Is Cost-Cutting Evidence of X-Inefficiency?

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X-inefficiency is surely among the most important topics in microeconomics. Yet, economists have found it difficult to study. If a given level of X-inefficiency were inevitable and changeless, it would be of little interest (indeed, would not really deserve to be called X-inefficiency at all). Thus, our attention should focus on actual and potential *changes* in X-inefficiency: that is, on causes of changes, internal to a firm, that shift the firm's cost function. We explore the use of firms' "cost-cutting" announcements to study the causes of changes in X-inefficiency.

Cost-cutting announcements by large corporations are made frequently and are reported in the business press. One might be tempted to interpret these announcements as indicating efforts to reduce X-inefficiency, and indeed we think that a substantial number of them are just that: our discussions with managers confirm that finding and trimming "fat" within the corporation is an important, yet somewhat intermittent, activity.

It is also clear, however, that not all cost-cutting announcements concern X-inefficiency. Some, perhaps many, may instead be reoptimizing (input and/or output) quantity responses to changes in exogenous factors, such as the prices of inputs or outputs. The announcements seldom make it clear whether the activity is reoptimization or fat-trimming.[1]

We aim to explore the existence and nature of fat-trimming within a firm, and how one might distinguish this from normal reoptimization. In particular, we seek evidence bearing on a central hypothesis in the informal theory of X-inefficiency (Harvey Leibenstein, 1966), with very broad support in news reports, in popular belief, and in our interviews with managers. This *fat hypothesis* is that a firm is most apt to cut costs to reduce X-inefficiency when it is under financial pressure. This hypothesis, if correct, has implications both for firm strategy and for competition policy.

While Olivier Blanchard et al. (1994) studied the effects of idiosyncratic cash shocks, it seems desirable to find a more systematic source of wealth shocks. One such source is exogenous changes in the prices of competitively supplied inputs or outputs. In Borenstein and Farrell (1999), however, we explain that not only must the price changes be out of the firm's control, they must also leave the firm's production possibilities unchanged. For instance, if the price of oil increases due to political instability, that raises the expected profits of U.S. oil companies on the oil they will be able to sell in any case, but it might simultaneously indicate reduced opportunity to explore for oil in the future. Likewise, if the technology for gold mining improved, the price of gold would fall, but the availability of the new technology to firms under study would offset the price change and could result in a net positive wealth shock (and increase their optimal production quantities). One might assess the source of price changes by examining quantity changes (potentially differentiating between supply and demand shocks), news reports, or the technology involved.

Drawing inferences from cost-cutting announcements faces another problem, because a price shock that (say) lowers the firm's overall profitability is likely also to lower its marginal

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[1] There are other data problems, including the following: (i) the division(s) in which the cost cutting is to occur are usually not precisely reported; (ii) magnitudes are not systematically reported (and usually are projections); and (iii) multiple reports of a single cost-cutting effort, sometimes months apart, are common.

profitability. Thus, the null hypothesis that firms simply are reoptimizing likely predicts that the firm will reduce output and presumably also reduce at least some inputs; this might be announced as "cost-cutting." So, it would seem that cost-cutting announcements in response to adverse price changes fail to distinguish between the null and fat hypotheses.[2]

Knowing the elasticity of the firm's supply curve might allow one to distinguish the hypotheses. If the supply curve is highly elastic, then an output price change will induce relatively large changes in optimal quantities, with relatively small effects on firm wealth. In contrast, if the supply curve is highly inelastic, then a price change will have significant wealth effects but will not induce much reoptimization. If supply elasticities vary across firms in an industry, one might test whether exogenous output price reductions cause greater cost-cutting among elastic- or inelastic-supply firms. In the remainder of the paper, however, we turn to strategies that instead use information on more than one market.

I. Cost-Cutting in Multi-divisional Firms

The internal-capital-markets literature in corporate finance suggests another approach to diagnosing fat-trimming. That literature has shown in various industries that divisions within the same firm cross-subsidize one another in financing investment. Owen Lamont (1997) shows that after the 1986 oil price crash many oil-producing companies cut back investment in divisions unrelated to oil (or divisions whose marginal profitability would likely rise with oil price reductions).

Some authors ascribe such changes to principal–agent problems within the firm that cause managers to make negative-NPV (net present value) investments with free cash flow, a form of fat in the firm (Michael Jensen, 1986). Others suggest that evidence of internal capital markets could reflect the firm's optimal response to inefficiencies in external capital markets. If the cross-subsidy reflects nonoptimizing behavior within the firm, it need not be limited to investment decisions. Negative wealth shocks to one division in a firm could trigger fat-trimming in other divisions.

Anecdotal evidence of this sort of corporate-wide belt-tightening is abundant. Our plan is to see whether this effect can be documented empirically. We identify a number of potentially testable empirical hypotheses.

First, under the null hypothesis that fat-trimming does not take place (or is unrelated to firm wealth) one would expect that a wealth shock to one division should not induce cost-cutting behavior in another unrelated division. The fat hypothesis would predict that a negative wealth shock in one division will trigger fat-trimming in other, even unrelated, divisions of the same firm.

Second, and closely related, under the null hypothesis, a division's cost-cutting would be unrelated to the size and degree of diversification of the corporation within which it is situated. Under the fat hypothesis, wealth shocks in a division would have implications for the entire firm, and the cost-cutting behavior of a division would be less responsive to its own financial performance if it is located within a large conglomerate.

Two cautions are in order. First, if capital markets are imperfect, such cross effects could arise even under the null hypothesis, as in the corporate-finance literature. Second, there is a problem with treating corporate structure as a natural experiment: one should ask why a firm chose the structure it did. For instance, many oil refiners are integrated into oil extraction; we should ask whether the reason might be synergies that would affect cost-cutting of the reoptimizing type. Thus, if it were highly advantageous to refine "one's own" oil (which does not appear to be the case in fact), the quantity decision problem for an integrated refiner/extractor could be different from that of a similarly sized stand-alone refiner.[3]

[2] For example, consider a company that owns oil wells. When the price of oil falls, the null hypothesis predicts that the company might reduce output because the marginal cost of producing from some wells now exceeds the price. But the price decline also lowers the wealth and cash flow of the firm, so the fat hypothesis also predicts cost-cutting.

[3] We say "could be different," because an integrated refiner that is buying its *marginal* crude oil externally faces a marginal decision that is likely to be identical to a firm that has no inframarginal crude supplies at all.

Economies of scope, in general, could make it difficult to distinguish reoptimizing from fat-trimming types of cost-cutting. A change that optimally lowers production in one division could, in the presence of scope economies, raise marginal production costs in another division and, thus, optimally lower production in the latter division as well. Note, however, that this explanation requires scope economies *on the margin.* If the scope economies are only common fixed costs that are independent of scale of the divisions, the change in output of one division will not cause reoptimizing in the other division.

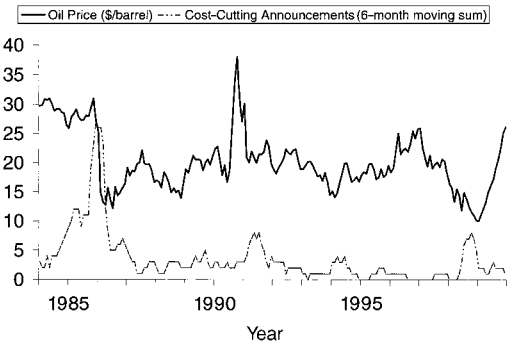

FIGURE 1. OIL PRICES AND COST-CUTTING

II. Vertical Integration as a Special Case

In a firm that is vertically integrated (e.g., a firm that both extracts and refines crude oil), a shock to the intermediate-good price (crude oil) may raise the profits and optimal scale of one division even as it lowers them for another.

At first, intuition might suggest that a fully vertically integrated firm (one that refines all of, and only, its own oil) is insulated from the wealth effects of a change in the price of the intermediate product. But the effect is actually more complex. There are, for instance, significant Ricardian rents in the oil-extraction business that change one-for-one with the price of oil. The refining business, on the other hand, is considered very competitive. The effect of an oil price change on the profits from oil refining is likely to be comparatively short-lived and small. Thus, for a firm to be wealth-neutral with respect to supply-shock-driven crude-oil price changes it would have to maintain much larger operations in refining than in extraction.

A price change exogenous to the firm may come from demand or supply shocks. A change in the intermediate-good price due to a supply shift will indeed affect the upstream and downstream divisions of the firm in opposite ways, so vertical integration will provide some wealth insulation. If, for instance, the price of crude oil declines due to an oil-field discovery that does not involve the observed firm, this will cause a negative wealth shock to the firm's oil-extraction division. However, it likely also will raise the expected profits, and optimal production quantity, from the firm's oil-refining business. Thus, if we observed cost-cutting in the firm's refining business after an exogenous decline in the price of crude oil, this would be consistent with the fat-trimming hypothesis and hard to square with the null hypothesis of optimizing behavior (absent significant scope economies).

In contrast, oil price changes due to demand shocks are apt to produce positively correlated wealth, and optimal-output, effects in the upstream and downstream divisions. If a weak world economy pushes down oil prices, its effect on the returns to operating an oil refinery also is likely to be negative. Both divisions of the firm could then plausibly engage in cost-cutting of the reoptimizing type, reducing output and laying off workers. Thus, demand-driven oil price shocks are not especially helpful for distinguishing between the null and fat hypotheses.

III. Cost-Cutting in the U.S. Oil Industry

We have collected 122 cost-cutting announcements by major U.S. oil companies since 1984. Figure 1 shows the time series of monthly oil prices and cost-cutting announcements. Because of the lag between price changes and the responses of firms (and to keep the scales of the two series in the same range), the cost-cutting series for each month is the sum of cost-cutting announcements in that month and the five following months.

Figure 1 indicates that cost-cutting announcements tend to follow oil price declines. As discussed above, however, this is just the be-

ginning of an attempt to discern fat-trimming statistically. Less quantitatively, the texts of some cost-cutting announcements support the fat-trimming hypothesis. For example, a March 1986 *Wall Street Journal* report on Amerada Hess, an integrated oil company, says that the company has announced it will respond to the plunge in oil prices by, among other actions, reducing output from its Virgin Island refinery since it has been losing money in its refining business (John D. Williams, 1986).

IV. Conclusion

We think that X-inefficiency merits much more empirical analysis. Our interviews with managers in two industries in which companies are subject to large wealth and profit fluctuations (gold mining and oil production/refining) strongly support the hypothesis that fat-trimming occurs in response to wealth and profit declines. We hope to use a panel of observations on major U.S. oil companies to distinguish fat-trimming, which conflicts with standard microeconomic analysis, from reoptimizing behavior that is central to standard microeconomics.

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