

**ECONOMIC ANALYSIS GROUP
DISCUSSION PAPER**

Why Prices Rise Faster than they Fall

by

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EAG 09-4 July 2009

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Abstract

For decades the fact that input price hikes are passed on faster than input price cuts was thought to be well explained by the assumption that competitive firms fully pass on all input price changes, so they can't price asymmetrically, so asymmetric pricing behavior is limited to oligopolies, firms that do all sorts of bizarre things (finding yet another one being no big deal). However, Peltzman found no effect of concentration on such asymmetric pricing, raising the puzzle of why competitive industries generally price asymmetrically. This paper solves that puzzle.

I. Introduction

For decades the economic profession has been aware of anecdotal evidence that firms pass on to their customers price increases their suppliers give them at a different rate than they pass on any price cuts they receive. Such asymmetric price transmission (“APT”) could take the form either of passing on input cost increases faster or slower than input cost decreases are passed on.¹ Asymmetric pricing has generated too massive a literature to summarize here, especially since there is already a fine and fairly recent survey of that literature (Meyer and Cramon-Taubadel (2004), “MC-T”).²

MC-T note two main proposed explanations of APT: non-competitive markets and adjustment costs. They add that the conjecture that non-competitive markets lead to APT is commonly “presented as essentially self-evident, without rigorous theoretical underpinning.” Their conclusion that this point is commonly thought to be self-evident is not surprising since APT seems so unlikely in competitive industries: if an industry always charges marginal costs, it must instantly pass on 100% of any price increase or price cut it receives from its suppliers. Therefore, APT cannot happen in such industries, so the explanation of asymmetric pricing is commonly thought to come from a second widely held idea: nobody really understands oligopolies, they exercise their market power in all sorts of bizarre ways, so the fact that some firms sometimes price asymmetrically just means that they must be oligopolies who happen to act out their bizarreness, in part, by pricing asymmetrically.

However, one might have hoped that the good old days described in the previous paragraph would have come to an end when Peltzman (JPE 2000) found that asymmetric pricing is not just anecdotal, it’s closer to universal. And if that wasn’t troubling enough, Peltzman also found asymmetric pricing to be as common in unconcentrated industries as it was in concentrated industries. At that point asymmetric pricing suddenly became a puzzle. In fact, Peltzman’s article

¹ Typically prices are found to rise faster than they fall. One exception is Ward’s 1982 study of fresh vegetable markets that found that “wholesale price decreases are reflected at the retail more so than are wholesale price increases.”

² While that paper nicely discusses 84 articles (summarizing 40 of them in a table), more articles have been written since then (e.g., Verlinda 2008, Yang and Ye 2008). However, MC-T’s general description of that literature still holds.

poses two puzzles, finding both faster adjustment to cost increases and that those adjustments remained bigger throughout the period he sampled.

Peltzman considered (and rejected) the obvious suspects for explaining these puzzles, noting that adjustment cost asymmetries were the only explanation he could think of that he couldn't refute. The example he gave of an adjustment cost explanation for such asymmetries is a good produced with inputs that were all purchased under "at-will" contracts.³ In such cases, as Peltzman noted, output can be reduced "quickly at low cost", unlike increasing output which requires search and may require a price premium. These timing and cost differences between increasing output and reducing it are asymmetries. However, such adjustment costs merely point at much broader explanations, so this note generalizes Peltzman's idea to all firms, regardless of whether they purchase anything under "at-will" contracts (or any other contracts for that matter). We also note that in that more general setting, this paper considers more than just adjustment costs since the puzzle in this paper's title is about timing, and while adjustment costs are part of the background for that puzzle, the issue there is adjustments that are made more or less "quickly".

Since 2000, many articles have shown ways that APT could be consistent with competition. MC-T summarize the results of those papers on adjustment costs as "ambiguous and sometimes contradictory" and then give a list of miscellaneous explanations (e.g., that rational firms will expect that low farm prices will not last long since the government will quickly bailout farmers by raising price to its earlier level). MC-T end their summary of these explanations by characterizing that list as giving "the general impression of a bouquet of often casual explanations, each of which is able to produce a wide range of asymmetric behavior." However, none of these papers gets to the heart of the puzzle of how and why competitive industries might generally price asymmetrically. This paper shows that the solution to this puzzle lies in the distinction between the classic old simplistic models of competitive markets in equilibrium (markets that are commonly found on paper, but

³ Agreements that employers can always cancel without liability are said to be "at-will". Agreements of large firms may be harder to cancel since the Worker Adjustment and Retraining Notification Act (1989) imposes fines on such firms that fire (without at least 60 days notice) as many as 1/3 of a plant's employees (29 USCA §2101-2102). However, there are exceptions to that act and GAO (2003) reported that "About one quarter of the 8,350 plant closures and mass layoffs in 2001 appear subject to WARN's advance notice requirements. ... Employers provided notice for approximately one-third of layoffs and closures that appear subject to WARN requirements."

cannot possibly exist in the real world) and the sort of competitive markets that we actually see in the real world. While it is true that asymmetric pricing CANNOT happen in simplistically competitive market models, allowing for the presence of factors that are present in any real world market (competitive, oligopolistic, or monopolistic) makes asymmetric pricing not just possible, but likely.

Indeed the answer to the asymmetric pricing puzzle is that in a real market, the process of changing price is not symmetric: every price hike that isn't enough to price a firm entirely out of the market in and of itself immediately gives a benefit to any firm that raises its price (of course price hikes will not turn out to be profitable if they cause enough of a reduction in quantity, but in any case, every unit the firm sells at the higher price gives it an immediate benefit); on the other hand, no firm ever gets any benefits from a price cut *unless and until* it can increase production and sales – and that commonly takes time. As shown below, more time is required to increase production and sales than to decrease it, in part because it's a harder thing to do (both inside the plant and inside the market), and in part because decisions to increase production and sales are made through a process that inherently takes more time.

Section II discusses a fall in the price of some input that leads a firm to expand output and pass some of that saving on to the firm's customers. Section III discusses the opposite situation: an increase in the price of an input leading to contraction and passing on some of that cost increase. Section IV compares the results of those two scenarios finding that each issue is asymmetrical: comparing Sections II and III shows that for each of these issues, passing on falling input prices is relatively costly (with marginal cost jumping by perhaps 25%) or takes months or years longer than passing on rising input prices does.

II. Falling input prices

A. Deciding how to respond to falling input prices

In reaction to falling input prices, each buyer will consider increasing its output and cutting its price to pass on some of the reduction in its cost. The list of factors that are relevant to that consideration includes (among many others): the cost of any capital it might buy to meet demand at the new lower price, conditions of supply for each other input it might buy more of, and all sorts of expectations about the future. The analysis requires all sorts of expectations because the expected

lifetime value of any additional capital it acquires, or any new contracts it signs, will be based on the whole series of prices and costs and productivity that are expected to be in effect during the expected lifetime of that capital or that contract. Since the factors to consider are different for different types of reactions that the firm might have, we consider three different types of reactions separately.

1. Adjusting to falling cost without adding capital or other long-lived assets

This section considers how a firm might respond to a reduction in the price of an input without adding new capital or other long-lived assets (which will be discussed in the next section). Assuming that we start from an equilibrium, the firm has no unused pool of labor on its payroll, so the only way it can expand is to add labor. While there are spot markets for labor where the firm could acquire more labor, allowing it to expand, and labor is commonly acquired that way for some jobs (e.g., some types of fieldwork), labor is typically acquired under contract. Additional labor can be acquired by signing more such contracts (which will be discussed in the next section) or by getting more work from existing workers (subject to a substantial penalty, such as “time and a half”, in addition to the production cost penalty for moving away from the original equilibrium mix of inputs to one that applies an inefficiently large amount of labor to a capital stock that this section assumes to be fixed). Although a firm could expand quickly by paying its current employees time and a half, moving from an equilibrium with no overtime costs to offering overtime would involve a discontinuous jump up in the firm’s marginal cost.⁴ Such a 50% jump up in the marginal cost of labor would be a 25% jump in total marginal cost if labor was half of marginal cost.⁵

⁴ Overtime is a relatively expensive way to get labor, but it is justifiable when (as this section assumes) it’s the only way a firm can expand in response to a change, like an input cost cut. Before such a disturbance to the initial equilibrium, firms would acquire labor the cheapest way, by hiring enough employees to produce all the firm wanted without having to pay overtime. About 25% of employees work over 41 hours/week (Bureau of Labor Statistics, Employment & Earnings, March 2009, p.36 table A-24, <http://www.bls.gov/opub/ee/empearn200903.pdf>), but that figure would be higher under this section’s assumption of lower input cost and no new capital or contracts allowed.

⁵ The Commerce Department reports wages and salaries were 52.7% of national income in 2008 (D-54 of http://www.bea.gov/scb/pdf/2009/07%20July/D-Pages/0709dpg_d.pdf).

2. Adjusting to falling cost by adding capital or signing contracts

To begin, consider a simple example, suppose a steel mill faced what it expected would be a very long-term decline in the cost of iron ore. Such a cost cut might be enough to get it to buy a new machine that could be used to relieve what had been a bottleneck in its plant, allowing it to sign contracts with a few more workers and other suppliers and expand its output. On the other hand, even facing that same fall in the initial cost of ore, the most profitable response to that decline could be totally different if the plant didn't expect that decline to last long, or if it expected some other problem in the future (e.g., one expectation that would reduce the expected profit from buying that machine would be if the steel mill expected that a recent invention might soon revolutionize the aluminum industry, giving the steel mill such strong competition that the machine that today's ore cost decline made it consider buying will no longer be profitable). Thus, the decision to increase holdings of long-lived assets is based on expectations of how long the new conditions and the rest of the environment will be in place.

An additional type of expectation required to invest in new capital (or sign new supply contracts) involves the value of what that capital (or contracted for inputs) will produce. While it is often convenient to simply assume that firms always know the demand curve they are facing, in the real world all they know is the one point on the demand curve that describes where the market is now. In other words, the industry may know the price it got when it used to produce the level of output that a cost cut encourages it to expand out to, but times have likely changed since then (technology has changed, competing products have changed, tastes may have changed, ...) and there's no guarantee that the firm will now be able to sell that old quantity for the old price. However, there's no way for a firm to know for sure what price will be when more is produced until after it installs the machines, signs the contracts, begins producing more, and then sees what price it gets. That uncertainty adds some risk to those investments.

Thus, if costs fall, the process of making a decision to add capital or sign contracts in response to the cost cut is based on considering many relevant factors and what their future values are expected to be. We also note that a plant manager can, at his sole discretion, make many decisions that affect output in the short run (e.g., buying small machines, hiring a few additional workers, how much overtime to authorize, how and when to schedule taking machinery off-line for maintenance, how much of each input to buy, ...). However, plant managers only have limited

authority: it is an important distinction that decisions on substantial increases in the firm's capital stock will likely be made at a level above the plant manager and based on reports, committee meetings, and eventually the board's views about reasonable uses of its capital budget.

Signing labor contracts may be easier than acquiring capital, but, as Peltzman points out, there are at least two potentially significant costs of hiring a new employee: search costs and price premia. In addition, we note that an employer that hires a new employee may face additional costs of on-the-job training (costs of providing training, added costs of supervision, and the costly mistakes of inexperience that new employees are likelier to make). We also note that each industry will have different levels of these adjustment costs (e.g., having more or less access to spot labor, rental markets for capital, stocks of currently under-utilized capital) and different expectations (e.g., some industries facing seasonal price changes that are expected to be temporary), potentially allowing tests of the effects of those costs and expectations.

3. Adjusting to falling cost by advertising

The adjustments in the previous two sections aim at increasing output and hopefully selling that added output. The obvious way to sell the increased output is to lower the price at which it is sold. Such price cuts can happen only when the price cutter is willing to accept the effect such a price cut has in directly lowering its revenue as a necessary cost that it hopes will be more than compensated by a resulting increase in the quantity sold (eventually). Such an increase in quantity sold can come from only three possible sources: sales to new customers, more frequent sales to current customers, or larger quantities sold per transaction with current customers. Since those first two sources are a very substantial part of any benefit that a price-cutter might get from cutting price, that leads to the question of how a price-cutter can bring new customers in (or bring current customers in more frequently), which is something that a price cut alone won't do: in fact, a price cut by itself conveys no information except to those current customers who happen to appear at the store (or website) after the price has fallen. The only way to get new customers to come in or to get existing customers to come in more frequently is to alert them to the price-cut, and such advertising

costs money. Thus, in the case of a cost-cut leading to a price-cut, those cuts are accompanied by additional expenses on advertising.⁶

B. The time it takes for firms to respond to falling input prices

Section II. A discussed some difficulties that firms face in expanding in response to falling input prices: time and a half for labor, forming long-term expectations before signing contracts, demand uncertainty, the capital budgeting process, and advertising. Each firm will have to deal with those problems in its own way, but we can get at least a ballpark estimate of the time involved from the way those expansion decisions are treated. For example, the Horizontal Merger Guidelines (U.S. Department of Justice and Federal Trade Commission 1992) label as a “supply response” the behavior of a firm that would likely begin selling in a market “within one year and without the expenditure of significant sunk costs” (§1.32), and consider expansion to be unlikely by competitors of a merged firm that “face binding capacity constraints that could not be economically relaxed within two years” (§2.22). These Guidelines (which are still in force) and earlier versions have been at the heart of antitrust policy since 1982.⁷ Of course, in some cases output can expand in less than a year or two, and in other cases expansion can take even longer. However, the survival (and increasing influence) of antitrust standards that focus on entry and expansion within a year or two suggests that the underlying reality that has caused the persistence of those standards is that there are lots of firms in the set it focuses on (firms that can enter or expand in about a year or two). With so much of the action taking place in about a year or two, the average amount of time required for entry or expansion might well be a year or two, but a guess that this average might be a month or two or a week or two, wouldn’t even be in the right ballpark.

⁶ Baumol, Quandt, and Shapiro (1964) studied a group of supermarkets that collectively had about 60% of the grocery store volume in Philadelphia in 1962 and found (p.351) “that the relative frequency of advertising is somewhat higher in periods of falling prices than in periods of stable or rising prices.”

⁷ One notable difference between the 1982 Guidelines and later editions (1984 and later) is that the 1982 version saw market competition as based on production shifts that could happen within six months (Section II.B.2), a shorter time-frame than in more recent guidelines.

III. Rising input prices

A. Deciding how to respond to rising input prices

We now consider the case in which input prices rise, leading each firm to consider reacting to that by reducing its output, raising its price, and to some extent passing on the cost increase. In this case too, each firm will want to consider many of the factors discussed in the previous section (the firm's consideration of its response to the cost increase still includes input costs and the conditions of supply for each input that it would buy less of). However, since these firms will likely not be considering any increase in their capital stocks (or their contracts with employees or suppliers), the main thought these firms should have about their existing capital stocks and their existing stocks of contracts with suppliers of inputs (e.g., labor, iron ore, rented work space, ...) is that "sunk costs are sunk" (i.e., a firm may now regret that in the past it acquired an amount of those inputs that it now wishes it didn't have so much of, but that past can't be undone now, it mostly needs to write that off as a *fait accompli*, as "sunk" and move on to other issues). However, insofar as the firm is able to reduce the level of its assets, as we did in the case where costs fell, we now consider three types of response to higher costs.

1. Adjusting to rising cost without reducing capital or other long-lived assets

Even if a firm's capital and contracts remain fixed, it can still reduce its output by running its machinery more slowly or less frequently (e.g., taking some machines off-line now to perform maintenance that would otherwise have been performed later), buying fewer inputs, and using less labor (e.g., reducing the efforts it puts into seeking new workers to replace others who choose to leave or retire).⁸ In all of these examples, as with the one Peltzman gave, "This can be done quickly at low cost". In addition, they can all be done at the sole discretion of the plant manager. We note that the consideration discussed in this paragraph doesn't require more than a simple static model: a plant's manager maximizes his plant's profits given the costs and prices that he is confronted with

⁸ Cutting back on overtime isn't an option here because we assume that we started from an equilibrium where the firm was acquiring its labor in the most economical way: contracting for all it needed.

at the time he makes his decisions, without any need to try to predict what costs and prices will be in the future.

2. Adjusting to rising cost by reducing capital or other long-lived assets

After suffering a cost increase, the only way that a firm's stocks remain relevant is in decisions about how to dispose of some of them (e.g., decisions about letting attrition take its toll, or even encouraging attrition as a way to reduce stocks that are now considered to be excessive). Unlike the capital budgeting decision discussed in section II. A. 2, decisions about maintenance of existing stocks of capital and contracts for labor and other inputs will likely be made quickly by the plant manager without interminable meetings with upper management and capital budgeting committees.

Similarly, while expectations about the state of the demand curve are just as uncertain in the context of decreasing output, the issue isn't as serious as it was in section II. A. 2 because attrition is a slow and gradual process affording the firm plenty of time to re-think its analysis if demand at higher prices turns out to be greater than it had anticipated.

The costs of hiring new workers considered in Section II. A. 2 introduce another asymmetry since there are no such costs in firing at-will workers. Indeed, while this asymmetry is most extreme with at-will workers, any firm faces such an asymmetry in at least two ways. First, insofar as it can accurately assess the quality of the workers in its employ, a cutback may be an opportunity to raise the average quality of its workforce by firing only the employees it finds least profitable. While an expansion could also give it an opportunity to try to raise average quality by hiring only the best, that's not such a good opportunity: the accuracy of assessing the quality of employees that are already in house is likely to be much higher (for any given effort at assessment) than the corresponding accuracy of determining the quality of outsiders. It's also simpler to fire the lowest quality current employee than to try to lure in a high quality new employee. An additional way in which employers are free to reduce labor inputs and the cost of contractual employees during a contraction is by letting attrition take its toll, costlessly and frictionlessly reducing its employment rolls (as opposed to the costly process discussed in Section II. A. 2 of searching for, training, and putting up with the mistakes of rookies).

3. Adjusting to rising cost requires no advertising

Given that the cost of some input rises enough to lead some purchasers of that input to raise the price at which they sell their output, such price increases directly increase the revenue of any firm that increases its price, but that benefit is somewhat reduced insofar as it lowers that firm's sales. This is just the symmetric flip side of what we saw in the case of decreasing costs, except that in that case it was also necessary for the price cutting firm to undertake advertising costs (to inform consumers who wouldn't otherwise know) while in this case such costs are unnecessary: the price hike by itself informs everyone who needs to know about it (i.e., the cashier or website that the customer is already visiting tells the new price to whoever wants to buy, and nobody else needs to know about the new price: the people who weren't interested in buying at the old price would be all-the-more uninterested in buying at the new price since it is higher).⁹

B. The time it takes for firms to respond to rising input prices

Section III. A discussed what firms have to do to reduce output in response to rising input prices, and the answer is: basically not much. Reducing output can be done easily and appropriately by plant managers at their sole discretion. A good ballpark estimate of the time required might be a day or a week. While there are, in fact, some things that are hard not to do (e.g., eating or breathing), production and sales tend to conform to the general rule that it's relatively quick and easy not to do something, much quicker and easier than doing something.

IV. The timing differences in dealing with rising and falling cost

Comparing Section II and Section III, we see that the case where a firm reacts to an increase in input costs is not the symmetric opposite of the case where a firm reacts to a decrease in input costs: these sections show ways in which responding to a fall in input price is relatively costly

⁹ The asymmetry in any market that we see by comparing sections II.A.3 and III. A. 3 seems similar to (albeit more general than) the asymmetry that Yang and Ye (2008) find in the specific case of their model of search with learning. The assumptions required for that model include: a continuum of firms (i.e., an infinite number of infinitely tiny firms) all identical and all having the same constant cost, a continuum of consumers who are identical (all demanding one unit up to a common choke price) except for their beliefs about what that constant production cost is. The conclusions from a model with so many restrictive assumptions are not as general as those this paper reaches.

(marginal cost may jump 25% in Section II.A.1) or relatively time consuming (taking months or years). The difference in time comes from considering changes in the stock of capital and contracts that falling prices lead to. And it's not just the costs, the expectations, and the risks that go into the analysis that change: the asymmetry in timing of price changes comes directly from the different bureaucratic environments in which the analysis is done (in one case at the plant manager's sole discretion, in the other case by a committee that proposes to upper management, who may then recommend to the board, any changes to the firm's capital budget). Not only will these calculations produce totally different answers, but we note that decisions that the plant manager makes on his own are bound to be done much more quickly and vigorously than decisions made through the board's capital budgeting process. Precise data and sophisticated econometric modeling are not required to see the asymmetry: the time commonly required to reduce output is surely measured in hours, days, or weeks; expansion can also be quick, but it commonly requires years. Thus, the time required to cut output is only a fraction of the time required to increase output, those two times are in two entirely different ballparks. Therefore, while the fall in an input's cost may eventually lead firms to decide to lower their prices, passing on some of their cost savings, it takes longer to make such a decision than the relatively easy decision in what at first seemed to be the symmetric case where an increase in an input's price leads firms to very quickly decide to pass those cost increases on to their customers.

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