profit must be zero for the efficient firm. Hence, price falls from p_0 to the new long-run equilibrium price p_1, and eventually all the benefits of the innovation have accrued to consumers.

Competitive Markets and Employer Discrimination

The events depicted in the previous section illustrate the most important conclusion that economists draw about competitive markets. The free-entry characteristic of these markets implies that at any particular time and place, competitive prices will tend toward their lowest sustainable level: the minimum point on the average cost curve. The prospect of positive economic profits entices producers into competitive markets. Ironically, the process of market entry eliminates economic profit. The market mercilessly favors the efficient and discards the inefficient, whether inefficiency comes from poor timing, lack of foresight, or pursuit of other motives. As we saw in chapter 2, discriminating employers are less efficient and have higher costs than efficient, non-discriminating employers do. In this section we apply this lesson to the competitive market.

In Figure 5-5, Billy Bob Bigot depicted on the left has higher costs of production than does Jacob Ableman. We imagine that the market is in short-run equilibrium at p_0, which is just sufficient for the discriminating firm to earn zero economic profit, while the equal-opportunity firm earns a positive economic profit. Under a regime of free entry,

equal-opportunity firms will enter the market, rotating the market supply curve from S_0 to S_1, until the equilibrium price equals P_1. Both firms cut their output to where P_1 equals their own marginal cost. The equal-opportunity firm now earns zero economic profit, while the discriminating firm experiences an economic loss equal to $q_{d1}(AC_1 - p_1)$. This example helps explain why racial or gender discrimination requires anti-competitive laws, such as the Jim Crow laws in the pre–civil rights South.



Discriminating Producer (Billy Bob Bigot) | Competitive Market | Efficient Producer (Jacob Ableman)

Figure 5-5

This is a point that many non-economists—both political liberals and political conservatives—have difficulty understanding. Competitive markets select against inefficient firms and in favor of efficient firms. Hiring workers on the basis of gender, race, or religion puts firms at a competitive disadvantage. Ultimately discrimination cannot be sustained in a competitive market.

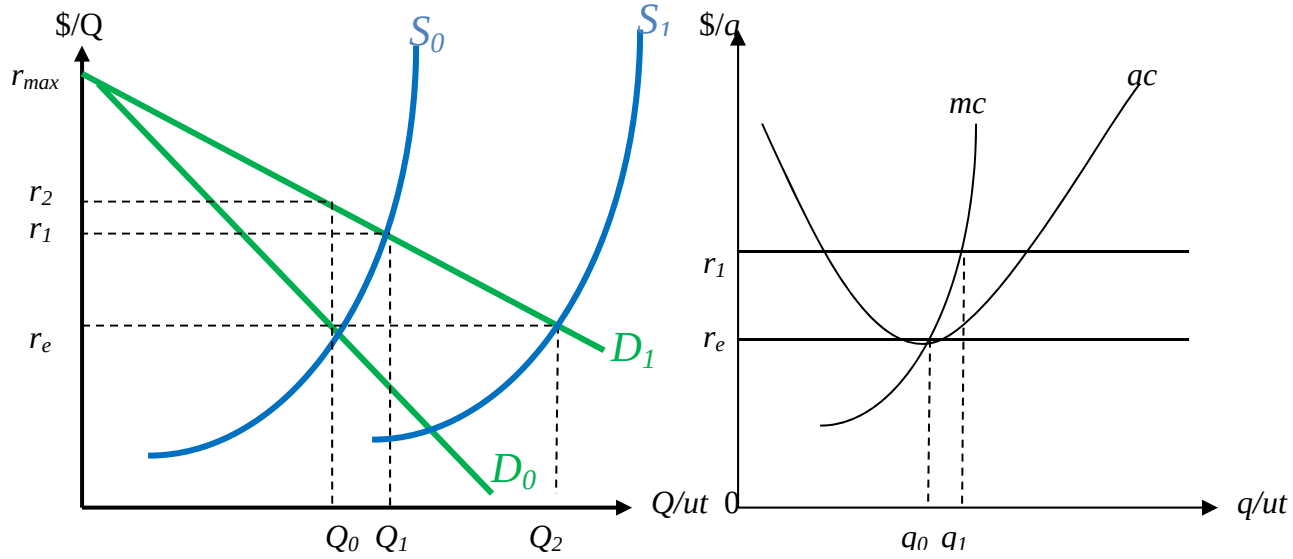
Rent Controls Revisited

Burt Lance of the Carter Administration (1977-1981) is credited with coining the phrase "If it ain't broke, don't fix it."[2] Other liberals would do well to learn this lesson; attempts to improve on competitive markets always turn out disastrously. The market for apartments in a large city is a paramount example of a competitive market. There are a large number of apartment buildings owned by profit-maximizing proprietors. The cost of supplying apartments involves substantial overhead (the mortgage on the building plus the landlord's foregone income on time and money invested in his business). While not actually homogeneous, apartment rents vary predictably by the size and location of the apartment complex. Hence, the typical landlord faces a "U-shaped" average cost curve whose minimum point (where *atc=mc*) identifies the lowest sustainable rent.

Figure 5-6 depicts an apartment market in long run equilibrium, with (average) rents at r_e and equilibrium quantity at Q_0. Now we imagine that the city grows unexpect-

[2] http://www.phrases.org.uk/meanings/if-it-aint-broke-dont-fix-it.html

edly, resulting in a "housing crisis." The increase in demand for apartment units leads to an excess demand at rental rate r_e, causing desperate apartment seekers to bid the average rental rate to r_1, which is the market clearing rental rate for new tenants willing and able to pay this rate. Long accustomed to the former equilibrium, long-term tenants consider r_1 "unfair" (i.e., less for them) and petition the city council to pass rent controls, prohibiting landlords from charging more than r_e. As we saw in chapter 4, rent controls turn a temporary housing shortage into a permanent one. Indeed, tenants find they can sub-lease the Q_0 at rental rate r^*. Ironically, those who sub-lease those apartments pay the clearing rent r_2 which is greater than the equilibrium rent r_1. Rent controls transfer property rights from landlords to the original tenants, who exploit other tenants.



Housing Market Landlord

Now we are prepared to examine what would happen in a competitive housing market in the absence of rent controls. Suppose that an enlightened city council, including one or more economists or social workers educated in economics, reject the rent control proposal and put their faith in the market. Allowing rents to increase to r_1 mean that landlords earn *temporary* economic profit on their units. This leads them to build more units and other landlords to enter the market. The result of additional apartment units shifts the supply curve to the right, creating a (temporary) excess supply of apartments until the equilibrium price (rental rate) returns to the long-run equilibrium level at r_e. The attempt to fix a competitive market – which was not broken – breaks it, causing a housing shortage and a shift in wealth from landlords (who would construct more units) to the original tenants, who pocket the excess rent.

Summary

1. The total cost of production is the sum of the fixed cost and the variable cost.
2. Marginal cost is the cost of producing the last unit of output; marginal cost equals a factor's price divided by its marginal product.
3. Minimum average cost (total cost divided by output) occurs at that rate of output where marginal cost equals average cost. Minimum average cost equals the firm's breakeven point.
4. The price-taking firm maximizes profit by producing that rate of output where marginal cost equals price (marginal revenue).
5. The existence of short-run economic profit encourages more firms to enter the market, increasing market supply and reducing equilibrium price to the lowest sustainable level.
6. The competitive equilibrium maximizes the sum of consumer and producer surplus.
7. A technical innovation creates temporary economic profit that attracts additional firms to the market, increasing supply and reduces long-run equilibrium price to the minimum point on the efficient firm's average cost curve.
8. Since discriminating employers will have higher costs of production than will efficient, non-discriminating firms, a competitive market will eliminate inefficient discrimination over time.
9. Rent controls are undesirable because they are both inefficient and inequitable. Rather than allowing temporary rent increases to generate economic profits, which encourage an expansion of a city's apartment stock, rent controls cause a permanent housing shortage and higher rents for new apartment seekers. Without rent controls, economic profit would increase the supply of units, eventually returning the rental rate to its lowest sustainable level.

Glossary

Economic profit: Total revenue (price times quantity) minus economic (opportunity) cost.

Fixed cost: A minimum purchase requirement that stipulates that the firm must pay certain costs (e.g., rent, mortgages, equipment payments, property taxes), whether it produces any output.

Variable cost: The cost that changes with the rate of output.

Marginal cost: The cost of producing the last unit of output.

Shutdown price: The lowest price necessary for the firm to produce. If the market price falls below the shutdown price, the firm produces zero output, limiting its loss to negative fixed cost.

Price-taking firm: A firm, whose price is set by a competitive market, causing the firm's marginal revenue to equal price.

Profit-maximization rule: The price-taking firm maximizes profit by producing that rate of output where marginal cost equals price (marginal revenue)

Consumer surplus: The difference between the value consumers place on a commodity and the amount they spend to purchase that commodity, depicted as the area below the demand curve and above the market price.

Producer surplus: The difference between the total revenue and total variable cost equal to the area below the market price and above the market supply curve. In long-run competitive equilibrium, producer surplus equals total fixed cost.