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Practice Update

A Tool For Budgeting Corporate Innovation Programs

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For business today, it is critical to have active research and development and innovation programs to develop new competitive products and infrastructure, and to patent these innovations to obtain a patent monopoly for them. This is particularly critical for innovative technology companies, whether publicly traded or pre-initial public offering. A significant budget allocation for each of these items is needed for these innovation programs. A tool is discussed here to benchmark and rank these programs, in order to support the budget process, and to serve as a leading indicator of stock price for the investment community.

What Do I Budget for Innovation Next Year?

Over the years, we have received a recurring question from clients, usually around November, regarding budgets for innovation. It goes something like this: "We are making our budget for next year. How much should I put down to spend on R&D and patents?"

The Innovation Score and Peer Group Ranking

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In response to these questions from clients over the years, we have developed an algorithm to score the innovation program of a company. This innovation score allows an objective quantification of the impact of the innovation program. This score acts as an index to rank the subject company among its peer group of competitors. Then to manage by objectives, the chief financial officer can choose what ranking he wants his company to target for next year.

Note that the innovation score is a function of various objective parameters such as the number of new patents, patent application expenses, patent litigation expenses, R&D expenses, revenues, the growth of revenue, the operating margin, and the growth in profits. Hence, the CFO can work backward through the function from the target value of next year's innovation index, to calculate the required input factors needed to obtain that target, such as R&D expenses, the number of patents obtained, patent expenses, patent litigation expenses, the number of new products launched, etc.

Also, to bring the story of the company's innovation to the customer and investor community, management of the superior performance company can describe their innovation index ranking versus their peers, to explain in objective terms their superior performance. For example, it would be valuable for a company if they could state, based on an objective quantitative algorithm, that they were ranked as "No. 1 in innovation" in their industry.

Validating the Algorithm

The key to validating the algorithm used for the innovation score, is a multiple regression analysis to investigate the correlation between the innovation scores of the constituent companies in a market sector for a time period T, against the change in the stock price of the companies in the following time period T+1. This correlation is measured by the R2 statistic, where there is an R2 materially above zero. This indicates that the algorithm in that market

sector is calculating an innovation score that has a significant correlation with future stock price, and a significant impact the market capitalization of the company. This is, of course, as it should be for a correctly calculated innovation score, since successful R&D, product launches, and intellectual property development will increase enterprise valuation. Indeed, it is a good definition of a successful innovation program that the program increases the market value of the company.

Case Study: Big Cap Oil Service Companies 2015-2016, Based in Texas

One example of this approach is the measurement of innovation on market cap for large cap companies in the oil service industry, in 2015 and 2016.

The companies analyzed included Schlumberger Ltd., Baker Hughes Inc., GE and GE Oil & Gas, Dril-Quip Inc., Weatherford International PLC and Halliburton Co. For 2015, their innovation programs were analyzed and measured, and the company innovation index was calculated for each. The innovation indexes were then correlated against the change in stock price (market cap) for each company for 2016, the year after the calculated Innovation Index.

A Leading Indicator of Stock Price

The results are shown in this graph. The vertical Y axis is the calculated corporate innovation index for 2015. The horizontal X axis is the change in stock price for the following year 2016. A multiple regression on the data shows a clear positive linear correlation between the innovation index and the subsequent stock price movement. That is, the better a company's innovation, R&D and intellectual property program, the better its stock price performed. Because of this correlation, the innovation index serves as a leading indicator of stock price movement.

A vital lesson of the innovation index analysis is "more"; that is, more innovation, more product improvement, and more new patents, yields more subsequent growth in stock price.

Applicable to Many Industries

A similar correlation between innovation measured by the innovation index and subsequent stock price movement have been found in a variety of industries, during a variety of stock market trends. These industries include medical devices, computers, pharmaceuticals, software, oilfield equipment, telecom and finance. (Yes, finance. Banks are technology companies, too. They have R&D budgets and patent portfolios. The innovators out-perform, and that can be measured.)

As a novel leading indicator of stock price, it is not surprising that the innovation index has found interest in the investment fund industry, in addition to corporate management.

An Opportunity for Competitive Advantage

Another very valuable observation of this analysis is the wide divergence of innovation practice and results. That is, some major players innovate far more than their competitors. This superior innovation correlates with superior subsequent stock price performance. The leading innovation company in this oil service industry group had a 2015 innovation index of 30.68, and its share price was up 35.60% in 2016. But the worst corporate innovator in the list had a 2015 innovation index of only 5.62, and its share price was down by 43.87% in 2016.

Hence, there is a great opportunity for a company to beat the competition by out-innovating the competition. And this can be measured and quantified for management to budget and plan. That is, by reference to the multiple regression trend line in the chart, the question can be answered: If

management wants to increase its competitive ranking in its industry by, say, x%, then should it increase its innovation budget by y%?

Case Study: Software, the Bay Area

A second case study of this technique involves a client that is a publicly traded software company. The general counsel and CFO approached us saying, “We feel that we are under-patented, compared to the competition, however, we need a better pitch to our CEO to obtain more patent budget. What can we do?”

Discussions between the CFO, the general counsel and the CEO went along subjective lines only. The CFO would say something like, “I think we need to spend more on product development and patents.” The CEO would respond, “I don’t think so. We’ve gotten this big without spending more, so why should we start now?” The CFO would respond, “But I really think we should spend more.” And the CEO would then respond, “But I really, really think we shouldn’t spend more.” Nothing much would be resolved by this exchange of subjective impressions.

So, we did a quantitative analysis of the innovation scores for this company and its 12 most relevant competitors. We calculated recent innovation scores for each company. We correlated the innovation scores against subsequent stock price movement for each company, and we got a significant R2, which validated that algorithm in that sector.

The study showed that our client, out of 13 competitors in the niche, ranked 12th in the impact of its innovation program. At that point, we could go back to the CEO and the board and point out to them that the very low ranking in the industry validated the subjective feeling of the CFO and general counsel that they were under-innovated, or at least under-patented.

We then further used the algorithm for the innovation score to calculate the budget line items and performance measures that they would need to have used that year to have gotten up to the median score for their sector, and alternatively, up to the top quartile score for their sector. Then we computed what the algorithm would require for key line items in the budget for R&D, patents, patent enforcement litigation, trademarks, new product launches, and other data points. We then estimated how much each of these items would cost. This then indicated, on an objective basis, what the company would require for budget line items to achieve the target innovation ranking for next year, assuming the industry performed about the same.

As a result, for the next year, the budget was increased a material amount, targeting an increase in the company's innovation ranking to the third quartile in its peer group, up from the fourth quartile. There was an opportunity for further improvement, but management decided that budget restraints did not permit even greater improvement that year. However, budget decisions for limited improvement were made based on an objective analysis of the circumstances, rather than on gut feelings.

Case Study: Medical Devices, Silicon Valley

A third case study is instructive guarding a medical device company. This company came to us and said, "We are the most innovative in our sector of the industry, but we would like some way to communicate this to the investor and customer community to help product sales and stock price support. How can we do this?"

To help present the story, we calculated the innovation score for the peer group of competitors in that market sector. The analysis showed that the subject company was in the top quintile in its peer group. We ran a multiple regression analysis for the innovation scores for the company's peer group for

period T, against stock price movement in period T+1. An interesting R2 statistic was shown indicating correlation. This indicated that the innovation scores calculated by the algorithm were leading indicators of stock price movement. This was then used in discussion with private equity and potential buyers to seek a premium in the price and terms in the next equity transaction. The comparative analysis of the innovation scores within the sector provided an object basis for this discussion.

Algorithm Research

An important question is what specific algorithm is best for calculating the innovation score. What are the different data variables used, and what are the calibrated coefficients for the input variables? For any such algorithm, it is required that only publicly available data be used. Otherwise, it would be impossible to calculate innovation scores for companies that are comparable across an industry. The data inputs may be esoteric, not commonly used for these purposes, and in awkward databases, but as long as the data can be extracted from various public sources, it can be used to compare all companies in the sector.

We found that using statistics for R&D expenditures, patent litigation and intellectual property development (such as patents and trademarks), together with various reported financial data, can lead to good results. Different variations of the core algorithm may be used in certain circumstances, and the optimum algorithm may vary by industry sector. However, we have found that one basic algorithm works well in a disparate variety of industry sectors. Of course, for analysis of a peer group, the same algorithm must be used for the innovation score for all of the companies in the peer group for a given year.

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