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The price effect of cost changes: passing through and here to stay

Cost pass-through arises when a firm changes the prices of its products or services in response to a change in its costs. In the field of competition policy, practical interest in cost pass-through has often been focused on: (i) the extent to which cartel overcharges have been passed-on, in the context of private damages actions; and (ii) the assessment of merger efficiencies, where the distinction between merger-specific savings in fixed and variable costs has been to the fore.

However, cost pass-through has a far wider application than this. It is relevant to the assessment of efficiencies arising from horizontal and vertical agreements, for instance, as well as to upward pricing pressure tests in unilateral effects merger analysis, to analysis of double marginalisation and input foreclosure effects in vertical supply chains, and to the impact of policy changes that shift costs (or demand).

Recognising this broader relevance, the UK competition authorities commissioned a detailed research report on cost pass-through from RBB.[1] This Brief highlights some of the key theoretical and empirical insights from that report and, in doing so, addresses a number of common pass-through fallacies. In particular, it questions policy guidelines relating to agreements and mergers that presume pass-through of efficiencies to be less likely for firms with high market shares. The reverse is often true.

Determinants of cost pass-through: insights from economic theory

Economic theory indicates that the degree of cost pass-through is highly dependent on (i) whether a particular cost change is firm-specific or industry-wide, (ii) the market structure and (iii) the slope of the marginal cost curve.[2] This section discusses these important features which may be relevant, for example, when assessing the passing-on defence as part of a damage claim – a topical issue given the EU Antitrust Damages Directive.[3]

First, it is important to distinguish between cost changes that affect all the firms in the market and those that affect a subset of firms, or even just a single firm. Where a cost increase applies only to one firm, cost pass-through is "firm-specific"; where all firms are affected, it is "industry-wide". This is an important distinction because economic theory indicates that the impact of a "firm specific" change of given magnitude will be smaller than an "industry wide" change of the same size.

Second, market structure matters. In highly competitive markets, with neither buyers nor sellers large enough to influence the market price, pass-through of industry-wide cost changes will depend on whether the demand side or the supply side is more price-sensitive. Suppose, for example, that consumers are extremely price-sensitive such that any price increase at all would destroy the market for the goods in question. In this case, output would be reduced in response an increase in supply costs and some firm exit may occur but there would be no pass-through to prices (otherwise demand would collapse to zero). On the other hand, if the overall level of demand is entirely insensitive to price then cost changes will be fully passed through (with no change in output). For intermediate cases, pass-through will be greater the less price-sensitive is the demand side of the market relative to the supply side. Intuitively, the impact of the cost increase is borne most by the side that values the market the most (if consumers value the market relatively more than producers, they will be relatively insensitive to price and so will bear a greater burden of the cost rise).

1. See the report prepared by RBB Economics for the Office of Fair Trading (now the Competition and Markets Authority, CMA), available at: www.gov.uk/government/publications/cost-pass-through-theory-measurement-and-policy-implications (the RBB Report). A summary of the report's main findings was presented at the first of the CMA's seminars on economic research.

2. Where the cost increase relates to one input of many, another important feature would be the share of the downstream firm's marginal cost accounted for by the input whose cost has been inflated. The smaller the share, the less an increase in the input price impacts on the downstream firm's overall marginal cost and so the smaller the absolute downstream price rise.

3. See europa.eu/rapid/press-release_MEMO-14-310_en.htm. The passing-on defence occurs when a defendant argues that its direct customer passed on some of the cartel overcharge further downstream in the form of higher prices, thereby mitigating part of the impact of the overcharge.

In contrast, in the same (highly fragmented) markets, firm-specific shocks have no impact on market price at all. This is because a vertical shift up (or down) in marginal cost induces the firm to reduce (or increase) output. However, the firm's output is so small that it has no impact on the overall level of output and so no impact on the market price. Cost pass-through does not occur.

Turning to the other extreme, a firm with monopoly power will pass through changes in unit costs. Intuitively, when marginal cost increases, each unit of output is more costly to produce and so any firm, even a monopolist, will scale back its production. In turn, this pushes up the price.[4] An interesting question is by how much will price rise? The answer lies in the "convexity" or the "curvature" of the demand curve. Roughly speaking, if demand becomes more price-sensitive as price rises, pass-through will be lower. The converse applies if demand becomes less price-sensitive as the price rises.[5] Indeed, in some cases (e.g. isoelastic demand), a £1 cost increase would increase price by more than £1, so called "over-shifting".[6]

Third, the slope of the marginal cost curve also matters. Suppose that as a firm produces more, capacity constraints impinge to an ever greater degree such that unit costs increase. This is the case of a so-called "upwards sloping" marginal cost curve. Now consider the introduction of a tax per unit produced. At any given output level, it costs more to produce an additional unit than before. If some of the tax is passed through, demand falls. However, this fall in demand eases the capacity constraint and thereby mitigates the need to increase price in the first place. In other words, if the marginal cost curve slopes upwards, pass-through will be lower (all else equal).[7]

Intensity of competition and pass-through: policy implications

Economics predicts that as competition increases so, in many cases, does industry-wide cost pass-through.[8] However, this relationship does not hold for firm-specific cost pass-through. In fact, in many cases, firm-specific cost pass-through declines as competition increases. The reasons differ according to the setting, but a rough intuition is that the more competition an individual firm faces (and the more scope that its customers have to switch to rival suppliers whose costs have not been increased), the weaker is its ability to pass on higher costs. Likewise, if a firm benefits uniquely from a reduction in costs, it will require only a relatively small reduction in price to induce substantial switching to its products.[9]

This discussion flags up potentially serious flaws in some policy stances on pass-through. The EC Guidelines on Article 101(3) TFEU, for example, state: "The greater the degree of residual competition the more likely it is that individual undertakings will try to increase their sales by passing on cost efficiencies." However, this view is not supported by the economics. On the contrary, a number of standard models suggest that firm-specific pass-through will be greater in more concentrated markets. This is important: agreements might be more likely to infringe Article 101(1) when they are between firms with large market shares; however, it would be wrong to presume that those large shares also imply limited pass-through of any efficiencies generated. Likewise, where a merger gives rise to a large combined share and a merger-specific cost reduction, one should not presume pass-through to be unlikely simply on the basis of the merged firm's share.

4. Assuming that the demand curve is not flat (i.e. that demand does not collapse to zero if the price goes up).

5. In technical terms, pass-through is greater the more "convex" is the inverse demand curve. With linear demand and constant unit costs, the pass-through rate in the monopoly case is 50%. The more "convex" is the demand curve, the further above 50% is the pass-through rate, all else equal.

6. The analysis of cost pass-through may carry over straightforwardly to assess vertical shifts in demand. Just as an increase in marginal cost may lead to higher absolute margins (over-shifting), so a vertical fall in industry demand may cause absolute margins to increase.

7. For a general discussion, see Weyl, E. G., and M. Fabinger (2013): 'Pass-Through as an Economic Tool: Principles of Incidence under Imperfect Competition', Journal of Political Economy, Vol. 121, No. 3, pp. 528-583. Over the longer term, industry dynamics such as entry and exit affect pass-through too, and fixed cost savings may also be passed on.

8. As explained in the RBB Report, this requires that demand is not "too convex", marginal costs are constant and that firms are either quantity competitors selling an identical product or symmetrically differentiated price setters.

9. If costs fall, and if competition is very intense, only the smallest amount of pass-through may be required to switch consumers to the firm benefiting from the cost reduction. However, this logic does not apply with all theoretical models. Firm-specific pass-through is sometimes greater when firms face more rivals. The precise form of demand matters.

Measuring pass-through in practice

As discussed in the RBB Report, the limited empirical work on cost pass-through undertaken to date has identified a wide range of pass-through estimates and, unfortunately, no"regular" results emerge that would allow for sensible rules of thumb as regards a "typical" firm-specific or industry-wide pass-through rate.[10] Consequently, understanding of the pass-through rates that apply in particular settings relies on case-specific measurement.

There are a number of ways to estimate cost pass-through. At the qualitative end of the spectrum, internal documents may report the extent to which large historic changes in costs have influenced price setting (in which case it is important to identify whether such cost changes are firm-specific or industry-wide). Where sufficient data are available, econometric techniques may be employed. Empirical techniques are also able to take into account adjustment lags (e.g. where costs of changing prices – so-called "menu costs" – delay or even deter pass-through) as well as assessing the extent to which prices rise more quickly following upward shocks than they fall when downward shocks occur (the so-called "rockets and feathers" phenomenon).

The choice of empirical approach and the weight given to the estimates obtained must reflect the extent to which the estimation technique is able to take account of the large number of potential influences on price, cost and the pass-through relationship.[11] For example, if a general increase in the level of demand in an industry increases the prices both of final products and the inputs used therein, it would be inappropriate to observe higher input prices and higher final product prices and presume that the former caused the latter. Further, imposing a particular type of demand form when estimating cost pass-through may pre-determine the results (since pass-through is closely related to the curvature of the demand curve).[12]

It is also important to establish which of a firm's costs are liable to affect prices and are therefore relevant to the pass-through relationship, and to gather sufficient data to allow that relationship to be tested.[13] Whilst textbook economic models emphasise the key influence of short-run marginal costs in this respect, the pricing behaviour of firms in practice may also take into account longer run considerations, such as the recovery of fixed-cost investments – when pricing long term contracts, for example.

Cost pass-through and the impact of horizontal mergers

In recent years there has been growing use of "price pressure tests" in the assessment of horizontal mergers, in particular in retail markets. One such approach uses the "Gross Upward Price Pressure Index" or GUPPI, in conjunction with a firm-specific pass-through rate, to arrive at a so-called "indicative price rise" (IPR). The intuition underpinning this approach is that a merger creates a "cost of cannibalisation": in comparison to the pre-merger situation, a price reduction by one of the merging parties is less attractive post-merger, because any extra sales made come partly at the expense of the profit earned by the other merging party.[14] This cannibalisation cost can be thought of as equivalent to a firm-specific increase in one of the merging parties' marginal costs. The impact of the merger on prices then depends on how, post-merger, this cost change is passed through to prices.

The value of the approach relies, inter alia, on having a reliable pre-merger estimate of firm-specific pass-through.[15] Unfortunately, as noted above, it is hard to identify any general theoretical or empirical results about the likely magnitude of firm-specific cost pass-through in any given industry, other than that it will be less than the equivalent industry-wide cost pass-through rate.

10. Greater empirical research is important because most theoretical papers focus on the impact of small changes in marginal cost whereas, in practice, much larger changes are often relevant. Further, there has been little investigation of demand curvature in practice, limiting the use of combining theory on the shape of the demand curve and empirical estimates of curvature to narrow the range of plausible pass-through rates. Research in this area is developing, however.

11. See Sections 7, 8 and Annex A of the RBB report for further details.

12. See Section 5: Are demand curves isoelastic or linear? of RBB Economics, "The Joint OFT/CC Commentary on Retail Mergers: FAQ," November 2011

13. As we set out in our report, this relates not only to the distinction between economic costs and accounting costs but also to cases where "fixed cost" savings may be passed on in the form of lower prices.

14. The GUPPI for firm A captures the cannibalisation cost as a percentage of firm A's price.

15. Some other approaches assume a pass-through rate implicitly though the choice of demand curve (an isoelastic demand assumption, for example, gives rise to greater pass-through than linear demand).

Some policy messages emerge, however, in spite of the limited guidance available from the economic literature. First, using estimates based on industry-wide cost shocks (which may be more readily available) as a proxy for a firm-specific shock would overstate (potentially by very much) the predicted price increase. Second, to assume a pass-through of 100% (in the absence of any empirical estimate) is entirely arbitrary. So while a GUPPI test might have value as a screen (e.g. for ranking areas of concern), as an absolute test of harm it fares much less well.[16] Finally, if a high pass-through rate is employed to gauge upward price pressure absent efficiencies, then consistency dictates that any marginal cost reductions arising from the same merger should also be expected to be passed through at a high rate.

16. In addition, there may be measurement errors in relation to the inputs used to compile the price pressure test (e.g. in relation to margins and diversion ratios); the test itself may not be appropriate given the nature of competition (e.g. negotiated prices); and dynamic considerations (new entry and buyer power) may render the test unreliable.

Cost pass-through and bargaining power in vertical settings

In vertical settings, the cost pass-through framework provides a new perspective on well-studied problems such as the effects of double marginalisation and the outcomes of bargaining.

Consider a standard vertical setting, where a manufacturer sells to a retailer that in turn sells to final consumers. Here, there are two levels of pass-through: upstream (how manufacturing costs are passed on into wholesale prices) and downstream (how the retailer's costs impact on retail prices). The overall price impact of a change in upstream costs will depend on both. Interestingly a higher downstream pass-through rate can enhance a retailer's bargaining power with a manufacturer and reduce the degree of double marginalisation (i.e. where both the upstream and downstream firms mark up their prices over their respective costs). The intuition is straightforward: as the downstream pass-through rate increases, the manufacturer suffers a greater loss of volume if it increases its wholesale price and so the more price-sensitive is its perceived demand. More generally, in a bargaining framework it can be shown that a greater degree of pass-through at the retail level can diminish a manufacturer's incentive to mark up the wholesale price. A credible commitment by a retailer to pass-through higher wholesale prices could deter a manufacturer raising its wholesale price in the first place.

Conclusion

Cost pass-through offers useful insight across a wide range of competition policy settings as set out in this Brief and in greater detail in the RBB Report commissioned by the Office of Fair Trading (now the CMA). Not least, the determinants of cost pass-through are useful when assessing the merits of the "passing-on" defence in relation to damage claims following the finding of a cartel – such arguments may well be given more prominence as a result of the Commission Directive to facilitate damages claims by victims of antitrust violations.

Further, cost-pass through is relevant for the assessment of efficiencies arising from agreements and mergers. In that regard, the economics challenges the oft-stated view that more competition gives rise to greater pass-through. While that claim is often valid for industry-wide cost shocks, the reverse may be the case in relation to firm-specific efficiencies. This yields the following policy implications.

While the EC Guidelines on Article 101(3) TFEU suggest that a less fragmented market structure gives rise to lower pass-through of cost efficiencies, in fact the opposite may be true. All else equal, a given marginal cost saving may be more likely to benefit consumers when it applies to a firm with a high market share than a low market share.

By the same token, a closer study of pass-through economics can also shed light on merger-specific efficiencies. The paucity of successful efficiency defences may well relate to the difficulty of persuading authorities that efficiencies are sufficiently large, timely and merger-specific. But to the extent that the poor track record of merger efficiency defences reflects a presumption by competition authorities that fewer firms and higher market shares make pass-through of firm-specific efficiencies less likely, such a view is not justified by the underlying economics.