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Dealing with Prices in a Quantitative Pricing Study

Price points are the most important aspect of every pricing study, since these data provide the foundation for the pricing strategy resulting from the pricing study! However, price points are often the aspects of pricing studies that management most overlooks. In this article, the author explains the importance of studying price points and provides guidelines for planning the studied price points using both observational and experimental data. Walter R. Paczkowski, Ph.D. is President of Data Analytics Corp. and is leading a workshop at the PPS Fall Conference entitled "Innovative Quantitative Techniques for Estimating Elasticities" on October 25. He can be reached at info@dataanalyticscorp.com.

I've often observed that every aspect of a pricing study, such as the budget, sample size, target audience, and even the team responsible for the study was carefully planned, organized, and frequently, hotly debated. **Everything except for the most important aspect - the price points.** I frequently heard: "We'll get to that later."

This is odd, to say the least, since they were the very focus of the studies! Why should they command any time when headier project issues demand attention? After all, a price is a price, whether it's historical in a data mart or "known" by management who needs just two minutes to write it down. **Management only needs the final price point from the study to use in the market. This is short-sighted.**

The price points studied should not be given short shrift. They should be discussed, debated, and planned upfront like everything else. Too much rests on the final one chosen since its effects reach into every aspect of the business. Certainly, it's the basis for revenue. But it also determines if new customers will be acquired; if repeat customers will be retained and incented to buy more; if more production capacity will be needed; if a larger work force can be supported; and so on throughout the business.

Everything rests on the final price because if customers cannot afford it, then they simply won't buy. At the end of the day, something must be sold and that depends on the price.

If we must be careful and thoughtful about the price points studied, what should we consider? It depends on whether observational or experimental data will be used. The following are guidelines for planning the studied price points.

> In a database marketing study, the price points should have ample variation to allow estimation of price elasticities.

Observational Data

Observational data are observed in the market, then collected and organized in a database. They're what happened; they're ex-post. The observed prices in the database are market determined and so are often believed to be ready for use, as is.

Many marketing managers and pricing analysts argue that because they reflect actual market behavior, they're the best to use. What could be better? A lot!

Here are some points to consider for an observational pricing study:

Have variation in the price data. In a database marketing study, the price points should have ample variation to allow estimation of price elasticities. The most popular estimation technique is ordinary least squares (OLS) regression. Many people are trained in simple regression, so it's a natural tool for estimating elasticities, the key to pricing.

The OLS formulas, however, require variation in the data since they're defined in terms of deviations (i.e., variation) from the means. Without variation, there are no estimates. We can develop estimates with little variation, but they will be questionable.

Prices for some products do not change often enough or by large enough amounts because of the nature of the products' markets or the time period covered by the database. The observed market behavior may thus be insufficient for estimation. Hence, questionable OLS elasticity estimates may result.

Use real prices. If a time series is used, then prices should be adjusted for the general cost of living. In other words, to use economists' terminology, use real prices.

Unadjusted prices are nominal prices,

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prices we actually observe. **Real prices reflect the prices of other things consumers could have purchased with their limited, often fixed, income; nominal prices do not.** If the nominal price of some other product consumers always buy increases, they will buy less of it.

Any money saved by buying less, even at the higher price, will be spent on something else. After all, the money has to go somewhere. A product's sales could be affected even if its nominal price does not change. It will look less expensive in relative terms so its effective or real price has fallen.

Use recent price history. Old data is stale data. If the market is dynamic, constantly changing with new products and offerings, then older data may not reflect conditions under which people are currently making decisions. New tablet computers are a good example.

Include competitors' prices. This goes without saying. No one competes in a vacuum, so why price in one? But including competitors' prices may lead to a statistical problem called multicollinearity. This basically means that the prices are correlated and because of this elasticities are difficult to estimate, if they can be estimated at all.

Economists divide, or deflate, nominal prices by an appropriate price index such as the Consumer Price Index. A more appropriate index for the product category should be used. For example, beverage prices should be deflated by the CPI for food and beverages, a subset of the overall CPI.

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This issue will surface when competitors typically follow one another: if one competitor raises its price, then all prices increase. Complex estimation method will then be needed.

Use marginal prices. Economists talk about deciding at the margin, meaning the last unit such that someone decides to do or not do something. They discuss marginal revenue, marginal cost, margin product, marginal utility, and marginal price. The marginal price is at the point where a consumer will or will not buy a product.

An average price is different. It's calculated by dividing sales revenue by the quantity sold. The logic is that sales revenue is price times quantity so dividing by quantity sold gives back the price. This is typically done when several prices are involved, as with a multi-part tariff, so that sales revenue is an easily calculated metric. The quantity would be gross units sold. The resulting "price" is the average over all units sold.

The problem is that average price falls as the quantity sold increases. So, quantity determines price. But price determines quantity (which, by the way, is the focus of the pricing study) by the downward-sloping demand curve.

This is a simultaneous equations problem resulting in biased elasticities if OLS is used. Since all pricing decisions are based on elasticities, the final price point used in the market will be incorrect.

The marginal price avoids the simultaneity issue. Unfortunately, it's not always easy to determine. If there is only one price for a product, then that's the marginal price. If there are multiple prices for a product as with a declining rate schedule, then there are many marginal prices. Different ways have been proposed to handle this, but this is a complex issue best discussed another time.

Experimental Data

Experimental data are collected through a market research study such as conjoint or discrete choice in which consumers are shown hypothetical price points. These studies are experimental because the analyst has control over what is used, whereas in an observational study the analyst has to use what's in the database.

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The experimental approach allows the analyst to study situations that don't currently exist in the market; basically, to play what-if games to determine what could happen. Because there's more freedom to choose prices rather than take prices as given, the analyst can also make more mistakes.

Here are some points to consider for an experimental pricing study:

Use only a few price points. Not all possible values have to be tested since a statistical model will be estimated. The model can be specified so that the effect of any intermediate price can be determined, even if the intermediate price was not part of the study per se.

This does not mean that a price outside the range of prices shown can be used. It does mean that a price intermediate between the maximum and minimum shown can be determined by interpolation. This is frequently done in a simulator which allows the pricing analyst to test any price point.

Use evenly dispersed price points. Try to have evenly dispersed price points. Don't have, for example, $1, $3, $5, and $25. Interpolation involves finding linear segments between points and without an even spread interpolation is difficult to justify.

Ensure sufficient variation. In addition to not using all possible price points, ensure sufficient variation in what is used for the reasons discussed above for observational data. The analyst is not hampered by actual market prices so flexibility is gained in specifying price points.

Have some meaningful distance between price points. Do not have price points that are too close to one another or that increase by small increments. For example, avoid prices such as $1.10, $1.15 $1.20, $1.25 because there's not much distinction between $1.10 and $1.15 or between $1.20 and $1.25. In a discrete choice study where consumers are asked to make comparisons, they could (and probably will) view the difference between $1.10 and $1.15 as too trivial to make a difference.

> A quantitative pricing study should include price points that are meaningful for the business, meaningful for the consumer, reflect the current and possible potential market, and are varied.

Their focus could then be on other factors, minimizing the importance of price. As a result, price would become insignificant when in fact it should be highly significant.

Use reasonable price points below and above current market prices. Managers frequently say that prices for their product category will never fall below the minimum currently in the market, so why waste time using a lower price in the study? Then one month after the study is completed, a competitor announces a lower price completely negating the study!

The purpose of the experimental approach is to evaluate what-if scenarios. If it's really believed that a lower price is impossible in the market, then it should be ignored in the simulator.

Include the competitors' prices. This was discussed above. But the point about reasonable prices points emphasizes the need to include competitors' prices. If they're not included, then there's no way to judge the effect of competitors. Cross-price elasticities cannot be calculated. Multicollinearity will not be an issue because of the way the experiments are constructed.

Final Recommendation

The recommendation is clear. **A quantitative pricing study should include price points that are meaningful for the business, meaningful for the consumer, reflect the current and possible potential market, and are varied.** This is a lot to consider, but why do less?