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## Dynamics of Competitive Rivalry

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## **Abstract**

This energetic lecture consist of a paper fight and another exercise to provide background, methodology, and findings from research that has empirically examined competitive dynamics. Foundational to this stream of research are several literatures including game theory and the Structure-Conduct-Performance paradigm. Unlike these literatures, however, research in competitive dynamics directly measures and analyzes firm action and rival action using a methodology of examining competitive actions identified through a structured content analysis of newspapers and trade magazines for firms in an industry. This robust methodology has enabled better understanding of competitive dynamics and the outcomes of this rivalry. It also has very practical implications. Thus, students also do an exercise in which they analyze actual competitive data between Coke and Pepsi to illustrate differences in their competitive behavior and the strengths and weaknesses of each of their approaches.

**KEYWORDS:** competition, rivalry, competitive interaction, competitive action

## Introduction

The competitive interdependence of rivals, which is at the heart of Schumpeter's (1942) 'creative destruction process' is also a central tenet of industrial organization economics (IO). In particular, oligopoly theory and game theory have explored the competitive interaction of rivals. A key finding of this work is that firms are not unaware and passive, but rather, they are acutely aware of the actions of others and prone to react. To avoid competitive warfare and achieve higher profits for all, these streams of research emphasize and encourage cooperative behavior (Axelrod, 1984). In related work rooted in the IO perspective, Porter's key force determining industry profitability and attractiveness is the intensity of rivalry (1980). He argued that firms in all but the most fragmented industries will be conscious of each other's actions, and that actions by one firm will generally incite rivalrous actions of others. He showed that more rivalrous industries experienced lower profitability (Porter, 1980).

Thus, both the positive and negative effects of firm and rival action dynamics are well acknowledged: Firm action is a key to continued success (Schumpeter, 1934), but actions also incite deleterious rival reaction (Porter, 1980; Schumpeter, 1942). While scholars have long recognized that firm actions are purposeful and goal-directed (Child, 1972; Porter, 1980), and the visible markers of business strategy (Mintzberg, 1978) they have only recently begun to measure and test the impact of firm-specific actions. This stream of research in the strategic management literature more closely examines firm and rival actions in the context of their externally directed, specific and observable competitive moves (Smith, Ferrier, and Ndofor, 2001). Rooted in the writings of Schumpeter and other Austrian economists, competitive dynamics research explores questions regarding the content and process of firm action and competitive interaction. In particular, competitive dynamics researchers have studied action, competitive response and the action-response unit, also known as a competitive event in an applied manner that builds upon but is different from those found in the IO and game theory literatures. In contrast to those literatures which often infer conduct based on other factors, competitive dynamics examines the actual actions of firms in an industry.

Competitive dynamics researchers have developed a methodology of examining competitive actions identified through a structured content analysis (Jauch, Osborn, and Martin, 1980) of newspapers and trade magazines for all the firms in an industry. This methodology proves quite useful in developing an understanding of competitive dynamics and the outcomes of this rivalry. Competitive dynamics research has considered, among others, empirical relationships between firm action and performance (e.g. Derfus, Maggitti, Grimm, and Smith, 2008; Ferrier, Smith, and Grimm, 1999; Lee, Smith, and Grimm,

2000; Young, Smith, and Grimm, 1996), firm action and reaction (e.g. Chen, Smith, and Grimm, 1992; Derfus et al., 2008; Smith, Grimm, Gannon, and Chen, 1991), and firm action and industry performance (e.g. Young et. al.1996). Chief among the findings from this literature are that firms in a given industry that take more competitive actions, respond faster to rival action, undertake a more heterogeneous and unpredictable repertoire of actions will more likely outperform their rivals in terms of outcomes such as profit, growth, and market share.

The competitive dynamics stream informs our understanding of the outcomes of competitive conduct. Importantly, however, the methodology used in this research stream is also practically applied in nature. Thus, unlike much scholarly research, the method itself may prove useful to managers and other individuals tasked with setting an organizations strategy vis-à-vis a competing set of rivals.

## **Competitive Dynamics Class Session Overview**

In this class session, students undertake two separate exercises. The first is an instructor led discussion about how a paper fight between two teams of students might unfold in terms of among other things, actions, reactions, and scoring. The discussion provides a catalyst to revisit a number of basic organizational issues as well as introduce the idea of the dynamics of competition. Following the paper fight discussion, the lecture proceeds to provide background, methodology, and findings from research that has been done to empirically examine competitive dynamics. During the session, students are presented with a second exercise in which, using methods from the competitive dynamics research, they analyze actual competitive data between Coke and Pepsi to illustrate differences in their competitive behavior, the strengths and weaknesses of each of their approaches, and make predictions about the implications for each firm based on this data.

## **The Paper Fight Discussion**

The class session begins with the discussion of a hypothetical paper fight between the students in the class<sup>1</sup>. Immediately at the start of the session, the professor tells the class that they are splitting the students into two groups. Next, the professor asks the students to imagine a particular member of each team has been given a stack of paper and that the paper was going to be used for a paper fight between the two teams. The professor then asks the class to describe what would happen. Students will talk about how they would get paper from their “captain,”

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<sup>1</sup> While some instructors may choose to perform an actual in-class paper fight, we urge caution in doing so.

roll up paper balls, and begin throwing them at the other team. Terms like chaos and craziness are typically offered. With some prompting, students may also provide details about where they would throw from, how they would launch an attack on the other team, how they would protect themselves, etc. After this discussion, the professor can use many of the students' comments as analogies to a number of basic organizational issues. For example, at the most fundamental level, each team represents an organization – a collective of individuals with a common purpose. Within the organization there would potentially exist division of labor – some people assigned to roles as paper rollers, some throwers, some collectors. The professor can also ask for feedback about how differential resources (i.e. stacks of paper of different sizes, more students on one team, or teams consisting of more athletes/baseball players, etc.) would impact a paper fight. Issues related to any impact the characteristics of the classroom might have can be discussed. For example, as is the case with the Structure-Conduct-Performance paradigm (SCP) from IO economics, the characteristics of the environment dictate some of the conduct of the competitors. Relatedly, it may also be a good time to point out that, while a paper fight between their two “organizations” would take place in the same environment (i.e. industry), that environment as it is faced from each organization's perspective is actually different – one team might be facing the windows and have sun in their eyes, one team's environment also includes the other team and vice-versa, this is a nuance that isn't always apparent to students when they are discussing SCP.

Students are asked how they might score a paper fight. Answers typically include number of throws, amount of paper remaining on one side or the other, number of “hits” or “headshots,” etc. At this point, the professor opines that it is interesting that, despite the fact that the students highlighted resource characteristics and the environment as having an effect on the paper fight, much of this effect is seen as taking place “indirectly” through the results of the actions undertaken by each team.

Next, the professor asks the students to describe what if anything, would happen differently if there was another round – a repeated game. Answers to this question revolve around what types of strategies they would employ – based on the fact that they now have some competitive knowledge and experience with how the other team said they would undertake a paper fight. For example, someone might say that they need to watch out for particular players or that they would need to throw more paper, or that they might try paper airplanes, etc. The professor draws an analogy to repeated interactions that occur between competitors and the information that may be available, as a result. In large part, this lecture is about using this information in various ways to infer competitive intelligence about rival strategy as well as make predictions about forthcoming rival action based on prior experience.

The professor uses this opportunity to debrief some additional strategic issues. For example, the students can be encouraged to think about innovation of competitive weapons in this context – (big wads of paper, paper airplanes, etc.) and how these innovations may emerge during subsequent rounds of competition. A discussion of the increasingly hypercompetitive nature of markets is interesting at this point, too. The paper fight provides an interesting setting to discuss such high-velocity markets. Specifically, the professor will point out how planning in such a context is quite difficult and competition begins to drive strategy. In these types of environments, plans may be cast aside in favor of emerging strategy derived from a focus on firm actions and rival reactions.

The discussion of actions and reactions provides the professor with an opportunity to begin to introduce the idea of the dynamics of competition. In particular, the point is made that, while basic premises of IO Economics (Bain, 1951; Mason, 1939) and Resource-Based theory (RBV) (Barney, 1986; Penrose, 1954) are extremely useful because they lead to rather robust conclusions about firm outcomes, they do so by making assumptions about what industry characteristics and resources will mean in terms of a firm's ability to take appropriate actions. Importantly, however, both largely omit the actual conduct or competitive actions of firms and rather, infer them. Thus, while a firm may be situated in a less than favorable industry or have inferior internal characteristics, it may be able to overcome these liabilities or compete more effectively than IO Economics or the RBV would predict by acting and reacting more effectively than rivals. In this lecture, research findings about outcomes based on action dynamics directly will be discussed.

## **Lecture on Competitive Dynamics**

The lecture portion of this class session proceeds with a PowerPoint presentation (Slide 1). The professor begins by discussing rivalry and how it can impact firms in different ways (Slide 2). For example, a price war might erode the margins of all players involved whereas, rivalry that plays out in the marketing arena, as was the case with the “cola wars” between Coke and Pepsi, might result in heightened awareness and improved market share for those involved – without sacrificing pricing levels (Slide 3).

At this point, game theory is introduced in the lecture beginning with two game trees in which a firm (A) is taking a price setting action with incomplete information about how its competitor (Firm B) will respond (Slide 4). In each scenario, Firm A sets a high or low price and Firm B responds by either setting a high or low price. The two game trees show the payoffs Firm A believes exist depending on the manner in which Firm B responds – either by matching Firm A's move (Scenario #1) or by choosing to respond with low price no matter what

Firm A does (Scenario #2). An analysis of this situation shows that Firm A will set a high price if it believes the probability is greater than  $1/3$  that Firm B will match their pricing strategy but Firm A will set a low price if it believes the probability is less than  $1/3$  that Firm B will follow a matching strategy (Slide 5). This example demonstrates how Firm A's choice of move in this situation is based on its probabilistic beliefs about Firm B's payoffs.

The simple game scenario used in the previous example provides for a good discussion of various categories of games in which players have complete versus incomplete information and are moving simultaneously versus sequentially (instructors might also use this as an opportunity to discuss the difference between incomplete/complete and perfect/imperfect information). A  $2 \times 2$  matrix is shown (Slide 6) to explain the characteristics of games with complete/incomplete information and simultaneous/sequential moves. Depending on games with which students in a particular course are familiar, instructors may provide examples for each of the quadrants in this matrix. For example, the prisoner's dilemma is a good example of a simultaneous game with complete information. The main point of this slide, however, is to show how the example in the previous slide demonstrates a sequential game in which players do not have complete information. Further, this type of situation is the concern of the current lecture on competitive rivalry.

It is fairly easy to see the tremendous potential value of being able to predict the action and reactions of rivals in a complex industrial setting where players may undertake a variety of strategies. At this point, instructors may wish to ask the students about the factors upon which players develop probabilistic beliefs about the subsequent moves other players will take. In our context, the question would be, upon what basis do firms develop beliefs about their rival's future behavior? The ensuing discussion should lead to the topic of firm differences in terms of their resources and capabilities and how they can influence actions and performance. Slide 7 is used to show how organizational resources (e.g. money, human capital, buildings, and brand) are similar to potential energy. Resources further provide the building block upon which the firm develops capabilities – kinetic energy – such as the ability to bring new product to market, the ability to implement advertising campaigns, the ability to cut prices, etc. Thus, resources and capabilities are fundamental to the firm's ability to take actions.

Boxers serve as a useful metaphor for linking resources, capabilities, and actions (Slide 8). Two boxers may differ such that boxer one is endowed with a vastly different set of resources such as better health, better eyesight, more height, heavier weight, etc. (Slide 9). This profile would lead this boxer to have capabilities based largely on these "resources." For example, the boxer may be capable of enduring physically and have a longer punching reach (Slide 10). Together, these resources and capabilities enable the boxer to take actions such as

throwing more punches, punch with greater force, react to rival punches more quickly, etc.

In a boxing context, it is clear to see that actions/reactions involve uppercuts, jabs, foot-shuffling, etc. Competitive dynamics research has conceptualized firm actions as externally-directed, observable competitive moves carried out to improve relative competitive position (Slide 11). Examples of basic actions include pricing, marketing, products, service, capacity increases/decreases, and signals. The instructor should link this discussion to the simple pricing scenario provided earlier highlight the different types of moves, besides pricing, taken in a competitive context. Data on actions are collected using a methodology of examining competitive actions identified through a structured content analysis (Jauch, Osborn, and Martin, 1980) of newspapers and trade magazines for all the firms in an industry.

News about Nike, gathered using this method in late 2006/early 2007, provides a good example (Slide 12). During that time, Nike undertook a number of externally directed observable actions. Although it may be impossible for competitors to legally peer directly into the inner-working of Nike, from their external perspective they can make some possible inferences about the firm. It appears Nike is planning a high-profile ad campaign/marketing, based on the announcement that they contracted with Spike Lee to direct a commercial. Nike has also undertaken a significant global expansion action into Germany. From this information, a competitor may infer several things. First, from a strategic perspective, it appears Nike believes there is potential in Europe. Further, Nike management sees value in Germany as a distribution point, which is likely why they've located they've purchased a warehouse near the airport. It is also informative that they have chosen this mode of foreign entry, purchase of a facility rather than leasing. Perhaps they believe this will be a long-term decision or they see relatively low real estate values. Interestingly, they also decide to focus on an automated facility. This decision may have been made because of technological advances make such a facility feasible. Coupled with their decision to purchase the facility, however, it is also possible they see human resource management in Germany as being a challenge for their firm and would prefer to have as much control as possible over the facility, hence purchase versus leasing, and limiting the number of workers that are needed. While none of these assumptions are absolutes – this type of action analysis does help rivals build a fairly rich qualitative assessment of their competitor's decision-making. Thus, this is an important benefit of the competitive dynamics methodology and directly ties to the sources of probabilistic beliefs rivals make about one another that was discussed in the price-setting example.

The competitive dynamics method can be used more quantitatively as well by tracking and organizing observable actions over time (Slide 13). Indeed,

quantitative action dynamics have been linked to firm specific outcomes such as market share, stock price, and profitability. In the price-setting example, payoffs were assumed to be profits, however, this is an interesting time to highlight the variety of “payoffs” in the real-world and the complex nature of predicting real-world outcomes. In the case of Coke and Pepsi, a set of actions is recorded and categorized (Slide 14). For example, when Coke launches a new advertising campaign, it is recorded as a marketing action. When they expand operations into Latin America, it is categorized as a global expansion action. The new Coke Lime represents new product introduction, and when they announce they will be increasing market share in the middle-east, they are using a signaling action. This categorized data can now be used for further analysis and comparison, as shown in the table illustrating two months of actual moves by Coke and Pepsi (Slide 15).

### **Competitive Dynamics Methodology Exercise and Competitive Dynamics Findings**

Students are asked to form teams to answer several questions about the data in the table which shows two-months of Coke and Pepsi action data (Slide 15). The students are to answer 4 questions: Which firm takes more actions?; Which appears to respond faster?; Which takes a more complex set of actions?; and Which takes a less predictable set of actions? After a few minutes, the professor ends the exercise and returns to the lecture to discuss basic findings from the competitive dynamics literature, using the data from Coke and Pepsi to drive some discussion.

Studies of competitive dynamics in the literature have been undertaken in numerous industries with consistent findings. First among these findings has to do with the impact of discrete action/reaction pairs between competitors (Slide 16). From this perspective, firms that undertake actions in faster sequence and that respond faster to their rivals are found to outperform rivals on factors such as profit, growth, and market share. Additionally, actions that are strategic in nature appear to have the same performance benefits. Strategic actions, which are defined as those that are resource intensive, unfold over a long period of time, and are difficult to reverse, appear to more difficult for rivals to respond to. The airline industry provides a good setting to demonstrate this difference. The purchase of airplanes is a strategic undertaking – expansive, time consuming, and difficult to reverse. Such an action may provide a long advantage for the airline, whereas, rapid minute-by-minute pricing changes airlines make are the opposite - providing competitive advantage that may literally last fractions of a second.

Looking at actions as a set of repertoires undertaken by a firm over a period of time, findings appear to indicate there is a benefit to taking a variety of actions (Slide 17). On the one hand, this may result because such repertoire is

unpredictable. On the other, it may be that firms taking a variety of actions have developed a broader set of capabilities than those taking a limited set. From a game theory perspective, unpredictable repertoires make it difficult for rival firms to make assumptions about the likelihood of how other firms will act and react. Using the Coke/Pepsi data, it is observed that Pepsi takes a more heterogeneous repertoire of actions (Slide 18).

Firms also may sequence their actions in a particular manner (Slide 19). Sequences can be thought of in a variety of contexts such as music (Slide 20), where musical notes which, like actions, can have a variety of characteristics, are strung together to make chords, passages and melodies (Slide 21). Using the boxing analogy, we may find a boxer that has a sequence of punches consisting of jab-jab-uppercut, jab-jab-uppercut, jab-jab-uppercut (Slide 22). Given this sequence, a rival would be fairly certain to know what is coming when the boxer next throws two jabs in a row. Thus, using this dimension, firms may be more or less able to make predictions about rival behavior based on the sequence of actions the rival has undertaken before. The findings from competitive dynamics indicate that unpredictable firms – in terms of sequence of actions – perform better.

Extremely complex real-world scenarios are difficult to model using simple game theoretic approaches like the earlier example. The competitive dynamic approach, however, does reveal some insights. Thus, a firm that takes a set of broad set of actions that is varied – heterogeneous, appears to be strategically complex (Slide 23), whereas the opposite is true for firms taking a more limited variety of actions (Slide 24). Firms that take actions over time that don't appear to follow a particular sequence are more unpredictable (Slide 25). On the other hand, a repetitive sequence of actions may allow rivals to predict and anticipate future actions (Slide 26).

Returning now to the Coke – Pepsi exercise, it should be easy to see that Coke took more actions than Pepsi (18 vs. 17), however, that appears to be the only action dimension in which Coke leads Pepsi. Indeed, Pepsi is faster, takes a more heterogeneous mix of actions, and is far less predictable in terms of action sequence (Slide 27).

Takeaways from the Coke – Pepsi exercise include a validation that there is a practical value in the competitive dynamics methodology (Slide 28). In this case, managers that are monitoring their competitor's actions will qualitatively learn something about their rivals resources and capabilities. Firms can and will use action dynamics to develop probabilistic beliefs about rival moves. For example, it appears Coke has a strong marketing capability in relation to others. Pepsi, on the other hand, appears to have a varied set of capabilities that allow them to take a likewise varied set of actions. Pepsi also seems to be more nimble than Coke since they are quick to take actions after Coke has done so. It is

particularly interesting to see the pattern of actions undertaken by Coke in the data. Assuming Pepsi is using the competitive dynamics methodology, it is possible they would correctly guess that Coke is about to introduce a new product the next time the company takes two marketing actions back-to-back. For Coke's part, the case can be made that strategists could use the methodology to be cognizant of their predictability and lack of heterogeneous action mix, something that may make them competitively vulnerable.

## Summary

This lecture provides background, methodology, and findings from research that has been done to empirically examine competitive dynamics (Slide 29). Foundational to this stream of research are several literatures including game theory which uses models to predict behavior and the Structure-Conduct-Performance paradigm research that largely infers firm behavior from industrial characteristics. Unlike these literatures, the research in competitive dynamics directly measures actual firm action and rival reaction. For the past 20 years, findings from this stream have been published in some of the top management journals. The competitive dynamics methodology proves quite useful in developing an understanding of competitive dynamics and the outcomes of this rivalry. In addition, it also has very practical implications and uses for managers tasked with responsibility for the performance of their organization.

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