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How Much Does Research Increase the Market Value of a Company?

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Qualitatively, it is clear that doing research tends to increase the market value of a company. Otherwise, companies would not spend money on it. Its effect comes from providing new product opportunities, decreasing costs through product improvements, improving recruiting ability, making a company more technically alert, providing a base of internal expertise, and more. But how large is the effect on average? And, since some companies appear to be affected more strongly than others, how much variation is there from one company to another?

One answer to these questions has been provided by showing that there is a correlation between the price/earnings ratios of stocks and research spending (Gilman, 1978). However, P/E ratios have shortcomings, (Fisher, 1984). They can be largely due to premium prices, or to deficient earnings. If there are no earnings, they are not defined, although companies without earnings may be relatively rich in assets. Therefore, an examination of the correlation between market price and research spending is presented here, as well as a comparison with the P/E correlation for the same companies. More specifically, the correlation between the price/sales ratio and the research expenditure/sale ratio is considered.

For steady-state situations earnings are a more meaningful measure of effectiveness than sales. But, during transient situations such as start-ups, turnarounds, changes of direction, and the like, sales may have more meaning because they are a precondition to earnings.

The sample chosen for this study is the list of the 100 U. S. companies that spent the most on R&D in 1983 (Inside R&D, Vol. 13, #23, 1984). This list is published annually, but only data for 1983 is examined here. Values for the prices per share were obtained from the January 4, 1984 issue of The Wall Street Journal; while the shares per company were obtained from the 1984 edition of the Standard and Poor's Stock Guide. For comparison, P/E ratios were also considered (for January 4, 1984).

A plot of total price versus research expenditures (both quantities divided by sales) is shown in Figure 1. The least squares regression line that is drawn through the data represents the equation:

\[
\left(\frac{P}{S}\right) = 0.238 + 12.5 \left(\frac{R}{S}\right)
\]  

(1)
with a correlation coefficient of 0.61.

A similar plot can be made for the \( P/E \) ratios of the same companies (with 10 deletions because of non-positive earnings). In this case the equation of the regression line is:

\[
\frac{P}{E} = 9.09 + 108 \left( \frac{R}{S} \right)
\]  

(2)

and the correlation coefficient is 0.54.

In both cases the correlations are positive, but the \( P/S \) case has a correlation coefficient that is 13% larger.

The slope coefficient (12.5) measures the statistical leverage that research spending exerts on a company's price. On this basis, an increase in the \( R/S \) ratio of unit amount may be expected to lead to an increase in the \( P/S \) ratio that is 12.5 times greater (for \( R/S \) less than about 0.15). Thus, the statistical leverage is large. This does not mean that doubling the research expenditures of any given company will double its price. A better interpretation is that if a given company were to behave like those companies that spend twice as much on research, their prices might double. Also, at a given level of \( R/S \), a company with relatively low \( P/S \) could expect to increase its \( P/S \) value to the regression line level, by spending its research monies more wisely.

The coefficient of determination (square of the correlation coefficient) is 0.37 (compared with 0.20 for the \( P/E \) ratios). This indicates that roughly 1/3 of the increases in the \( P/S \) ratios of these companies above the base level of 0.24 is related by research spending. This is not to say that it is "caused" by it because the relationship may be indirect.

In order to see whether there is qualitative consistency with the quantitative results, consider the short list of companies from this set that have \( P/S \) ratios greater than 2. They are:

- Hewlett-Packard
- Merck
- Intel
- AMP
- Wang Laboratories
- Searle
- Syntex

and most of them are admired for their strong research programs. On the other hand, consider the seven companies with \( P/S \) ratios less than 0.25. They are:

- Ford
- Allied
- Mobil
and few of these have notably strong research programs. Thus, qualitative consistency is confirmed.

Another check for consistency can be made by considering the (P/R) ratio. From an investor’s viewpoint, this should not exceed 15, according to Fisher. The part of (P/S) that depends on (R/S) in Figure 1 may be divided by (R/S) to obtain an adjusted value for (P/R). This is just the slope coefficient, or 12.5; a value quite close to Fisher’s rule-of-thumb. In other words, the regression line given here represents a prudent relationship between prices and research spending levels.

It should be emphasized that Figure 1 describes the behavior of a large ensemble of companies. It does not describe how individual companies will behave because too many factors in addition to research expenditures are involved.

The data given here certainly support the position that effective research is a lever of considerable power for companies to use in their quest for increased value.

REFERENCES


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Market price versus research spending
(100 companies with largest 1983 research expenditures)
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