

Inefficient Market Pricing: An Illusory Economic Box

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ABSTRACT

Welfare economics typically holds that market outcomes are Pareto efficient only if markets are competitive and average costs are constant or increasing. Otherwise, to attain market efficiency requires some regulatory implementation of a rule to equate price to marginal cost, though the ability of such a pricing rule to accomplish this is tempered by second-best considerations. In contrast to this typical claim, we explain why market prices must be Pareto efficient even in the presence of decreasing average cost. The existence of an analytical box labeled inefficient pricing turns out to be an illusion that is generated by the imposition of a theoretical convention of price uniformity that has no basis for existence other than analytical convenience. In short, profit seeking alone is sufficient for Pareto efficiency, for Pareto inefficiency simultaneously means that firms are failing to exploit opportunities for profit, and to embrace such a failure provides a poor basis for economic modeling.

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Ever since Jules Dupuit's (1844) rumination on the pricing of bridge crossings, economists have explored the efficiency of pricing policies. While the First Theorem of Welfare Economics acknowledges the Pareto efficiency of competitive pricing, it is also commonly claimed that competitive pricing covers only a subset of all market pricing. Pricing is dichotomized between those instances where it is consistent with Pareto efficiency and those where it is not, and with efficient pricing requiring, among other things, that average cost is non-decreasing. With decreasing average cost, however, market pricing will violate Pareto efficiency because price will exceed marginal cost. Under such circumstances, price regulation might be necessary to secure Pareto efficiency. To be sure, there is no guarantee that price regulation will secure Pareto efficiency, for second-best considerations abound, as do numerous considerations concerning the competence of regulators actually to implement such a rule.¹ Nonetheless, the economic literature exhibits a sharp dichotomy with regard to the Pareto efficiency of market pricing, where it is efficient on one side of the dichotomy and inefficient on the other.

J. H. Clapham (1922) observed that economists could not construct a mapping of actual commercial activities onto their conceptual categories of increasing, constant, and decreasing cost. Those conceptual categories comprised economic boxes that could not be filled. Clapham assumed that the

¹ The welfare losses of such regulation can exceed its benefits when the distortion created by the taxation necessary to finance the regulation is greater than the market inefficiency the regulation is designed to correct.

boxes were real, only economists could not fill them. We take Clapham one step further, by explaining that those boxes are illusory in the first place. We claim that the only real box is one labeled efficient pricing. The box labeled inefficient pricing does not exist. It is an illusion created by an economic model that misrepresents actual commercial life, by imposing a convenient theoretical presumption of price uniformity onto a reality where price uniformity is ill-founded and rarely exists.

The standard claim about pricing is more a statement about the grammar of economic analysis than it is a proposition about the world of commerce. That grammar adopts uniform pricing as a norm, and assesses the world of commerce against that norm. Uniform pricing, however, is a recipe for market failure and not success, as we shall explain below. We start by describing briefly the standard formulation of the Pareto inferiority of market pricing with decreasing average cost. We then explain why this standard formulation is incoherent, and show how a coherent reformulation simultaneously eliminates the claim of Pareto inefficiency. The key to our claim lies in our recognition that uniform pricing and atomistic competition are exceptional and not generally prevailing situations. In the economy of real life, decreasing average costs are the norm, and so is multiple pricing. In such an economy, the search by firms for profitable opportunities leads simultaneously to the exploitation of gains from trade and the elimination of Paretian inefficiency. It is maximizing net worth and not setting price equal to marginal cost that comprises the first-best principle of economic efficiency.

To be sure, our claim that inefficient market pricing is an illusory box is not to claim that there is no basis on which people might object to observed pricing practices. For one thing, many pricing practices are shaped in significant ways by regulation. Moreover, much regulation changes ownership rights, and so involves a shift from one Pareto allocation to another. Regulation would thus be principally about changes in the distribution of wealth and not about expanding the extent to which gains from trade are exploited, for profit-seeking is sufficient to accomplish this.

WELFARE ECONOMICS AND DICHOTOMIZED PRICING

The standard formulations of welfare economics distinguish between situations where the conventional competitive model is thought to apply and situations where it is thought not to apply. A central feature of the logic of free competition when average cost is non-decreasing is that price will equal marginal cost. The presumption that firms seek to maximize their profits or net worth is sufficient to secure Pareto efficiency under these circumstances. Under other circumstances, as illustrated by monopoly or, more generally, decreasing average cost, free competition is thought no longer to imply efficient pricing. The central claim under these circumstances is that price will exceed marginal cost, in which case the road to efficient pricing is thought to run through some regulatory agency that imposes marginal cost pricing.

The expressions of concern about allocative inefficiency in the presence of decreasing average cost continue to this day. The textbook literature is replete

with claims about inefficient pricing in the face of decreasing average cost, along with discussion of the second best problems that accompany tax-subsidy schemes. In his general, wide-ranging examination of *The Regulation of Monopoly*, Roger Sherman (1989) presents such arguments cogently and reflects well the prevailing professional consensus. In his tightly focused examination of transportation pricing, José Gómez-Ibáñez (1999) crafts his comprehensive discussion around this same theme, and in so doing reflects a commonly recurring thematic.²

Figure 1 illustrates the standard claim about the allocative inefficiency that can arise when average cost is decreasing. The particular case portrayed there is one where there is constant variable cost and some significant component of fixed cost, though any formulation where marginal cost is less than average cost will work. A firm that sets price equal to marginal cost will fail to cover its full cost, so pricing at marginal cost clashes with the continued existence of the firm.³ Pricing at average cost will allow for the continued existence of the firm, but it also means that there are people who are willing to pay between marginal cost and average cost for the service, and yet are unable to receive it. Pareto efficiency is violated in Figure 1 when price is set at P_{AC} .

This does not mean, however, that Pareto efficiency can be secured by setting price at P_{MC} . At this price, the enterprise would not be able to cover its cost and would be in the process of consuming its capital and leaving the

² For a few other expositions of the same theme, see Dall'Olio and Vohra (2001), Small (1999), Arnott and Kraus (1998), Currier (1997), and Vohra (1990).

³ Setting price equal to marginal cost also clashes with the rationality behind the initial creation of a firm, for no firm that planned to make losses in the long run would be created intentionally.

business. For the firm to stay in business, the gap between average cost and marginal cost must be covered in some manner. If the loss from marginal cost pricing is covered through taxation, some metric must be constructed for comparing the welfare loss from taxation with the welfare loss from average-cost pricing. This is where second best theorizing comes into play.

PRAGMATIC OBJECTIONS TO A MARGINAL COST RULE

While the analytical intricacies of second best theorizing are numerous, there has also been a continual though small parade of contrary arguments claiming that the invocation of decreasing cost does not constitute sufficient grounds to replace market pricing with regulated pricing. For the most part, these dissenters accept the theoretical arguments concerning Pareto inefficiency under decreasing cost, only they claim that there is no basis for thinking that regulatory agencies will have either the knowledge or the incentive required to impose Pareto-improving price regulations.

In this respect, Dupuit noted that any positive price for crossing a bridge “which it cost nothing to cross” will exclude consumers willing to pay a price less than the toll but more than the cost. To be sure, Dupuit does not argue that the only efficient method of pricing is one that permits all consumers to cross when the marginal benefit of their crossing is greater than marginal cost, because he recognizes that to finance the bridge, total revenues must at least equal total costs. It remained for such later economists as Harold Hotelling (1938), Abba

Lerner(1944), and others to seek to transform pricing at marginal cost into a Rule with which to guide policy.

Dupuit himself noted that the utility information that would be needed to implement such a rule is not available in practice, but hoped that advances in knowledge would eventually provide some guidance. The years that have passed since the publication of Dupuit's paper have not brought forth a theoretical or empirical method of determining statistical data regarding utility.⁴ Clapham's claim from 1922 holds as well today as it did then. In fact, the failure of central planning in the twentieth century demonstrated that the market procedure for generating and applying utility information is superior to statistical methods. The market procedure gives incentives and information to people who can most appropriately act on it, and is far more accurate and less costly than any other scheme yet imagined or implemented.

Ronald Coase's (1946) examination of the Lerner-Hotelling claims argues that multiple pricing is likely to be superior to a combination of marginal cost pricing and taxation to cover the loss that the firm would otherwise suffer. Among other things, Coase notes that knowledge about demands and costs are not easily accessible through libraries or surveys, and that markets provide stronger incentives for people to act knowledgeably than governments provide to regulators. Coase's argument is a form of applied second-best theorizing that comes out on the side of market pricing over regulated pricing as a practical method for approaching Pareto efficiency.

⁴ For a wide ranging exposition of Dupuit's thought on many related topics, see Ekelund (2000). For a Dupuit-like examination of the practicalities of seeking to implement marginal cost pricing for electricity in France, see Henri Lepage (1991).

The bulk of the other dissenting literature takes a similar tack. Among the most prominent contributions in this vein are those penned by G. F. Thirlby (1946) and Jack Wiseman (1952), and also more recently by E. C. Pasour (1987). We would also call attention to the original and neglected contribution of Asik Radomysler (1946), as well as the essays collected in James Buchanan and G. F. Thirlby (1973). These papers do not deny the welfare-related problems that decreasing cost presents. Their defense of market-based pricing is thus derivative and not direct. It is based on the implausible character of a claim that government regulation of prices is likely to represent genuine improvement, because governments are held to lack either the knowledge or the incentive to find and impose efficient pricing programs. Contrary to these critics of pricing rules for efficient pricing, our claim is that there is never any efficiency ground for objecting to market pricing. Objections to market pricing must be grounded rather on claims of equity or justice.

UNIFORM PRICING: THE BLINDING CONVENTION

If a firm that operates under conditions of decreasing average cost is constrained to offer a uniform price to all potential buyers, the dilemma portrayed by Figure 1 is unavoidable and market pricing must be Pareto inefficient. To be sure, there is a large literature on multi-part pricing schemes as an alternative to tax-subsidy schemes as a way of overcoming the inefficiency associated with uniform pricing at average cost. It is well recognized, of course, that a

monopolist that practices first-degree price discrimination will generate a Pareto efficient outcome, a result that has been further generalized by Walter Oi (1971).

These various formulations are regarded as special cases that mitigate, and in the limit overcome the inefficiency associated with uniform pricing at average cost. The general case, however, remains one of inefficient market pricing when average cost is declining. The comparative merits of regulated pricing and market-based multi-part pricing is thus ultimately a complex matter of second-best measurement, and, moreover, with analytical boxes that are pretty much incapable of being filled, at least without great ambiguity and arbitrariness.

While the analytical intricacies of second best theorizing have their aesthetic qualities, they are unnecessary for the case at hand because the situation to which that theoretical framework is addressed is incoherent in the first place. That framework pertains to an illusion and not to reality: the claim of inefficiency is an illusion that is created by a faulty theoretical lens that imposes uniform pricing for no good reason other than analytical simplification. Uniform pricing in the presence of decreasing cost is, however, inconsistent with economically rational conduct by firms. Once it is recognized that pricing is an object of choice and not a parameter, it turns out that the search for profits within the framework of a market economy is sufficient for Pareto efficiency. There is no dichotomy between efficient and inefficient market pricing, for market pricing is always economically efficient. If this were not the case, economists could not plausibly claim that firms are seeking to maximize their net worth.

Uniform pricing can be a reasonable, simplifying abstraction, so long as the abstraction is not confused with reality. In reality, prices overwhelmingly are vectors and not scalars. Theaters and airplanes are both exemplary cases of decreasing average cost, as the cost of admitting one more customer is close to zero, so long as capacity limits have not been reached. It does no harm to speak abstractly of the price and the cost of a seat at a theater or on an airplane. After all, confusion could quickly arise in trying to work with a model where the 800 patrons to the theater paid 120 different prices or where the 300 passengers on an airplane paid 60 different prices.

Yet this world of multiple pricing is the world in which we live, and the logic of such a world needs to be taken into account before pronouncements about efficiency or inefficiency are advanced. To be sure, uniform pricing makes possible a simple and tractable model of competitive equilibrium. Much of the literature on marginal cost pricing has sought in turn to extend this simple model to actual practice. Yet any examination of actual practice would surely show multiple pricing overwhelmingly to dominate uniform pricing. Uniform pricing is surely the exception in contemporary economies. It is multiple pricing that is the standard practice, and it remains to be seen how this standard practice conforms to the spirit behind the standard formulations of welfare economics.

Across a wide range of goods and services, one more unit of output can be supplied at less than average cost. An important reason for this is the presence of fixed and common costs. Common costs exist because there is almost no such thing as a firm that produces only one product. We may speak of

bakers and barbers in our blackboard illustrations, but even such simple firms as these offer multiple numbers of products. A baker's ovens and premises are a common input whether the marginal output is bread, rolls, or cakes. A barber's chairs and premises are a common input whether the marginal output is a simple haircut, a permanent, or a change in color. A single-product firm is an idealized abstraction to concentrate analytical attention on other things, but it is nowhere a feature of reality. There is far too much complementarity among production processes for a single-product firm to be commercially sensible.

Such models as that depicted by Figure 1 represent a set of trading relationships between a firm and its customers. The conventional outcome represented by O_{AC} , as well as the alternative outcome represented by O_{MC} , is one where a single contract covers all those relationships. That contract entails a uniform offer of P_{AC} to all buyers, and allows buyers to choose how much they wish to buy at that price.

A firm faced with this situation, however, would generally not employ this form of contract because the firm could increase its net worth by shifting to a more complex contract with multiple prices. The gap between P_{AC} and P_{MC} in Figure 1 illustrates the gains from trade that can be achieved through an expansion in output from O_{AC} toward O_{MC} . Beyond O_{AC} , D indicates the marginal value of added output while MC indicates the marginal cost of providing that output. Gains from trade and, hence, profits will continue to exist until the efficient output O_{MC} is attained. At this output, marginal price will equal marginal cost while average price will at least equal average cost. It is not necessary that

all exchanges be performed at the equilibrium price; only the marginal unit must be traded at that price. For all other units, any price settled on by the two parties is efficient.⁵

PRICING AND TRANSACTION COST

When price is a vector and not a scalar, the firm must be able to maintain that vector against forces that would degrade it and, thereby, undermine the firm's ability to pursue successfully its commercial plans. When buyers differ in the contributions they are asked to make through the firm's pricing structure to fixed and common costs, firms must be able to withstand the degradation that would result from the emergence of a secondary market among consumers. Multiple pricing entails transaction costs, and a firm will expand the elements in its pricing structure only so long as this expansion results in an anticipated increase in net revenue. Prices will only equal marginal costs when transactions costs are cheap enough to permit conditions approximating atomistic competition.⁶ When prices are higher than marginal costs, it is to the benefit of both the consumer and producer to find low cost ways of transacting—yet these do not always exist. A firm's failure to expand further the elements in its price vector means either that it is not seeking to maximize profits or that it thinks doing so would result in negative net revenue. Simply put, there aren't markets

⁵ For a related examination with specific reference to public utility pricing, though without our emphasis on profit-seeking and not the equality between marginal cost and marginal price, see James Buchanan (1968).

⁶ This is why there is a lot of software piracy. The marginal cost for a consumer to supply an additional unit is almost as small as it is for the original producer. However, the original producer has large fixed costs to cover, whereas the software pirate has only his marginal cost.

for everything, and there will not be when the costs of arranging such markets exceed the benefits.

The existence of the firm is predicated on lowering market transactions cost. All costs of pricing plans are transaction costs. A profit maximizing firm will seek in a cost-effective manner to secure a price structure where the price of the marginal unit approaches marginal cost, while at the same time maximizing profits. Let Figure 1 represent the bridge discussed by Dupuit, and which has provided a widely used illustration ever since. There are myriad ways that bridges might and do charge multiple prices. Relatively simple forms of multiple pricing involve prices that vary with the type of vehicle and with the time of day. It is also common for quantity discounts to be used, where a pass to allow twenty crossings within a month can be purchased for less than the cost of twenty individual crossings. Prices can also differ, depending on whether a token purchased in advance or currency is used to pay for the crossing.

Degradation of the pricing structure is always a concern, and elements will be added only so long as they are anticipated to increase net revenue. A bridge owner might calculate that between 2200 and 0600, the tolls collected are less than the outlays required to staff the toll booths. He might thus think of eliminating that shift of toll collectors. Before doing so, however, he would have to take into account the possible degradation in the revenue collected the remainder of the day, as riders who might otherwise have crossed at 2130 or 0630 decide to change their travel plans.⁷ Similarly, a baker who faces the

⁷ To save on wear-and-tear, the bridge owner could close the bridge to all traffic between 2200 and 0600, regardless of the prices travelers are willing to offer. Thinking about the net effects of

prospect of unsold bread going stale might think of discounting that bread toward the end of the day. Before doing this, however, he would have to try to take into account the effect of such a policy on the buying decisions of customers who otherwise might have bought their bread earlier in the day.

EFFICIENCY, EQUITY, AND MARKET PRICING

To assert the Pareto efficiency of market pricing does not, of course, mean that there is no basis on which market prices can be criticized. It is only to assert that there are no *Paretian grounds* on which they can be criticized. They can be criticized on a variety of ethical and distributional grounds. The search for profit in a setting of significant common costs and decreasing marginal cost for particular units of output will lead to pricing structures that (1) entail multiple prices paid for the same service and (2) have prices for the marginal customer that approaches the cost of serving that customer. The maximization of profit is a sufficient condition for the exploitation of gains from trade, which in turn is what defines Pareto efficiency.

To say that the pricing programs that are established by profit seeking firms are necessarily Pareto efficient is not, however, to assert any normative claim on behalf of those prices. Those prices are Pareto efficient, but so are many other sets of prices that would be generated through market competition that proceeded from different patterns of ownership rights. There is, after all, an indefinitely large number of initial starting points from which Pareto efficient

this extreme policy on traffic flow and total profit is a difficult commercial problem, but no more difficult than deciding whether to staff toll booths or deciding which prices to charge during such hours.

allocations may be generated. For instance, Axel Leijonhufvud (1998) advances the quite plausible claim that to a significant extent distribution in contemporary societies is a game of rent distribution that is channeled by societal conventions and institutions, and which, presumably, are amenable to modification.

Regulation is not an instrument for correcting market pricing to achieve Pareto efficiency, for there is no systematic inefficiency for regulation to correct. Regulation does entail changes in the distribution of ownership claims within a society, which in turn can change the distribution of rents within that society.⁸ That change in distribution might represent a form of politically organized theft, as perhaps illustrated by a good deal of the literature on rent seeking and rent extraction. Alternatively, it could represent some restoration of justice through a rectification of prior injustice. Whether particular cases of regulation can be plausibly justified as a means of correcting past injustice, through its ability to modify the distribution of ownership, is a different matter, but this is what regulation accomplishes in any case. The grammar of Pareto efficiency, however, is incapable of addressing these issues. Market pricing operates inexorably to exploit gains from trade. It is possible to complain about market prices, but those complaints cannot be based on efficiency grounds, and must, instead, be based on grounds of injustice or inequity, however this might be accomplished.

⁸ For a somewhat related recognition of the primacy of distributional over allocational issues in this setting, see Fisher (1991).

References

- Arnott, Richard and Kraus, Marvin (1998). "When are Anonymous Congestion Charges Consistent with Marginal Cost Pricing?" *Journal of Public Economics* 67: 45-64.
- Buchanan, James M. (1968). "A Public Choice Approach to Public Utility Pricing." *Public Choice* 5: 1-17.
- Buchanan, James M. and Thirlby, G. F., eds. (1973). *L. S. E. Essays on Cost*. London: Weidenfeld and Nicolson.
- Clapham, J. H. (1922). "Of Empty Economic Boxes." *Economic Journal* 32: 305-14.
- Coase, Ronald H. (1946). "The Marginal Cost Controversy." *Economica* 13: 169-82.
- Coase, Ronald H. (1970) "The Theory of Public Utility Price and its Application." *Bell Journal* 1: 113-28.
- Currier, Kevin M. (1997) "Existence and Uniqueness of Marginal Cost Pricing Equilibrium." *Atlantic Economic Journal* 25: 312-17.
- Dall'Olio, Andrea and Rajiv, Vohra (2001). "Efficiency in an Economy with Fixed Costs." *Journal of Public Economic Theory* 3: 185-201.
- Dupuit, Jules. (1952). "On the Measurement of the Utility of Public Works." *International Economic Papers* 2: 83-110.
- Ekelund, Robert B., Jr. "The Economist Dupuit on Theory, Institutions, and Policy." *History of Political Economy* 31: 1-38.

- Fisher, Peter S. (1991). "The Strange Career of Marginal Cost Pricing." *Journal of Economic Issues* 25: 77-92.
- Gómez-Ibáñez, José. (1999) "Pricing." In José Gómez-Ibáñez, William B. Tye, and Clifford Winston, eds. *Essays in Transportation Economics and Policy: A Handbook in Honor of John R. Meyer*. Washington: Brookings Institution Press, pp. 99-136.
- Hotelling Harold. (1938). "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates." *Econometrica* 6: 242-69.
- Leijonhufvud, Alex. (1998) "Three Items for the Macroeconomic Agenda." *Kyklos* 51: 197-218.
- Lepage, Henri (1991). "The Practice and Politics of Marginal Cost Pricing: The Case of the French Electric Monopoly." In Richard E. Wagner (ed.), *Charging for Government* (London: Routledge), pp. 90-109.
- Lerner, Abba P. (1944). *The Economics of Control*. New York: Macmillan.
- Oi, Walter. (1971). "A Disneyland Dilemma: Two-Part Tariffs for a Mickey Mouse Monopoly." *Quarterly Journal of Economics* 85: 77-96.
- Pasour, E. C. Jr. (1987). "Marginal Cost Pricing: implications for Public Utility Regulation." *Journal of Public Finance and Public Choice* 5: 45-51.
- Radomysler, Asik. (1946). "Welfare Economics and Public Policy." *Economica* 13: 190-204.
- Sherman, Roger. (1989). *The Regulation of Monopoly*. Cambridge: Cambridge University Press.

- Small, Kenneth A. (1999). "Economies of Scale and Self-Financing Rules with Non-competitive Factor Markets." *Journal of Public Economics* 74: 431-50.
- Thirlby, G. F. (1946). "The Ruler." *South African Journal of Economics* 14: 253-76. [Reprinted in Buchanan and Thirlby, eds. Pp. 165-98.
- Vohra, Rajiv (1990). "On the Inefficiency of Two-Part Tariffs." *Review of Economic Studies* 57: 415-38.
- Wiseman, Jack. (1957). "The Theory of Public Utility Price: An Empty Box." *Oxford Economic Papers* 9: 56-74. [Reprinted in Buchanan and Thirlby, eds. Pp. 247-71.]

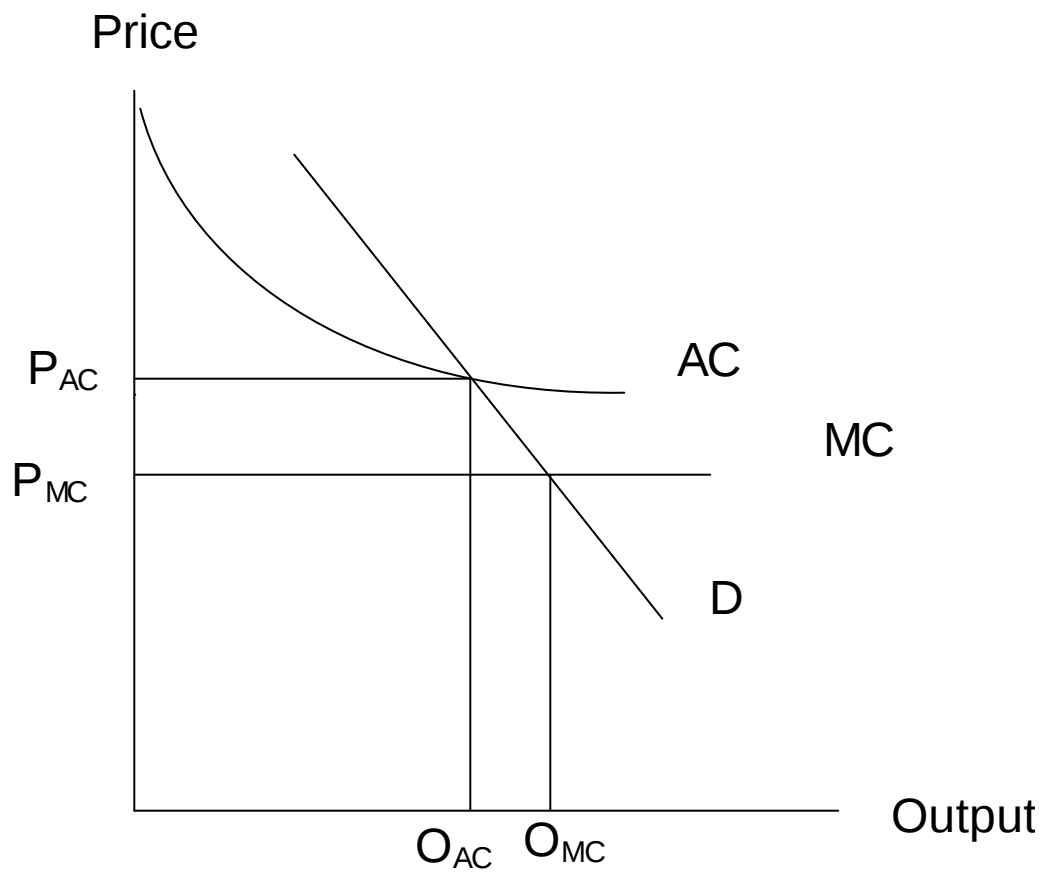


Figure 1: Standard Portrayal of Marginal Cost Pricing Dilemma