15.1 TESTING THE NEOCLASSICAL THEORY OF THE FIRM

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Construct testable hypotheses from the neoclassical theory of the firm
- Test these hypotheses against the given data

Let's review the basic properties of the neoclassical theory of the firm as given in previous chapters ("Cost and Industry Structure," "Perfect Competition," and "Monopoly"). To keep things simple, we'll focus on the short run behavior of a single firm, and we'll look to the similarities of this behavior regardless of whether the market is competitive or monopolistic. First, the firm is portrayed as a functional relationship between inputs (factors) and outputs (products). Because we're considering the short run, there are variable and fixed inputs, and therefore variable and fixed costs.

Second, the firm accepts the demand for its product as given and determines how much it should produce–its quantity of output (Q)–so that its profits are maximized where the cost of producing the last unit equals the revenue from selling it–that is, where marginal cost (MC) equals marginal revenue (MR). We assume that the firm is subject to diminishing marginal returns. Therefore marginal costs will always eventually rise to meet marginal revenue and will cause average total cost (ATC) to eventually rise (giving it its 'U' shape). Hence, the very simple **Hypothesis 1**: over some short-run period, managers are aware of their firms' marginal costs associated with increasing (or decreasing) their production, and they generally find that marginal cost increases over a relevant range of production.

Now, consider the conditions presented in the chapters "Cost and Industry Structure" and "Perfect Competition":

1. If MC < ATC, then ATC is decreasing (marginal cost is 'dragging down' average total cost the same way a low test score would drag down your course grade). Therefore, if ATC is decreasing, it must be the case that MC < ATC.
2. Profits = Q(P-ATC), where P represents price. Therefore, firms make losses when P < ATC, break even when P = ATC, and make profits when P > ATC.
3. Profit maximizing firms under perfect competition produce where MC = MR = P.

We can read these three conditions in reverse to establish a necessary condition for firms to avoid making a loss. Plugging (3) into (2), it should be clear that, since the firm will produce where P = MC, the profit equation can be restated as Profits = Q(MC – ATC) under perfect competition. Hence, if the firm is going to break even or make a profit then MC must be ≥ ATC. Taking this back to (1),

then, for MC to be equal to or greater than ATC, ATC must either be constant or increasing at some reasonable level of output.

Hence, **Hypothesis 2**: if firms maximize profits by producing a quantity where marginal cost equals marginal revenue, then under competitive conditions firms must normally be producing in a situation in which average total cost is either constant or increasing. Really, this is just an extension of hypothesis one which allows us to test our theory by looking at average total costs rather than marginal costs.

TESTING THE THEORY

It is generally held that a developed science should be capable of expressing ideas about how the world works in hypotheses, and that these hypotheses should be compared with actual observations to determine how well the theory explains what we see in the real world. Fortunately (and perhaps surprisingly), a considerable number of studies on both costs and prices have been produced going back over 100 years. Saving the reader a laborious trek through all of them, we'll just look at a couple to test the validity of our hypotheses.

In 1998 Alan Blinder and colleagues published a book, Asking About Prices, which was not actually concerned with microeconomics (it was concerned with testing theories of macroeconomic price 'stickiness'), but just the same can help us test our hypotheses [1]. Their approach was somewhat uncommon to mainstream economics at the end of the 20th century: they simply asked business people about how they did things. For our purposes, their work (see p. 103) sheds light on hypothesis 1. Asking business executives about the shape of their marginal cost curve was apparently a bit tricky. Evidently, most do not normally consider the concept of marginal cost, so the surveyors had to repeat, rephrase, and further explain the question before a response could be given.

And the responses were not encouraging for the neoclassical theory of the firm. Firms representing only 11% of GDP were believed to have upward sloping marginal costs curves. Nearly half reported constant marginal costs, and, almost shockingly, 41% reported decreasing marginal costs (suggesting increasing returns). Evidently, the 'law' of diminishing marginal returns is more like a local custom, appropriate to only a small part (about 11%) of the US economy.

In fact, similar findings had been reported over 50 years ago. In an article published in the American Economic Review in 1952, Wilford Eitemen and Glenn Guthrie reported their findings from a survey of manufacturing companies across the US. Specifically, they found that only 5% of the goods produced conformed to the standard 'U'-shaped depiction of average total costs. The majority (60%) of products were reported as having average total cost curves which simply declined as output increased up to maximum capacity. (Almost all remaining products were reported as similar but with a slight rise in average total costs just before capacity was reached.)

DESIGNING THE AVERAGE TOTAL COST CURVE

Eitemen offered a simple, intuitive reason why we should expect that most average total cost curves would always decline with increased output. One way to look at the matter is in terms of the percentage of designed maximum capacity output at which you would want your production process to operate most efficiently. To give an example, imagine you're an engineer and you have been tasked with designing a machine (or a factory, or the layout of an office) that can produce some maximum number of units in a given day. In designing the machine, you find that it will have to operate more

or less efficiently depending on how heavily it's being used. Would you design it to operate most efficiently when it's only running at 20% capacity? Maybe 60%? Perhaps 99%?

Most would say that a production process should work best when it's operating somewhere near the level of output it was designed to be capable of producing–otherwise, why should it be made to produce so much output in the first place? Translate 'work best' into 'operate at lowest average total cost' and the implication should be clear: a 'U'-shaped average total cost curve indicates a production process that was designed to be capable of producing up to some maximum amount inefficiently. In contrast, a declining average total cost curve indicates that the production process was made to work best when it's producing as much as it was designed to be capable of producing–the most efficient, lowest average total cost point being at or near 100% of maximum capacity output.

Returning to the three postulates we used to develop hypothesis 2, Eitemen and Guthrie's findings indicate a clear departure from the standard model of firm behavior. If most firms believe their average total costs decline as output increases, then mathematically their marginal cost curves must be below ('dragging down') their average total costs. (Perhaps in many cases, the firm's marginal costs are constant as Blinder et al. indicate is common throughout the economy.) Now, if marginal costs are always less than average total costs, then there are only two possible conclusions to be drawn:

1. Firms produce a quantity where MC = MR. But, since MC is always < ATC, and under perfect competition profits = Q(MC-ATC), then firms in perfectly competitive markets will always make a loss. This doesn't seem like an attractive conclusion–surely we can find firms in competitive markets that manage to make a profit. So it's worth considering the alternative:
2. Firms do not produce a quantity where MC = MR. That is, under the cost structure that most firms report, the standard profit maximization behavior postulated in the neoclassical theory of the firm is not only unrealistic, it's impossible.

Clearly, the implications of these findings do not bode well for the neoclassical theory of the firm presented in earlier chapters. The preponderance of evidence may not wholly refute the neoclassical model, but it does expose severe limitations. In the breakout box below, two additional hypotheses are examined, giving greater reason to abandon the neoclassical theory of the firm. The section that follows then introduces a few basic concepts from an alternative, heterodox viewpoint.

TWO MORE HYPOTHESES

From the neoclassical perspective, we can imagine a firm incrementally increasing its, say, weekly output, and continuing to do so as long as its marginal revenue is greater than its marginal cost. Once the additional revenue of one additional unit of output just covers the cost of that unit's production, the firm settles on that level of output–profit maximizing equilibrium has been reached where MC = MR. Assuming that marginal cost must be positive (most workers won't pay their boss to let them work more hours, but perhaps there are exceptions), then marginal revenue must also be positive.

Now, refer back to chapter "Elasticity," specifically the section asking "Does Raising Price Bring in More Revenue." There you learned that a firm that is able to set its own price can increase revenues by cutting prices if demand is elastic. If on the other hand demand is inelastic, cutting your price will increase your sales (that's the law of demand after all), but the lower price will weigh heavier on your revenues than the gained sales, and your revenues will actually decline. Mathematically, this works out to a simple rule: if demand is elastic then selling more will increase revenues–which is to say that marginal

revenue is positive when the elasticity of demand > 1 (and MR is zero when the elasticity of demand = 1, and negative when elasticity of demand is < 1). Hence, **hypothesis 3**: If firms produce where MC = MR, then MR must be positive, and therefore demand must be elastic.

Blinder et al. (1998 p. 99) found some support for this–but not much. While noting many businesses do not actually calculate or even think along these lines, the authors found that, among those that could give an answer, 84% believed demand to be inelastic (and, by implication, negative revenues). In fact, 41% believed that the elasticity of demand was zero–that is, a price cut would not increase sales at all.

Now consider a more general issue. In chapter "Supply and Demand" you were introduced to the centerpiece of neoclassical economics: the market model. The chief argument of that model is that prices in the market will adjust to bring supply and demand into an equilibrium in which the quantity people wish to sell is equal to the quantity people wish to purchase–that is, the price mechanism acts to clear markets. This model fits into the broader narrative of neoclassical thought which holds that capitalist economies are organized by price adjustments in the complex network of markets that make up these economies. Therefore, **Hypothesis 4:** unless the world changes very seldom or very slowly, leaving most markets in their previously established equilibria for long stretches of time, prices should be changing rapidly with frequent bidding, as in an auction market.

Figure 2 – Left: Auctioneer does brisk business at the Hickman Saturday Auction, 15 miles south of Lincoln, NE. (O'Rear, Public Domain). Right: Stock brokers on the New York Stock Exchange, 1963. (US News & World Report, Public Domain). Price bidding is essential to auction markets like the ones depicted above. But, of the things you've purchased in the last month, for how many of them did you bid–or even negotiate–a price?

By now you could probably predict what the evidence was going to tell us about this important part of standard neoclassical theory: throughout most of the modern US economy, prices change relatively infrequently. Blinder et al. (1998, p. 84) find that 49% of responding firms change their prices no more than once in a year or even longer. Indeed, only 22% reprice daily, weekly, or monthly. The auction market model at the core of neoclassical economics exists, indeed; but, it would appear that it lies somewhere between minor and insignificant in today's economy.

The evidence reviewed above suggests that basic ideas from neoclassical microeconomics about how businesses, markets, and capitalist economies function have, at best, very limited application to the real world. While the evidence doesn't necessarily deliver a fatal blow to the neoclassical theory of the firm, it should be disconcerting to find so many businesses viewing their world and their work in a fundamentally contradictory way. Likewise, the prevalence of yearly price changes doesn't invalidate the auction model of markets you learned in an earlier chapter; but it does raise questions as to its usefulness, and to whether an alternative model should take priority in our understanding of modern capitalist economies.

15.2 COSTING AND PRICING: A HETERODOX ALTERNATIVE

LEARNING OBJECTIVES

By the end of this section, you will be able to:

- Explain the concepts of costing, depreciation, going concerns, and pricing
- Identify the basic pricing methods of full cost pricing and target rate of return pricing
- Calculate prices according to these methods
- Discuss the implications of planning, costing, and pricing for the existence of a supply curve

The empirical findings presented in the previous section suggest that our standard models of how firms behave and what determines prices are not appropriate for understanding today's economies. Choosing the profit maximizing level of output does not appear to be relevant to firm behavior in the short run. Likewise, frequent price adjustments 'in the market' are not characteristic of most real-world markets, in which prices are clearly determined by producers and maintained over relatively long periods of time. All of this suggests that a deeper look into the actual nature of firms' costs and the actual manner in which prices are determined is necessary. Fortunately, ample information about these processes is available, and it comes from the costing practices of accountants and the pricing practices of management.

Costing is the process of estimating the costs of production before production actually takes place–and, hence, before the actual costs of production are known with certainty. To do this, of course, it would be necessary to have some idea of how much output the business will be producing and the direct and indirect expenses that will be involved at that level of production. Making such calculations may involve a simple, educated guess or a sophisticated process of research, experiment, and forecast. What is important, from a theoretical standpoint, is that it is a fundamentally uncertain task which takes place before exchanges occur in the market. This view is consistent with what was suggested above, that firms plan their production processes before, a topic discussed further in chapter "The Megacorp."

DEPRECIATION AND THE GOING CONCERN

A complete review of cost accounting isn't necessary here, but one particular type of cost, depreciation, is of particular historical and conceptual significance. **Depreciation** is a way of accounting for the expense of an asset–say, a machine press–over the life of the asset. For instance, suppose your machine shop purchases a press (a machine that does exactly what it sounds like it does) for $20,000.

If you expect that the press will be in use for the next 10 years you might account for a depreciation expense of $2,000 per year for the next decade.

To understand the significance of depreciation, consider how businesses usually calculated income before the late 1800s. Before then, business enterprise was often treated as a terminal venture, having a clearly defined beginning and end date. Investors would pool money to start a business, purchase materials and capital (say, a ship and local goods to be traded abroad), and hire workers (the ship's crew). At some predetermined date (perhaps when the ship returned to port) the business would be liquidated: its crew would be paid and any remaining assets would be sold off. The resulting profit to the investors would, in essence, simply be whatever money was leftover. In this approach, what was the relationship between the productive asset (the ship) and profit?

Profits were simply decreased by the cost of the ship, but increased by whatever price could be fetched by selling the ship at the end of the venture.

But, accountants in the late 1800s asked, is that an appropriate way to think of, say, a railroad company? Will a railroad lay thousands of miles of line, run trains across it for some predetermined number of years, and then pull up the line to be sold for scrap metal? Clearly not. Instead, fixed assets like a railroad's line, or an airline's planes, or a law firm's office building are depreciated over the course of their useful life. Conceptually, this is simply the recognition of the role those assets play in allowing these businesses to generate an income into the foreseeable future. Most importantly, this accounting method reflects the fact that these businesses are not treated as terminal ventures. Rather, they, as nearly all businesses today, are considered **going concerns**: organizations which are expected to continue to exist into the foreseeable future.

PRICES FROM PRICING

Similar to costing, pricing refers to procedures businesses use to determine, beforehand, the price at which they will sell their product once production is up and running and sales can be made. While modern pricing procedures can be complex and will vary widely across different businesses and industries, two basic methods should be understood: full cost pricing and target rate of return pricing. Both are instances of markup (or cost-plus) pricing: setting the price of a business enterprise's product by adding some dollar amount over and above average costs of production.

Full cost pricing (sometimes called normal cost pricing) is the simpler of the two methods. It can be written as

$$P = (ATC)(1 + r)$$

Where:

P is the price at which the business plans to sell its product

ATC is the average total (or per-unit) cost determined in the costing process

r is the predetermined markup

Target rate of return pricing is similar, but a bit more complicated. Here the price is being set, not to

achieve a particular percentage profit above costs, but to earn a desired return on the money invested into the business. The formula can be written as

$$P = ATC + \frac{ROI(IC)}{Q}$$

Where:

ROI is desired return on invested capital

IC is invested capital–that is, money invested into producing the product

Q is the expected quantity of output sold

CALCULATING PRICES

To illustrate both approaches, consider a business that invests $10 million into a plant designed to manufacture inexpensive steak knives. It expects that over some relevant period it will be able to produce and sell 2 million knives; and, at that level of production, its per-unit costs will be $1.80 per knife. The calculated prices using our two pricing procedures are given below (assuming that in the first case the desired markup is 10% (or 0.1), and in the second the desired return on invested capital is also 10%).

Full cost price: $P = (1.80)(1 + 0.1) = \$1.98$

Target rate of return price: $P = (1.80) + \frac{(0.1)(10{,}000{,}000)}{2{,}000{,}000} = \$2.30$

Notice also that, even though the markup and desired return on invested capital are both 0.1 (10%), the resulting markups and hence the prices are not the same. This is because, although both procedures are essentially marking the price up over costs, the treatment of the costs being marked up are different.

It is worth reflecting on the significance of these insights into cost accounting and markup pricing, as they represent important general concepts in heterodox economics which are usually neglected in standard neoclassical theory. First, they suggest that business enterprises are making decisions before anything is even produced, let alone 'brought to market'. In particular, pricing practices (and the intended quantity of output and corresponding cost estimates on which pricing is based) are a component of the planning process which takes place within the business enterprise. Contrary to the axiom that firms cannot recover fixed costs in the short run and therefore should ignore them in making short run decisions, it is long run planning driving short run behavior that is most important for understanding what determines prices.

Second, to acknowledge costing and pricing as it actually occurs is to acknowledge that the future is fundamentally unknowable. While standard (neoclassical) models assume that firms know their production costs and, typically, also the amount they can sell and the resulting revenues they can expect to take in, actual firms face uncertainty in how their plans will work out. A particular implication of this reality: since firms set prices based on estimated average total costs at an expected level of output, a change in the actual quantity of production/sales is unlikely to affect the predetermined price. This

suggests that price and quantity supplied are determined completely separately, which in turn means that there is no such thing as a supply curve.

THE ILLUSORY SUPPLY CURVE

Recall from the basics of the neoclassical market model that a supply schedule (and its corresponding supply curve) simply shows the relationship between how much a firm (or firms) would be willing to supply at various market prices. That is, supply simply refers to the functional relationship between quantity supplied and the market price, with the market price determining the quantity supplied. If, however, the two are determined separately then there's no way around the implication: quantity supplied is not functionally related to the market price–that is, there is no supply curve.

The astute reader may have already realized the impossibility of supply curves under certain conditions from the failed hypotheses discussed earlier in this chapter. Referring back to chapter "Perfect Competition," specifically the section titled "Marginal Cost and the Firm's Supply Curve," you'll recall that a firm's marginal cost curve (above minimum average variable cost) is its supply curve. (This is because quantity supplied is determined where MC = MR and, under competitive conditions, MR = P. Hence, quantity supplied is determined by P = MC.) Now, as was shown with the test of hypothesis 2 above, firms simply couldn't determine their quantity supplied this way–at least not under competitive conditions and having the empirically typical average total cost curves. This, of course, means that the neoclassical theory of supply must be rejected for these cases.

This doesn't mean that the basic ideas of supply–higher prices leading to higher output and vice versa, for instance–are completely absent in the real world. Some industries–particularly, those related to mining and agriculture–do in fact see diminishing returns. In these (albeit limited) parts of modern economies upward-sloping supply curves may be found. However, as our examination of the cost structures of actual firms suggested earlier in this chapter, this relegates what is considered the normal case in neoclassical economics to a special–and pretty rare–case.

Third and finally, a review of the evidence and history of actual businesses reveals an anachronism within the neoclassical theory of the firm. As you learned in chapter "Perfect Competition," the firm chooses the most profitable line of business (and appropriate production technique) in the long run, and the profit maximizing quantity to produce in the short run. If, in the short run, the firm is making a loss it will choose to shut down (if its fixed cost losses would be lower than the losses on continuing production). In an abstract, but important way the business enterprise this theory is describing is a terminal venture. Yet, beyond the halls and offices of economics departments, firms are generally seen as going concerns. This is reflected, for instance, in the accounting practices discussed above, as well as in the relationships firms maintain with customers. Blinder et al. (1998, pp. 96-7) found that 85% of all sales in the economy are made to regular customers whom the business expects to sell to in the future. In manufacturing and wholesale trade that number is over 90%.

As will be explored in more depth in the chapter "The Megacorp," the idea that businesses are organized and run as going concerns is a significant theoretical innovation over the standard neoclassical theory of the firm. For now, we only need to consider what it means for prices. The role of the price mechanism–the 'invisible hand of the market'–in neoclassical economics cannot be overstated. It is the process by which self-interested people (consumers, workers, entrepreneurs, landlords, and all the rest) are brought together in exchange for their mutual benefit. It is the mechanism that allows economists to believe in a (potentially) optimal equilibrium state–in an individual market, and in a capitalist economy as a whole.

In contrast, what is being argued in this section is that prices–at least those prices not actually determined through an auction–are set by businesses themselves as part of their planning process. The reader may have noticed that in the markup pricing introduced above a glaring question was ignored: namely, what determines the markup? A succinct, if incomplete answer can now be given: if the firm is to be a going concern, the markup, as well as the procedures that determined costs, will reflect the needs of the firm to continue to do business into the foreseeable future. For most firms there will also be plans to grow. Hence, from this view, prices are not exchange-based, market clearing values at all. They are, rather, reproduction prices–allowing the firm to reproduce itself through time–and, typically, also growth prices–ensuring the firm brings in the earnings necessary to expand. To use a now-familiar term, the vast majority of the prices we see in actual capitalist economies today might best be called **going concern prices**.