Strategic Innovation through Business Intelligence

James K. Ho[+]

University of Illinois at Chicago IL 60607, USA

Abstract. We show how Porter's five forces that shape competitive strategies can be linked directly to long term profitability of industries, as measured by the return on invested capital. As the five forces framework has become a staple approach to strategic analysis, playing a key role in both business practices and academic studies, this quantitative linkage to profitability provides analysts a powerful tool to evaluate their business propositions based on their subjective rating of the competitive forces involved. Of even greater potential is the prospect of a systematic exercise to train managers in innovative strategies through business intelligence, by benchmarking businesses facing like forces outside of one's industry, rather than conventional practices within one's own.

Keywords: strategic innovation, competitive forces, return on invested capital

1. Introduction

In Porter's framework of five competitive forces that shape strategies, one gets the general sense that the stronger the forces, the more difficult it is for an industry to stay profitable. In the most recent update [1], data on the return on invested capital (ROIC) was compiled for 31 industries from 1992-2006 as shown in Figure 1. However, there is no successful attempt to date to link such profitability measures directly to the competitive forces. We show that such a correlation can indeed be established. Specifically, if the five forces facing a particular industry are rated on some scale of, say, from 1 to 5, with 5 being the strongest, then the average ROIC for the industry from 1992-2006 is given by a multi-linear function of these force ratings. The closeness of fit is such that 98% of the variations in the data can be explained by this functional relationship.

1.1. Competitive Forces and Profitability

As the five forces framework has become a staple approach to strategic analysis, playing a key role in both business practices [2] and academic studies [3], our quantitative linkage to profitability provides analysts a powerful tool to estimate profitability of their business situations based on their subjective evaluation of the competitive forces involved. For example, in the case where a manager has determined that the five forces: competition among existing players, threat of substitutes, power of sellers, power of buyers, and threat of entry are rated 5, 4, 3, 4, 2, respectively, our function returns a ROIC of 13.4%.

Much as we can claim a remarkable closeness of fit, our function formally relates generic forces facing entire industries to their average profitability over a relatively long term of 14 years. Any application should be considered in such context. Therefore, continuing with our example, it may be most useful for our manager to realize that 13.4% can be the expected long term ROIC for the industry on hand, or the status quo. If he or she is actually contemplating a strategy that would reduce the rating of power of buyers from 4 to 2, for instance, the ROIC will improve to 16.7%. This means the manager may be elevating the business into a comparable, more profitable category of industries with an average long term ROIC of 16.7%. But it is not a prediction that his or her business will attain such profitability just by using the new strategy.

1.2. Brief Summary of the Five Forces

Entry of new competitors:

The ease with which new entrants can overcome any existing barriers to start competing in the industry.

Bargaining power of suppliers:

The ability of suppliers to capture more of the value in the supply chain for themselves.

Bargaining power of buyers:

[+] Corresponding author. *E-mail address*: jimho@uic.edu

The negotiating leverage with which buyers exert pressure on the industry.

Threat of substitutes:

The availability of product or service that perform the same function by distinctly different means, and at comparable or more favorable costs.

Rivalry among existing competitors:

The extent, in terms of both the basis and intensity of competition that tends to drive down an industry's profit potential.

2. Rating of Competitive Forces for US Industries

In order to establish a linkage between industry profitability and the five forces, we need to quantify the latter. Using typical guidelines derived from the original concepts for this model, we use a focus group approach to rate the intensity of the forces on a scale of 1 to 5, representing categorical ratings from Weak, Medium-Weak, Medium, Medium-Strong, to Strong, respectively. We are mindful that this exercise refers to entire industries over a span of 14 years (1992-2006). To formalize the procedures, we use SIC codes [4] to identify an industry. Then, we look up the online resource at Answers.com for a synopsis of the industry, including its brief history, organization and structure, background and development, current conditions, as well as its industry leaders. With leads from such material, we research further the competitive environment of the industry by studying in particular the section on risk factors in annual reports of representative companies. Relevant articles in the business press, reports of trade associations and industry watch groups are surveyed where available. Based on widely available templates used by business consultants and academic researchers (see e.g. [5]), we compiled checklists that can be customized for specific industries.

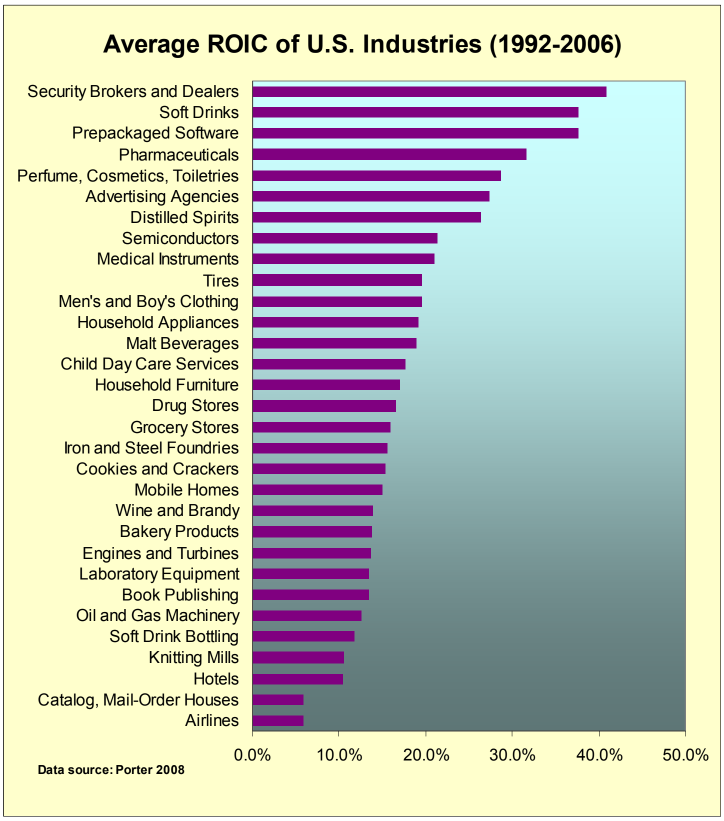

Fig. 1. Average Return on Invested Capital (ROIC) of U.S. Industries [1]

2.1. A Generic Model

The following is a generic model for rating the five forces:

- Threat of New Entrants (ENT)

a. Switching costs for customers are low.
b. Start-up costs are not prohibitively high.
c. Industry distribution channels are accessible.
d. There are no government or copyright/patent restrictions.
e. There are few incumbency advantages.

- Bargaining Power of Suppliers (SUP)

a. There is threat of forward integration.
b. Suppliers have diverse customer base.
c. It is difficult to switch suppliers.
d. The supplied product/service is specialized or limited, or has a strong brand.
e. There are a few dominant suppliers, and industry is not key customer.

- Bargaining Power of Buyers (BUY)

a. There is threat of backward integration.
b. Buyers have bargaining power because of their order quantities.
c. Product/service offered is not unique.
d. Buyer purchases same product/service from many different suppliers.
e. Buyers are price-sensitive, and can switch suppliers easily.

- Threat of Substitutes (SUB)

a. There are products/services that perform the same function but by different means.
b. Prices of substitutes are comparable.
c. Customers are not adverse to change.
d. It is not expensive to switch suppliers.
e. There are indirect/downstream substitutes.

- Rivalry among Existing Competitors (COM)

a. Existing competitors are providing similar and better products/services.
b. Much money is spent on advertising and marketing within the industry.
c. The industry does not have a clear market leader.
d. There are many competitors.
e. The market is not growing significantly.

2.2. Competitive Force Ratings of US Industries (1992-2006)

Table 1. Rating of competitive forces for U.S. industries (1992-2006)

Forces	ENT	SUP	BUY	SUB	COM
U.S. Industries					
Security Brokers and Dealers	2	1	1	1	4
Soft Drinks	1	1	2	2	4
Prepackaged Software	2	2	3	1	2
Pharmaceuticals	2	4	2	2	2
Perfume, Cosmetics, Toiletries	3	2	2	1	4
Advertising Agencies	3	3	2	1	4
Distilled Spirits	3	2	2	3	3
Semiconductors	2	3	4	2	4
Medical Instruments	3	3	4	1	4
Men's and Boy's Clothing	5	2	4	1	4
Tires	3	2	5	1	5
Household Appliances	3	2	4	2	5
Malt Beverages	4	2	3	5	3
Child Day Care Services	4	3	4	3	3
Household Furniture	4	3	4	2	4
Drug Stores	4	3	4	3	3

Grocery Stores	4	2	4	2	5
Iron and Steel Foundries	3	3	4	3	4
Cookies and Crackers	3	3	4	3	4
Mobile Homes	3	3	4	4	3
Wine and Brandy	5	2	4	2	5
Bakery Products	5	2	5	2	4
Engines and Turbines	3	5	5	2	3
Book Publishing	2	3	4	4	5
Laboratory Equipment	3	4	5	3	3
Oil and Gas Machinery	4	3	5	2	4
Soft Drink Bottling	3	4	4	3	5
Knitting Mills	4	3	4	4	4
Hotels	5	3	4	2	5
Catalog, Mail-Order Houses	5	3	5	4	5
Airlines	5	5	4	3	5

3. The Functional Linkage

In one comparative study, we found the Cruise Industry (which was not included in the data from [1]) turns out to have exactly the same five-forces configuration as the Book Publishing Industry. The question arises naturally whether their profitability records bear similar resemblance. The ROIC for the Book Publishing Industry is an average of 13.25% from 1992-2006 from Fig 1. For the Cruise Industry, we did not have exactly comparable data, but deduced the best estimates from publicly available information. Using data from annual reports from 2002 to 2007 for the two leaders in the industry: Carnival Corporation & PLC, and Royal Caribbean Cruises LTD, we obtained 13.39% ROIC for the period 2002 to 2007 for the Cruise Industry, which is remarkably close to the 13.25% observed for the Book Publishing Industry, albeit for a different time frame of 1992-2006. We consider this agreement strong evidence that there is direct linkage between the five forces ratings and the ROIC.

The broader assumption is that businesses facing similar competitive forces may benefit from similar strategies. As an illustrative example, consider the Super Bowl, the major annual sporting event that in 2010 drew an audience of over 100 million on television. A 30-second commercial spot during the telecast cost between USD 2.5 and 3 plus million. An obvious question for researchers is what businesses advertise on this program and what do they have in common. Using the above generic model for rating competitive forces, we have found that they share a common competitive force profile characterized by high Competition and Buyer Power, medium to low Supplier Power and Threat of Entry, and low Threat of Substitution. Although the relative sizes and marketing resources vary tremendously, they must all consider the high cost advertising strategy to be worthwhile.

The observation that industries having similar configurations of force ratings may indeed have similar profitability measures suggests that we look for a full functional relationship between the force ratings and ROIC. That means we want a formula to return a value for ROIC given the input ratings of the five forces. Using the following notation for the five independent variables corresponding to the force ratings

ENT: Threat of New Entrants

SUP: Bargaining Power of Suppliers

BUY: Bargaining Power of Buyers

SUB: Threat of Substitutes

COM: Rivalry among Existing Competitors

a Multiple Linear Regression of the ROIC data in Figure 1 to the values of these variables in Table 1 yielded the function

$$ROIC = 63.42 - 2.50*ENT - 2.67*SUP - 3.21*BUY - 2.54*SUB - 2.70*COM$$

The closeness of fit is indicated by an R Square of 0.98.

The use of this linkage can be illustrated with the example of the Cruise Industry. Suppose certain players make a strategic move that reduces the force rating of rivalry among existing competitors from 5 (strong) to 4 (medium-strong), they may have elevated their position from an industry with long-term average ROIC of 13.92% to one of 16.52%. We reiterate the emphasis on long-term industry-wide averages so that there is no misconception of any specific prediction of profitability. Nonetheless, such quantitative estimates should be useful for the evaluation of strategic options.

4. Strategic Innovation

We showed how Porter's five forces that shape competitive strategies can be linked directly to long term profitability of industries, as measured by the return on invested capital. The five forces are rated on a scale from 1 (weak) to 5 (strong) and a functional relationship is derived to estimate the long-term average ROIC for U.S. industries. Apart from direct application to industry-wide strategic analysis or for individual enterprises, as a quantitative tool for analysts to evaluate business propositions based on their subjective rating of the competitive forces involved, this linkage has a more intriguing potential. While truly innovative strategies are desirable, it is difficult to produce systematically. Now managers can be guided by the forces-profitability relationship to benchmark industries outside of their own to identify others facing like forces. Best practices from elsewhere that have been shown to be effective in force reduction can be copied as "innovation" within one's own industry. Systematic programs can be developed along this line for human resource training in strategic management.

Within the specific context of Supply Chain Management, for example, it is well recognized that all strategic decisions revolve around the trade-off between efficiency and responsiveness. There is an emerging knowledge base of successful strategies in diverse business environments. However, going through seemingly endless and isolated cases and wondering how one can borrow from them would not be productive. It will be helpful for managers to have a better guide: indeed a "map" to navigate the sea of potentially useful ideas for strategic innovation. In [6] the design of a prototype template for this purpose was presented. Navigation on the hypermap is by competitive force profile. A supply chain manager armed with a specific profile of his/her own business environment, browses through the indices to select similar profiles. The corresponding case will be brought up showing relevant strategic options and where they are positioned on the trade-off spectrum. With such business intelligence support systems, managers can be guided by the force profiles to benchmark industries outside of their own to identify others facing like forces. Best practices from elsewhere that have been shown to be effective can be copied as "innovation" within one's own industry. Systematic programs can also be developed along this line for human resource training in supply chain management.

5. References

[1] Porter, M. E. The Five Competitive Forces That Shape Strategy", *Harvard Business Review,* January, 2008, pp. 79-93.

[2] Mullins, J. *The New Business Road Test--What entrepreneurs and executives should do before writing a business plan*, 2nd Edition, FT Press, New Jersey, 2006.

[3] Grundy, Tony. Rethinking and reinventing Michael Porter's five forces model, *Strategic Change* 2006, **15**: 213–229.

[4] U.S. Department of Labor, Occupational Safety & Health Administration (SIC) System Search at http://www.osha.gov/pls/imis/sicsearch.html

[5] Ehmke, C., Fulton, J., Akridge, J., Erickson, K., Linton, S. Industry Analysis: The Five Forces, Agricultural Innovation and Commercialization Center, Purdue University, EC722, 2004. Available at http://www.ces.purdue.edu/extmedia/ec/ec-722.pdf.

[6] Ho, J.K. A Hypermap for Supply Chain Management, *World Academy of Science, Engineering and Technology* 2010, **66**: 1178-1181.