

**RESEARCH ARTICLE**

Competitors matter: How competitors' actions moderate the influence of firm profitability on the prioritization between growth and efficiency increase

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Firms have been shown to prioritize between growth and efficiency increase sequentially depending on their level of profitability. Adding arguments from the attention-based view to this discussion, we hypothesize that actions of competitors in the marketplace could moderate this relationship. Using data from business simulations, we specifically test whether the influence of firm profitability on the prioritization decision varies with changes in competitor products' pricing, promotion, and quality. Our analysis reveals that product promotion intensifications of competitors strengthen the positive relationship between firm profitability and the prioritization of growth relative to efficiency increase, whereas product price reductions weaken this relationship.

1 | INTRODUCTION

In business practice, we see that managers take situational decisions about the relative importance of growth and efficiency increase. For instance, Carsten Spohr, CEO of the Lufthansa Group, announced in 2019 to put a stronger focus on profitability as "it's now about changing from a growth attitude to a profit generation attitude" (Lufthansa, 2019a). Even though the company achieved solid earnings and substantial cost reductions in the previous quarters, Ulrik Svensson, CFO of the Lufthansa Group, specifically states that "in an increasingly challenging market environment, it is more vital than ever that we consistently take every action within our influence and further reduce our costs" (Lufthansa, 2019b). As a reason for this decision, Lufthansa managers mention the continued pricing pressure in Europe, which forces the company to refrain from growth initiatives or even reduce its capacities (Lufthansa, 2019a, 2019b, 2019c). This example shows that decision makers aim at increasing shareholder value in the long run by focusing on either growth or financial efficiency increase in the short run. Prioritizing between these two levers

in view of the current competitive situation thus becomes an omnipresent and ongoing task for managers.

The observations from business practice raise the question which antecedents lead to the prioritization of growth and financial efficiency increase. Behavioral choices of managers are influenced by signals that receive managers' attention (Ocasio, 1997). According to Greve (2008), deviations of goal achievements from ex ante specified aspiration levels raise managerial attention. His study on the relationship between size goals and performance goals¹ shows that size goals are deactivated if firm performance falls behind the respective aspiration level. Once this aspiration is satisfied, managers devote more effort to size goals than to performance goals. Thus, Greve (2008) concludes that decision makers pay sequential attention to size goals and financial performance goals. This result is in line with the behavioral theory of the firm, according to which firms solve performance issues as they arise and act similar to a fire department (Cyert & March, 1963). In other words, the prioritization between growth and efficiency increase is driven by the fulfillment of profitability goals.

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However, we know from the attention-based view of the firm that decision makers also pay close attention to the actions of their competitors. Therefore, firm-external factors may also play an important part in the decision to prioritize growth relative to efficiency increase. In fact, decision makers need to “anticipate, prepare for, and react to” (Ocasio, 1997, p. 196) competitors' actions when formulating corporate strategies. Competitive actions are reflected by changes in their products' quality, price, or promotion (Ocasio, 1997). Consequently, these actions may lead firms to deviate from their general approach to increase their priority for growth with rising levels of profitability.

Empirical evidence on the drivers for the prioritization between multiple goals is scarce (Kotlar, de Massis, Wright, & Frattini, 2018; Linder & Foss, 2018), and “a closer examination of how organizations prioritize goals [...] is a valuable direction to pursue” (Gaba & Greve, 2019, p. 665). While Greve (2008) started to analyze the prioritization between growth and efficiency increase and identified the fulfillment of profitability goals as an important firm-internal antecedent, we add towards this discussion by analyzing the firm-external context as a contingency factor. Specifically, we examine how competitive actions of peers in the marketplace moderate the relationship between firm profitability and the subsequent prioritization of growth relative to efficiency increase. Furthermore, we add to the literature on goal prioritization by presenting empirical evidence based on quantitative goal specifications with a unique data set. Such goal specifications are rarely published in practice, and previous studies had to rely on assumptions about the formulation of aspiration levels (e.g., Gaba & Greve, 2019; Greve, 2008). In our study, we utilize data from business game simulations, which allow us to measure the prioritization between growth and efficiency increase in a novel way. This way, we do not only cover a methodological gap but can also verify whether managers indeed pay sequential attention to size goals and financial efficiency goals. Overall, our study thus contributes to a deeper understanding of antecedents of prioritization decisions.

2 | THEORETICAL BACKGROUND AND HYPOTHESES

2.1 | Prioritization of growth and efficiency increase

Formulating goals is one of the main tasks of corporate management (Barnard, 1938) because goals have a “directive function” (Earley & Lituchy, 1991, p. 81) for the behavioral engagement of individuals in their work environment. In this context, managers may try to minimize or maximize certain targets such as costs or revenues. However, corporate goals cannot be formulated using optimization narratives (Hayek, 1968; Ocasio, 1997) because decision makers would need complete knowledge of all alternative actions and their outcomes. This is not the case in business practice as management is engaged in an ongoing collection of information and experience (Cyert & March, 1963; Hayek, 1968; Ocasio, 1997). Because of bounded rationality and a lack of full knowledge, managers strive for satisfaction rather than optimization (March & Simon, 1958; Simon, 1947).

Therefore, they use aspiration levels to formulate goals. An aspiration level is the smallest, measurable, and quantitative result that can lead to the satisfaction of the decision maker (Earley & Lituchy, 1991; Schneider, 1992).

The long-term increase of shareholder value belongs to one of the most important goals of managers and can be achieved by different levers (Cho & Pucik, 2005; Penrose, 1955; Penrose, 1959). Building on the resource-based view, a firm can be understood as a bundle of resources under the control of the management. Making decisions regarding the resource base as well as the coordination of economic activities is therefore the core mandate of management (Penrose, 1959). If the management decides to enlarge the resource base, we speak of growth, while an improved resource exploitation can be understood as an increase of efficiency. Both changes have a direct effect on the company's financial value (Cho & Pucik, 2005). Growth and efficiency increase can therefore be understood as the outcome of dividing the overarching goal, that is, shareholder value increase, into two subordinate levers. Such a goal division principle is also discussed by psychology researchers (Abraham & Sheeran, 2003; Karniol & Ross, 1996; Klein, 1989).

In the behavioral theory of the firm as well as the psychological goal literature, there is a general agreement that humans hold more than one goal and need to find ways to handle multiple goals (Kernan & Lord, 1990; Louro, Pieters, & Zeelenberg, 2007; Vogt, de Houwer, & Crombez, 2011). Orehek and Vazeou-Nieuwenhuis (2013) particularly argue that there are two general approaches to deal with multiple goals: (1) attending to goals sequentially and (2) attending to goals concurrently. “Pure sequential goal pursuit would require that only one goal is active at a time and that the remaining goal structures are entirely deactivated” (Orehek & Vazeou-Nieuwenhuis, 2013, p. 340). In most cases, a person will never fully deactivate all other goals while pursuing a primary goal. This means that prioritization between multiple goals is done in a continuous way (Abraham & Sheeran, 2003; Kernan & Lord, 1990; Louro et al., 2007; Orehek & Vazeou-Nieuwenhuis, 2013; Schmidt & Dolis, 2009; Vogt et al., 2011). Therefore, prioritization is understood as “the relative ranking of a given goal among an array of goals possibly under consideration by an individual” (Geers, Wellman, & Lassiter, 2009, p. 914).

Previous studies discussed various reasons why there is a need for individuals to prioritize (Cyert & March, 1963; Orehek & Vazeou-Nieuwenhuis, 2013). They include goal conflicts (Kernan & Lord, 1990; Louro et al., 2007; Vogt et al., 2011), limitations in human capacity for conscious information processing (Klein, 1989), limited capabilities of attention (Louro et al., 2007; Ocasio, 1997), or limitations to personal resources such as time or energy (Louro et al., 2007; Vogt et al., 2011). For the specific case of prioritizing between growth and efficiency increase in a corporate context, Greve (2008) analyzed firm profitability as an influencing factor.

2.2 | The influence of firm profitability

Greve (2008) discusses the unequal devotion of effort to size goals and performance goals (in the sense of profitability). He builds on the

behavioral theory of the firm (Cyert & March, 1963) according to which (1) decision makers pursue multiple goals and (2) managerial action is determined by the comparison of ex ante specified aspiration levels and corresponding ex post achieved results. If achieved results are below the respective aspiration level, “decision makers initiate problemistic search for actions that may produce outcomes above the aspiration level” (Greve, 2008, p. 477).

Greve (2008) discusses in how far size and performance goals are connected and presents two alternative explanations. According to the sequential attention model, managers primarily attend to one goal at a time. The effort devoted to the respective goal depends on its achievement level relative to the respective aspiration level. If achieved results are below the corresponding aspiration level, managers devote effort to improve the results. Once the aspiration level is fulfilled, managers shift their effort to the next goal. Greve (2008) further argues that sequential attention “reduces cognitive effort and political strife and thus yields easier” (p. 480). In contrast, the activation model proposes that managers may indeed devote attention towards the two goals simultaneously. This explanation builds on the assumption that certain goals can be causally linked “in such a way that fulfillment of one goal helps an actor fulfill the next” (Greve, 2008, p. 480). Specifically, he argues that financial performance below the aspiration level can have its cause in deficient firm size. Hence, managers would devote effort to grow the firm in order to increase financial performance. The activation model might be especially applicable in manufacturing industries or other industries in which economies of scale play an important role.

To investigate the relationship between size and performance goals, Greve (2008) empirically tests whether size goals are (de-)activated when financial performance lags behind the aspiration level. Specifically, he defines the achieved financial performance of the past fiscal year as the aspiration level for the current one. His results show that size goals are less important to managers if performance relative to aspirations decreases. At the same time, fulfilling financial performance goals becomes a higher priority for managers. In the opposite case, “size goals gain attention when performance goals are satisfied” (Greve, 2008, p. 480). Thus, his findings are consistent with the sequential attention model. Furthermore, Greve's (2008) results indicate that decision makers indeed compare the company's profitability to previously achieved profitability levels and pay attention to diversions, suggesting a rather dynamic view on aspiration levels in contrast to a static view.

2.3 | The relevance of competitors' actions

In addition to firm-internal performance feedback, the behavior of peers represents stimuli which managers need to interpret and react to (Ocasio, 1997). Competitive dynamics research defines a competitive action as an “externally directed, specific, and observable competitive move initiated by a firm to enhance its relative competitive position” (Smith, Ferrier, & Ndofo, 2001, p. 321). Areas of competitive actions that trigger a market response (van Waterschoot & van

den Bulte, 1992) include: (1) product (e.g., features and quality level), (2) place (e.g., distribution channel types and location of stores), (3) promotion (e.g., use of salespeople and advertising), and (4) price. This 4P classification of the marketing mix, introduced by McCarthy (1960), provides a solid basis to categorize competitive behavior of peers in the market place (Rindova, Becerra, & Contardo, 2004). Despite noteworthy critique, it remains a high-impact framework for both practitioners as well as researchers (e.g., Keh, Nguyen, & Ng, 2007; van Waterschoot & van den Bulte, 1992). Ocasio (1997) and Greve (2008) themselves mention product characteristics, prices, and sales campaigns as a meaningful tool for competitive attacks. For the purpose of this paper, we will refer to these elements as *action parameters*.²

Changes in the marketing mix represent competitive actions in the market place (Rindova et al., 2004; Smith, Ferrier, & Ndofo, 2001). Specifically, managers *identify* competitive actions by searching for changes of action parameters (Ocasio, 1997; Smith, Grimm, Gannon, & Chen, 1991). This observation reveals if competitors (1) decrease prices, (2) intensify product promotions, or (3) improve product quality (Boyd & Bresser, 2008; Chen & Miller, 2012; Rindova et al., 2004; Smith, Ferrier, & Grimm, 2001; Smith, Ferrier, & Ndofo, 2001; Tsai, Su, & Chen, 2011).

Once identified, managers of a focal firm *interpret* the actions of their competitors because “each competitive action carries a message, be it in terms of intent of the action or a signal relating to the strategy of the actor” (Smith, Ferrier, & Ndofo, 2001, p. 322). This interpretation is of high importance as it aims to “discern the rival's competitive priorities and intentions” (Tsai et al., 2011, p. 773). There is consensus in the competitive dynamics literature that price decreases, promotion intensifications, and quality improvements aim at attracting new customers or increasing sales with existing ones (Boyd & Bresser, 2008; Rindova et al., 2004; Smith et al., 1991; Smith, Ferrier, & Grimm, 2001; Smith, Ferrier, & Ndofo, 2001). Hence, managers of a focal firm will interpret such actions as competitors' focus on growth objectives.

Following the identification and interpretation of competitors' actions in the marketplace, management of the focal firm needs to decide how they will *react* to such actions against the background of their own level of firm profitability. This decision depends on the type of competitive action performed by competitors because “the information carried in a competitor's action can lead to [i.e. signal] an *opportunity* or to a *threat*” (Smith et al., 1991, p. 63). “If the action is perceived as a *threat* (e.g., a system-wide price cut), competitors will act to defend themselves; if it is perceived as an *opportunity* (e.g., a promising innovation), competitors will not want to be left out” (Chen, Smith, & Grimm, 1992, p. 443).

2.4 | The moderating influence of competitors' product price actions

Price cuts are a comparably simple competitive action and are quickly implemented (Chen & MacMillan, 1992; Chen & Miller, 1994, 2012;

Ferrier, 2001; Miller & Chen, 1996; Smith, Ferrier, & Grimm, 2001; Steenkamp, Nijs, Hanssens, & Dekimpe, 2005). Firms use price cuts as a means to increase their relative market share (Ferrier, 2001; Smith, Ferrier, & Ndofofor, 2001). They are easily and immediately recognizable by all market participants, and their effect on market share is uncomplicated to estimate (Chen & MacMillan, 1992). Therefore, competitors' price cuts are obvious actions that can be considered as aggressive and provocative by managers of the focal firm (Chen & MacMillan, 1992; Chen & Miller, 1994; Smith et al., 1991; Tsai et al., 2011).

The negative consequences of competitors' price cuts come quickly into effect for the focal firm because they "work directly on purchase behavior [...] rather than on cognitive processes preceding purchase" (Steenkamp et al., 2005, p. 38). Price cuts of competitors can lead to an erosion of market share and profitability of the focal firm (Chen & MacMillan, 1992; Smith, Ferrier, & Ndofofor, 2001; Steenkamp et al., 2005; Upson, Ketchen, Connelly, & Ranft, 2012; Volpe, Risch, & Boland, 2017). They are especially threatening if other companies imitate this competitive action and thus start a price war (Rindova et al., 2004; Smith et al., 1991). Such price wars "tend to increase total industry demand and consumer surplus, but they also tend to be detrimental to firm profitability" (Rindova et al., 2004, p. 672). Furthermore, price cuts not only threaten the profitability of a firm in the short-term but may also lead to an interpretation of low quality of products or services by customers. Such a perception by customers makes it difficult to increase prices at later points in time (Spann, Fischer, & Tellis, 2014). For these various reasons, avoiding a price war is a core interest of decision makers (Chen et al., 1992; Rindova et al., 2004; Steenkamp et al., 2005).

Overall, managers of the focal firm will perceive price cuts of competitors as a *threat* rather than an opportunity because they fear becoming involved in escalating rivalry (Chen et al., 1992; Smith, Ferrier, & Grimm, 2001). To protect their current level of profitability, they will react with precaution and lay a stronger focus on efficiency increase than they would have done in the absence of price cuts of competitors.

Hypothesis 1. Negative product price changes of competitors weaken the positive relationship between firm profitability (compared with its past profitability) and the prioritization of growth relative to efficiency increase.

2.5 | The moderating influence of competitors' product promotion actions

Product promotion intensifications of competitors are also perceived as a competitive action by managers of the focal firm (Chen & Miller, 1994; Ferrier, 2001). The aim of such activities is to increase revenues by attracting new customers (Smith, Ferrier, & Ndofofor, 2001). However, research has found that the intensification of promotional activities only has a limited negative effect on market share and revenues of competitors in the short term (Smith, Ferrier, & Ndofofor, 2001;

Steenkamp et al., 2005). Promotional activities take longer to unfold their effect than actions such as price changes because they influence the cognitive processes of customers preceding a purchase decision (Steenkamp et al., 2005). In addition to an initial (short-term) effect, such activities "also have a long-term effect of generating strong brand value transferable to the next-generation product" (Ofek & Sarvary, 2003, p. 363). Therefore, they can be considered to be an "investment in intangible assets with predictably positive effects on future cash flow" (Ofek & Sarvary, 2003, p. 364).

However, there are also positive sides for the focal firm if one or several competitors increase their product promotion activities. Promotion intensifications can increase the base of actual and potential customers and thus have a demand-expanding effect for the entire product market (Derfus, Maggitti, Grimm, & Smith, 2008). Furthermore, Derfus et al. (2008) highlight that promotion campaigns aim at differentiating the products or services from those of competitors. Such a differentiation may actually reduce rivalry and the threat of destructive competition.

As overall demand increases, the intensification of promotional activities may "represent a positive sum competition" (Derfus et al., 2008, p. 76). For this reason, Dubé and Manchanda (2005) conclude that "firms tend to free-ride off one another's advertising investment" (p. 82). Hence, managers of the focal firm will interpret product promotion intensifications of competitors as an *opportunity* rather than a threat. With the same level of firm profitability, managers of the focal firm will therefore lay a stronger focus on growth than they would have done in the absence of this competitive action.

Hypothesis 2. Positive product promotion changes of competitors strengthen the positive relationship between firm profitability (compared with its past profitability) and the prioritization of growth relative to efficiency increase.

2.6 | The moderating influence of competitors' product quality actions

Improving product quality aims at increasing the willingness to pay of existing customers and at attracting new ones (Ofek & Sarvary, 2003; Soberman & Gatignon, 2005). Quality improvements are (1) complex to develop, (2) emerge over a long time span and thus need more time than other actions such as price cuts, and (3) require significant investments in research and development and are thus highly resource-consuming (Andrevski, Brass, & Ferrier, 2016; Boyd & Bresser, 2008; Chen & Miller, 2012). Competing firms closely observe each other's efforts and actions in this respect (Chen & Miller, 1994, 2012; Chen, Tribbitt, Yang, & Li, 2017; Ferrier, 2001).

Product quality improvements require a positive, long-term outlook on the future market development as they represent a high commitment to the respective market, which is not easily reversible (Boyd & Bresser, 2008; Chen et al., 2017). At the same time, such investments do not only affect the focal innovating company but also affect its competitors. Product quality improvements are

acknowledged to have a positive effect on the entire market as they potentially increase the overall demand (Derfus et al., 2008). Therefore, significant product quality improvements by competitors are perceived and interpreted as an *opportunity* rather than a threat as these actions might lead to a market expansion (Derfus et al., 2008; Soberman & Gatignon, 2005). Other companies in the market "will not want to be left out" (Chen et al., 1992, p. 443). Consequently, firms will put an even stronger focus on growth with rising levels of profitability.

Hypothesis 3. Positive product quality changes of competitors strengthen the positive relationship between firm profitability (compared with its past profitability) and the prioritization of growth relative to efficiency increase.

Figure 1 shows a graphical summary of our research model with the hypotheses to be tested. The temporal structure of the model is presented in Figure 2.

3 | METHODOLOGY

3.1 | Sample and data

Few studies empirically analyzed antecedents for the prioritization of goals in a corporate context. This may be due to difficulties in obtaining data on the managerial focus of attention, which can be derived from the aspiration levels for different goals. Geers et al. (2009) also highlight that there is "insufficient data directly examining the concept and measurement of goal priority" (p. 931). To address this shortcoming, we test our hypotheses using data derived from business simulations. This allows us to collect data on aspiration levels and offers a unique opportunity to directly determine the chosen prioritization of growth relative to efficiency increase. Business simulation data are commonly utilized in research projects on strategic decision making (e.g., Audia, Locke, & Smith, 2000; Boone & van Witteloostuijn, 2005; Hogarth & Makridakis, 1981; Kilduff, Angelmar, & Mehra, 2000; Quigley, Tesluk, Locke, & Bartol, 2007).

Previous literature has demonstrated that "decision making in games does not differ from managerial decision making" (Remus, 1978, p. 828) and that simulations provide an exemplary picture of the business reality. In practice, managers are confronted with complexity as well as uncertainty. The simulation that we use for our empirical analysis reflects both of these aspects because participants need to make a variety of simultaneous decisions and deal with unpredictable behavior of competitors.

The business simulation was conducted in undergraduate, graduate, and post-experience study programs at an international business school between 2007 and 2014. Specifically, the simulations were an element of Bachelor of Science, Master of Science, MBA (full-time and part-time), as well as Executive MBA courses. These courses focused on the topics of general management and competitive strategy. Having previous work experience was a prerequisite to be admitted to the simulation. Participants of the MBA and Executive MBA programs had several years of working background. Participants of the Bachelor and Master program had completed at least one full-time internship.

To ensure that participants played seriously, three important incentives were installed: First, all participants received credits for the respective course. Second, grading was based on firm survival and performance in the simulation. Third, the team whose firm had the highest accumulated share price increase including total dividend payments after the last simulation period also received a prize. Our observations revealed a high level of motivation of participants as well as distinct competitive behavior. Similar to previous studies (Locke, 1986; Quigley et al., 2007), we did not observe any differences between executive participants (MBA and Executive MBA) and non-executive participants (Bachelor and Master) in terms of competitive behavior, decision quality, and team performance. Therefore, there is no differentiation between these two groups in the empirical analyses. Additionally, a bias due to self-selection can be excluded since course participation was mandatory in all programs.

The software *TOPSIM General Management* was used for conducting the business simulations. During the simulation game, a team of three to six students represented one fictitious company and competed against four to five other teams. For the purpose of diversity

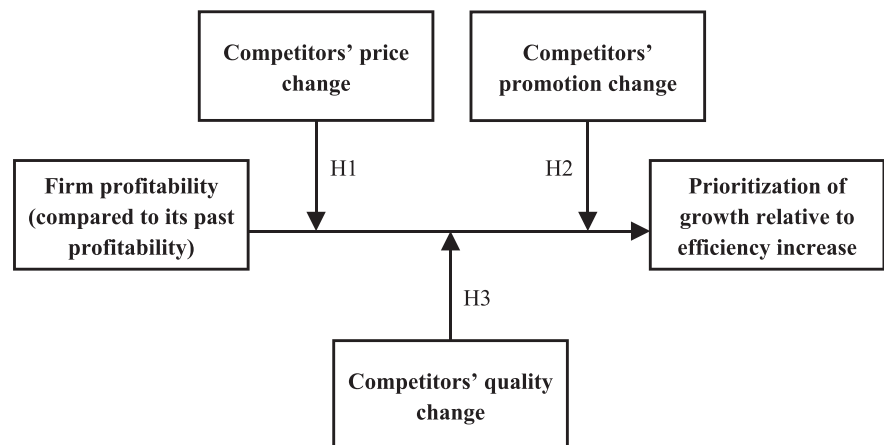


FIGURE 1 Research model of the study

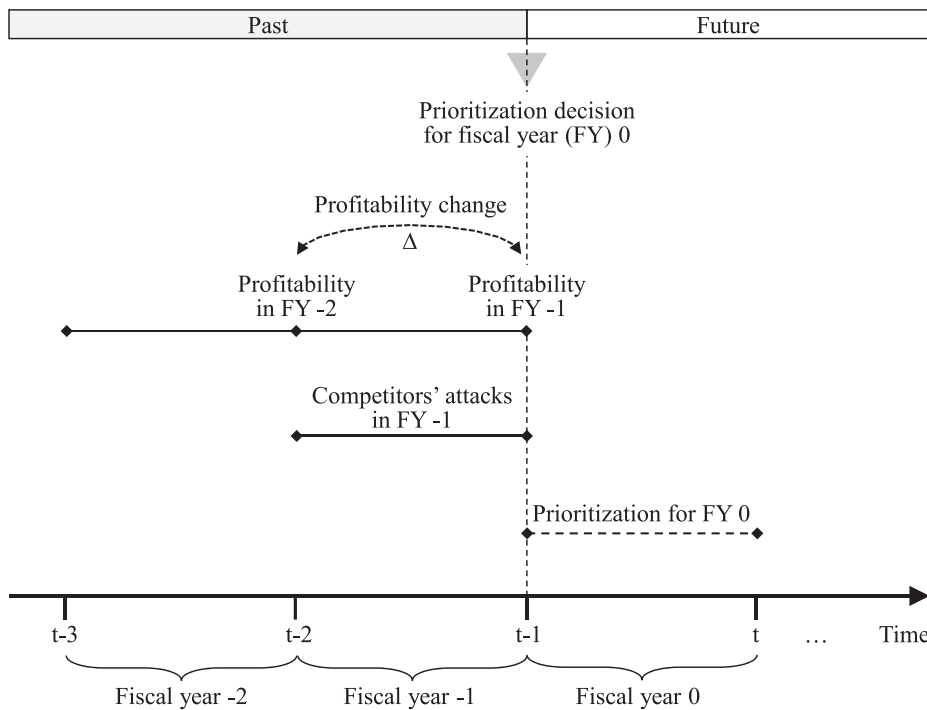


FIGURE 2 Temporal structure of the research model

within the teams and comparability between the teams, criteria such as gender, nationality, and age were considered when compiling the teams. In the simulation, the companies produce copy machines while covering most of the value chain activities. At the start of the simulation, the companies are completely identical in all aspects such as material, human and financial resource configuration as well as previous results. The business is also well established and profitable. The companies are then further developed based on the decisions of the teams. Increasing the financial value throughout the course of the simulation is the overarching goal.

The game consists of five to six rounds of simulation (to which we refer as *periods*), each representing one fiscal year. About 3 hours of working time is available to the teams per simulated period. During these hours, participants have a reserved study room available for discussions and decision making. Furthermore, participants have the possibility to ask questions to the instructors to avoid misunderstandings or ambiguities. After the end of the working time, the teams hand in their decisions for the next period on a prespecified printed form as well as electronically.

Throughout the entire simulation, all teams have three sources of information. First, teams receive financial reports on the results of their own firm in the previous period, including balance sheet, profit and loss statement, cash flow statement, and a set of indicators and ratios. Second, all teams have the opportunity to purchase a market research report comprising details on competitors' actions as well as corresponding financial and nonfinancial results. Third, an economic forecast informs the teams about general market changes, such as demand, interest rates for loans, or input material prices. On the basis of this threefold knowledge pool, the teams take decisions in the areas of product development, purchasing, production, product sales,

and financing. Examples include research and development spending, purchases of input materials for production, investments and divestments of production lines, hiring and dismissing production staff, as well as taking up loans and deciding upon dividend payments.

To provide participants with a basic knowledge about the causal relationships between the decisions to be made and their effects, they received two kinds of preparatory information before the start of the simulation: (1) a written manual and (2) an introductory lecture. Therefore, participants had a general understanding which functional relations the software used to derive outcomes in terms of sales and profitability based on their input decisions. However, participants only knew about the shape of these functions but not about the exact parameters of the underlying curves (see Appendix B for details on the functional shape). Throughout the simulation, they accumulated experience and learned to estimate the causal links more precisely. To support this learning process, we conducted debriefings with all participants after each period, in which we presented competitive actions as well as selected results of each company (see Appendix B for details).

The teams had the chance to diversify their companies in terms of product and geographical scope throughout the simulation. At the end of the simulation, firms could be active in up to four market segments. The complexity of the simulation thus increased stepwise as new areas of decision making were added throughout the course of the game. Overall, participants took a total of 35–51 decisions per period. To avoid unrealistic decisions of the teams, the design of the simulation imposes two restrictions. First, cash-out approaches in the last period had a strong and negative effect on the share price. As participants were aware of the going-concern design of the simulation, endgame effects could be avoided in all simulations. Second, firms

could go bankrupt due to over-indebtedness and would then drop out of competition.

The simulation game was conducted 30 times. In 24 simulations, there were five participating companies; in six simulations, there were six companies. This provides us with a sample of 156 companies. For each of the companies, we collected data for the periods in which participants took decisions. This provides us with observations of five to six periods per company. Eight of the 156 companies dropped out of competition due to bankruptcy. To avoid survivorship bias, we still considered the collected data until the companies went bankrupt for our analysis. Furthermore, we included only those firm-period observations in which participants purchased a market research report. This report is the only source of information on competitors' behavior which is hypothesized to influence the prioritization decision of the focal firm (all moderating variables are published in this market research report). Overall, the sample of 156 companies provides us with 711 firm-period observations in which participants took decisions.

3.2 | Dependent variable

We measured the prioritization of growth relative to efficiency increase for the upcoming period t based on the difference between a firm's *focus on growth* and its *focus on efficiency increase*. Using this difference score approach, we can estimate the relative goal priority on a continuous scale (Kernan & Lord, 1990). Therefore, larger values (i.e., >0) indicate a prioritization of growth, whereas smaller values (i.e., <0) indicate a prioritization of efficiency increase.

To measure the firm's focus on growth in t , we asked participants of the business simulation to specify their aspirations for sales for the next upcoming period. We used sales as a measure for growth in line with the work by Greve (2008). In a first step, we calculated the *planned* percentage change in sales, that is, the planned sales for the next period t relative to the achieved sales in the current period $t-1$. However, this figure alone is not a meaningful indicator of the company's growth intentions since it does not consider the expected change in market demand. Consequently, we had to put the planned change in sales into perspective of the general market growth. In a second step, we therefore calculated the *potential* percentage change in sales, that is, the expected change in sales if the firm grows at current market growth rates. For the calculation, we also consider that market growth rates vary across the different product and geographic market segments and that firms have the option to expand into newly opening markets. In a final step, the planned change of sales is put into perspective with the potential change of sales in order to determine the company's focus on growth (see Appendix A for detailed formulae). Consequently, a firm's focus on growth equals zero if the respective team plans to grow its company by the same rate as the overall market demand does. The time value of money is taken into account for all calculation steps as real values are used instead of nominal values.

To measure the firm's focus on efficiency increase in t , we asked participants of the business simulation to specify their aspirations for return on equity (ROE) for the next upcoming period. We used the ROE as a measure for efficiency in line with other business simulation studies by Boone, van Olffen, and van Witteloostuijn (1998) and Boone and van Witteloostuijn (2005). In a first step, we calculated the *planned* percentage change in ROE, that is, the planned ROE for the next period t relative to the achieved ROE in the current period $t-1$. However, the realized ROE of some companies is either close to zero (but positive) or even negative. This could lead to a distorted picture if decision makers plan with a reasonable ROE for the upcoming period. To determine the company's focus on efficiency, we therefore introduced cost of equity capital as a threshold and differentiated between four different cases (see Appendix A for details). For the cases that the achieved ROE is not an appropriate point of reference, we substitute it by the cost of equity. In all cases, a firm's focus on efficiency equals zero if the firm does not aim to change its current level of ROE.

3.3 | Independent variable

Following the study by Greve (2008), we investigate the influence of firm profitability compared with its past profitability. Profitability itself is measured based on ROE in line with other business simulation studies by Boone et al. (1998) and Boone and van Witteloostuijn (2005). This approach is also consistent with the core assignment of our study to increase the shareholder value. Participants were informed by the instruction manual that ROE has a strong influence on the share price in the simulation software. Therefore, we measured firm profitability by the percentage change in ROE, that is, the achieved ROE for the current period $t-1$ relative to the achieved ROE in the previous period $t-2$ (see Appendix A for detailed formulae).

3.4 | Moderating variables

To measure the *competitors' price change* from $t-2$ to $t-1$, we calculated the percentage change of the weighted average product price in the primary home market segment (excluding the focal firm). The weighting is based on sales of the competitors. We do not consider price developments in other geographic and product market segments which firms can enter over the course of the business simulation. This is because the primary home market segment is the largest one by far and price changes in this segment have the strongest impact on firm survival. Therefore, participants of the business simulations paid most of their attention to this segment.

To measure the *competitors' promotion change* from $t-2$ to $t-1$, we calculated the percentage change in the average number of deployed salespeople (excluding the focal firm). In the business simulation, salespeople have a direct influence on the demand of consumers. The size of the salesforce can also be flexibly adjusted; that is, salespeople can be hired and dismissed in every period.

To measure the *competitors' quality change* from $t-2$ to $t-1$, we calculated the percentage change in the average amount of research and development spending (excluding the focal firm). The setting of the business simulation allows participants to increase the quality of their products by specifying a budget for development. This automatically increases product quality.

3.5 | Control variables

Our study controls for various percentage changes in firm and market characteristics³ between the previous period $t-2$ and the current period $t-1$. We take this approach and do not consider absolute outcome levels for these characteristics because all companies are identical at the beginning of the business simulation. Consequently, it takes several periods for variance of static variables to develop. In contrast, dynamic indicators, that is, change variables, show variance from the very first period. The absolute level of firm and market characteristics is therefore not necessarily meaningful given that the base level before the start of the simulation is artificially predefined.

First, we controlled for the *change of firm scope* because firms with a diversified presence in different market segments may compete less aggressively (Greve, 2008). For our calculations, we first estimated sales diversification across the different product and geographic market segments using an entropy measure. Then, we performed a min-max normalization of the entropy numbers so that data points fall into a range of 0 to 1. Finally, we took the value of 1 minus the normalized entropy value and calculated the change of firm scope based on this adjusted figure. This transformation was necessary in order to avoid divisions by zero.

Second, we included *change of firm slack* because slack can encourage risk-taking and therefore growth initiatives (Bromiley, 1991; Greve, 1998, 2008; Kim, Finkelstein, & Halebian, 2015). We measured slack based on the total amount of cash reserves. This way, we control for the possibility that firms with increasing cash reserves can afford investments more easily or might be more tempted to do so.

Third, we added the *change of firm leverage* as a control variable because firms with a high debt ratio are exposed to a higher risk and may therefore invest less into (costly and risky) growth initiatives (Deephouse & Wiseman, 2000). We used the debt to assets ratio to estimate firm leverage.

Fourth, we also control for the *change of market concentration*. It is important to take this effect into account because firms in highly concentrated markets have a weaker interest in provoking price wars and in growing at a faster rate than their competitors (Greve, 2008). The market concentration is operationalized with a Herfindahl index based on each company's market share in the total market (across the different market segments) in terms of sales.

Additionally, we included indicators for each simulated period as a control variable. Thereby, we capture simulation-specific effects⁴ in the external environment, such as GDP growth or inflation rate.

4 | ANALYSIS AND RESULTS

The descriptive statistics and pairwise correlations for the variables included in our empirical model are shown in Table 1. Before running our analyses, we performed tests to determine the appropriate model settings. A Breusch-Pagan/Cook-Weisberg confirmed the presence of heteroscedasticity ($\chi^2 = 33.93, p < 0.001$). Therefore, we continued with Huber-White robust standard errors. A Breusch-Pagan Lagrange multiplier (LM) test further indicated that a pooled ordinary least squares (OLS) model is appropriate; that is., our model does not need to account for the panel structure of our data. Furthermore, we examined the variance inflation factors (VIFs) to test for multicollinearity. The mean VIF for the full model with all interaction variables is 2.65, and the highest individual VIF value is 3.74. As both values are below the threshold value of 10.0 (Baum, 2006), multicollinearity does not affect our results.

Table 2 presents the results of the regression analysis. Model 1 only contains the control variables. In Model 2, the main effect of firm profitability (compared with its past profitability) is added. The moderators are added stepwise in Models 3, 4, and 5. For the interpretation, we will focus on Model 5, which contains all variables.

The results show that firm profitability⁵ has a significant positive effect on the prioritization of growth relative to efficiency increase ($\beta = 0.281, p < 0.05$). Therefore, an increase in firm profitability leads to an increase in the prioritization of growth relative to efficiency increase. This result verifies the empirical findings of Greve (2008), which show that managers pay sequential attention towards size and profitability goals.

The interaction of firm profitability with competitors' price change is positive and significant ($\beta = 0.288, p < 0.05$). Therefore, if competitors decrease their prices (i.e., negative change), the positive impact of firm profitability on the prioritization of growth relative to efficiency increase becomes weaker. In other words, firms put a stronger emphasis on efficiency increase if competitors decreased their prices. This supports Hypothesis 1.

The interaction of firm profitability with competitors' promotion change is positive and (weakly) significant ($\beta = 0.137, p < 0.1$). This means that promotion intensifications of competitors strengthen the relationship between firm profitability and the prioritization of growth relative to efficiency increase. Put differently, an increase in promotion activities by competitors leads a focal firm to put a stronger priority on growth than in the absence of these changes. This supports Hypothesis 2.

The interaction of firm profitability with competitors' quality change is not significant ($\beta = -0.083, p > 0.1$). Consequently, we do not find evidence in our data that the influence of firm profitability differs with product quality improvements of competitors. We therefore cannot support Hypothesis 3.

As a robustness test, we also reran our empirical analysis with an alternative model. Going back to Kahneman and Tversky (1979), literature on aspiration levels suggests that firms are more risk averse in gain situations, that is, when performance is above the reference point, and more risk seeking in loss situations, that is, when

TABLE 1 Descriptive statistics and correlations

	N	Mean	s.d.	Min	Max	1	2	3	4	5	6	7	8	9
1	711	2.520	22.717	-210.274	305.219	1.000								
2	710	0.047	18.404	-283.000	232.000	0.097*	1.000							
3	711	-0.024	0.037	-0.136	0.104	0.065	0.006	1.000						
4	711	0.147	0.104	-0.061	0.580	-0.023	-0.031	-0.094*	1.000					
5	711	0.319	0.399	-0.695	1.850	0.026	-0.021	0.209*	0.206*	1.000				
6	711	-0.161	0.253	-1.000	0.653	0.026	-0.002	0.329*	-0.033	0.234*	1.000			
7	711	3.392	40.163	-213.000	259.500	-0.039	-0.005	0.227*	-0.174*	-0.093*	0.104*	1.000		
8	710	0.140	0.507	-0.747	9.177	-0.042	-0.083*	0.143*	0.065	-0.004	0.022	0.047	1.000	
9	711	0.026	0.048	-0.066	0.265	0.024	-0.037	-0.035	0.152*	-0.064	-0.047	-0.092*	-0.050	1.000

*Significant at $p < 0.05$.

performance is below the reference point (e.g., Fiegenbaum, Hart, & Schendel, 1996; Fiegenbaum & Thomas, 1988; Goensch, 2017; Schlosser, 2015, 2020). This may also be relevant in the context of our study because growth initiatives involve a higher level of risk taking than efficiency improvement initiatives (Greve, 2008). In line with the approach taken by other empirical studies (e.g., Gaba & Greve, 2019; Greve, 1998, 2008; Kim et al., 2015; Park, 2007; Xu, Zhou, & Du, 2019), we therefore ran an analysis in which our independent variable was entered into the regression using a spline specification with a knot at the reference point. This way, the slope for firm profitability could differ above and below the reference point in order to reflect different risk attitudes. As expected, we see the tendency that the positive effect of firm profitability is weaker if performance is above compared to below the reference point. However, the slope estimates above and below the reference point are not significantly different from each other, which may be caused by the comparatively small sample size (Labianca, Fairbank, Andrevski, & Parzen, 2009). Nevertheless, we find consistent evidence for our Hypotheses 1 and 2 using this alternative model, which raises confidence in our results.

5 | DISCUSSION

5.1 | Interpretation and implications

Building on the behavioral theory of the firm, Greve (2008) argues that goals related to firm size and efficiency are interdependent of one another. Using data on companies from the insurance industry, he finds evidence for a sequential attention to these goals. While using an entirely different empirical approach, that is, business simulations, our study supports Greve's (2008) finding that profitability has a significant influence on the subsequent prioritization of growth relative to efficiency increase. Decision makers particularly react to the dynamic changes in profitability. If profitability decreases, managerial resources are increasingly devoted to efficiency increase compared with growth. Inversely, profitability improvements encourage managers to focus more on growth than on efficiency increase. Nevertheless, our study additionally showed that this effect is contingent on the actions of competitors, particularly product price reductions and promotion intensifications.

The positive effect of firm profitability (compared with its past profitability) becomes weaker if competitors decrease the product prices. This suggests that managers closely observe the prices of their competitors (Ocasio, 1997; Smith et al., 1991) and interpret price cuts as a competitive attack (Chen & Miller, 2015). We provided three different reasons for this effect: First, profits at the focal company might decline if competitors increase their market share. Second, if the focal company reacts by decreasing product prices as well, a price war may be initiated, which reduces margins even further. Third, any consecutive price increases are rather difficult to impose once competitors decrease their prices, especially in industries with a high price sensitivity of demand. Managers of the focal firm therefore interpret price

TABLE 2 Results of ordinary least squares (OLS) regression for the prioritization of growth relative to efficiency increase

Variables	1		2		3		4		5		6	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Firm profitability (cpp)			0.089 [*]	0.041	0.085 [*]	0.042	0.250 [*]	0.109	0.253 [*]	0.101	0.281 [*]	0.128
Firm profitability (cpp) × Competitors' price change							0.217 [*]	0.099	0.289 [*]	0.132	0.288 [*]	0.132
Firm profitability (cpp) × Competitors' promotion change									0.102 ⁺	0.057	0.137 ⁺	0.081
Firm profitability (cpp) × Competitors' quality change											-0.083	0.094
Controls												
Competitors' price change			0.065	0.051	0.054	0.051	0.054	0.051	0.043	0.053	0.044	0.053
Competitors' promotion change			-0.057 ⁺	0.029	-0.066 [*]	0.029	-0.066 [*]	0.029	-0.065 [*]	0.029	-0.067 [*]	0.029
Competitors' quality change			0.009	0.052	-0.000	0.050	-0.000	0.050	0.006	0.051	0.008	0.051
Change of firm scope	0.025	0.039	0.022	0.038	0.024	0.039	0.026	0.039	0.026	0.039	0.025	0.039
Change of firm slack	-0.052	0.042	-0.052	0.042	-0.067	0.047	-0.067	0.047	-0.067	0.047	-0.067	0.047
Change of firm leverage	-0.051	0.039	-0.044	0.037	-0.038	0.033	-0.030	0.031	-0.026	0.031	-0.024	0.031
Change of market concentration	0.012	0.054	0.016	0.054	0.020	0.054	0.020	0.053	0.031	0.054	0.029	0.054
Period 2	-0.262 ⁺	0.139	-0.258 ⁺	0.139	-0.234 ⁺	0.131	-0.267 [*]	0.133	-0.286 [*]	0.134	-0.292 [*]	0.135
Period 3	0.031	0.185	0.013	0.186	0.085	0.182	0.055	0.183	0.033	0.186	0.032	0.186
Period 4	-0.117	0.155	-0.126	0.154	-0.010	0.116	-0.063	0.120	-0.079	0.121	-0.092	0.123
Period 5	-0.183	0.157	-0.192	0.156	-0.089	0.137	-0.135	0.137	-0.157	0.137	-0.155	0.137
Constant	0.101	0.126	0.107	0.125	0.047	0.101	0.077	0.102	0.095	0.103	0.098	0.104
N	710	709	709	709	709	709	709	709	709	709	709	709
R ²	0.017		0.025		0.030		0.048		0.054		0.056	
Adj. R ²	0.005		0.012		0.014		0.030		0.035		0.036	
F	1.343		1.951		1.657		1.707		1.847		1.669	

Note: All variables are z standardized. Huber-White robust standard errors. "cpp" is an abbreviation for compared with its past profitability.

⁺ $p < 0.10$. ^{*} $p < 0.05$. ^{**} $p < 0.01$. ^{***} $p < 0.001$.

cuts as a *threat* and react by initiating cost savings to secure their margins. Even if profitability may have developed favorably in the past, firms therefore put a stronger focus on efficiency increase than in the absence of competitors' price cuts.

In addition, our results showed that the positive effect of firm profitability (compared with its past profitability) becomes stronger if competitors intensify their product promotion. This is an interesting finding as promotion is not directly attached to the product but more a product-related activity. Even though this may cause a short-term shift in demand away from the focal company to its competitors, there may be positive long-term effects for two reasons: First, promotion intensifications of competitors potentially have a demand-expanding effect for the entire market. Second, if the promotion emphasizes product differentiation, rivalry among competitors could even decline, which reduces price and margin pressures. Therefore, managers of the focal firm interpret product promotion intensification as an *opportunity* with the potential to profit from in the future. Under these circumstances, a favorable development in profitability thus provides an even stronger incentive for decision makers of the focal firm to increase their focus on growth.

5.2 | Limitations and future research

Our study provides initial support that product price and promotion as competitive action parameters have a moderating influence on the relationship between firm profitability and the prioritization of growth relative to efficiency increase. However, given the restrictions in the design of the business simulation, we could not examine further competitive actions, particularly the place of sale (as a fourth dimension of the 4P framework). Future research might therefore extend our findings to other competitive actions. As we could not find evidence for a moderating influence of competitors' product quality improvements in our study, further studies may also re-examine whether innovative activities nevertheless play a role for the prioritization of growth relative to efficiency increase in certain industries. Moving beyond competitive actions, researchers may also investigate moderating effects of other changes in the firm-external environment, such as changes in regulations, international and intranational crises, or changes in input prices.

Moreover, the setting of the business simulation allowed us to study only the short-term effects of competitors' behavior, that is, how they influence the prioritization of growth relative to efficiency increase of a focal firm in the immediately following period. However, competitive attacks may also have long-term implications. For example, price cuts may lead to price wars enduring over several years (Maskin & Tirole, 1988; Rindova et al., 2004; Schlosser & Boissier, 2018). Nevertheless, several studies show that competitive attacks primarily induce immediate and less long-term reactions (e.g., Chen & Miller, 2012; Miller & Chen, 1996; Steenkamp et al., 2005). Therefore, studying the short-term effects on the prioritization decision may be particularly relevant. Still, it could be interesting to analyze whether we see similar mid- to long-term influences of

competitors' actions on the decision to prioritize between growth and efficiency increase.

Furthermore, the fact that we based our analysis on data from business simulations may bring up the question of external validity of the results. The design of the simulation game, particularly the causal links between a firm's actions and the corresponding outcomes, reflects the conditions in many manufacturing industries (i.e., small number of firms, many customers, differentiated goods, and some control over pricing). However, there are products or industries for which these settings might not be representative. For example, if branding or brand loyalty plays an important role, it may be less threatening to a focal company if its competitors decrease their prices (e.g., Agrawal, 1996; Heil & Helsen, 2001). Consequently, firms might make different decisions concerning their prioritization between growth and efficiency increase under these circumstances. Verifying or extending our model in other contexts and identifying additional boundary conditions might therefore be an interesting starting point for further investigations.

Overall, despite the limitations related to the particular design of the business simulation, our approach gave us a major advantage, namely, the possibility to collect data on planned as well as actual outcomes in a relatively controlled setting. Data on aspiration levels and goal quantifications, which are the basis for measuring the prioritization decision, are very hard to obtain as this information is seldomly disclosed to the public. This may also be the reason why this topic has seen limited attention in research. Therefore, scholars who use published field data need to rely on additional assumptions about quantitative goal specifications to construct aspiration levels *ex post* and based on observed outcomes. However, any corporate intentions that do not follow these predefined, oftentimes history-based rules for goal specifications are not considered. We believe that the usage of business simulation data in our study is a first step to compensate for the downsides of previously applied, alternative approaches and thus helps to enhance future research in this area.

Our study focused on analyzing antecedents for the prioritization between growth and efficiency increase. However, it was beyond scope of this paper to discuss the implications of this prioritization decision. We derived the two levers—growth and efficiency increase—from the overarching goal of managers to increase the shareholder value. Therefore, it would be interesting to see how the prioritization between these levers actually influence shareholder value. Does the relatively long persistence of a chosen prioritization decision enhance value increase? To which extent do shifts of prioritizations positively relate to value? These are fruitful avenues for research questions to be addressed.

6 | CONCLUSION

Firm profitability as a firm-internal factor has been shown to influence the prioritization of growth relative to efficiency increase (Greve, 2008). We hypothesized in our study that competitive actions as a firm-external factor have a moderating influence on this

relationship. Our empirical analysis particularly showed that the influence of firm profitability on the prioritization of growth relative to efficiency increase is weaker if competitors undertake price cuts. We argued that the focal firm is urged to secure their market position and margin by putting a stronger emphasis on efficiency increases. In addition, the results showed that the influence of firm profitability on the prioritization of growth relative to efficiency increase is stronger if competitors undertake promotion intensifications. We reasoned that the focal firm uses the positive effect on total market demand and differentiation as a growth opportunity. Overall, our study lays the ground for further studies that examine antecedents and consequences of corporate growth and efficiency increase strategies.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ENDNOTES

- ¹ Greve (2008) uses the term *performance*, whereas we use the term *efficiency* for the prioritization decision; both terms describe the financial efficiency in the sense of profitability.
- ² For our empirical analysis that is based on business simulations, participants did not have the possibility to make decisions regarding the place of sale, leading to an exclusion of this action parameter from the investigation. We therefore limit our theoretical discussion to the action parameters (1) product price, (2) product promotion, and (3) product quality.
- ³ We only control for those factors that change over the course of the simulation game and are likely to affect the prioritization of growth relative to efficiency increase. Certain factors that may be relevant in practice, such as free float of shares, are equal for all companies in our business simulation.
- ⁴ We also examined whether additional simulation-specific indicators, such as educational program or calendar year, need to be included. However, tests showed that there is no significant difference between these groups and including these indicators did not improve our model fit.
- ⁵ For ease of reading, we leave out the additional term ("compared with its part profitability") in this section.

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APPENDIX A: FORMULAE USED FOR CALCULATING VARIABLES

A.1 | Indices explanations

Company j

Period t

Market segment i

Number of firms in the market N

A.2 | Calculation of dependent variable

$$\text{Prioritization of growth relative to efficiency increase}_{j,t} = \text{Focus on growth}_{j,t} - \text{Focus on efficiency increase}_{j,t} \quad (\text{A1})$$

$$\text{Focus on growth}_{j,t} = \frac{\Delta \text{sales}_{\text{planned},j,t} - \Delta \text{sales}_{\text{potential},j,t}}{|\Delta \text{sales}_{\text{potential},j,t}|} \quad (\text{A2})$$

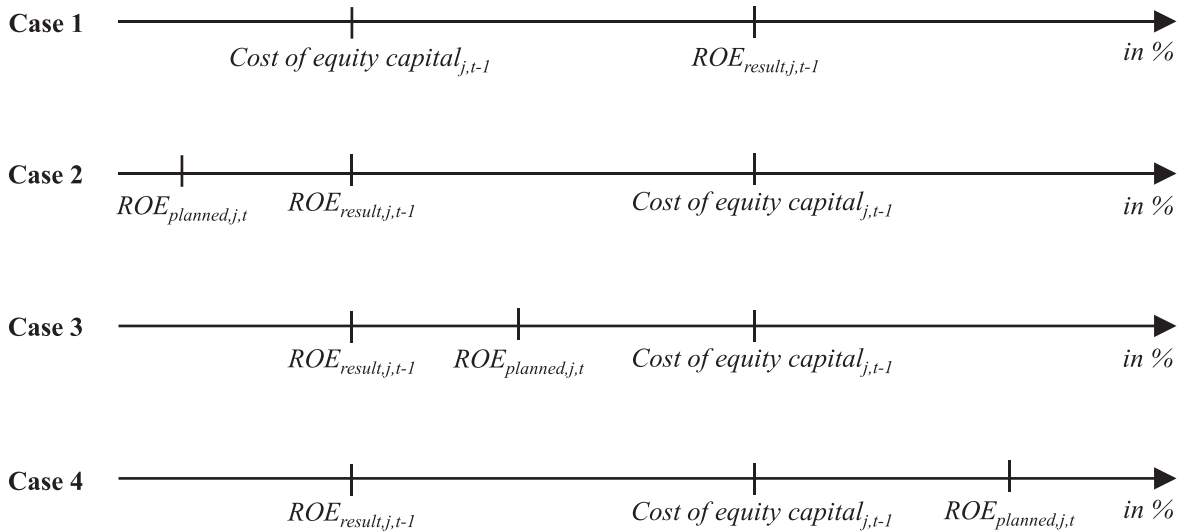
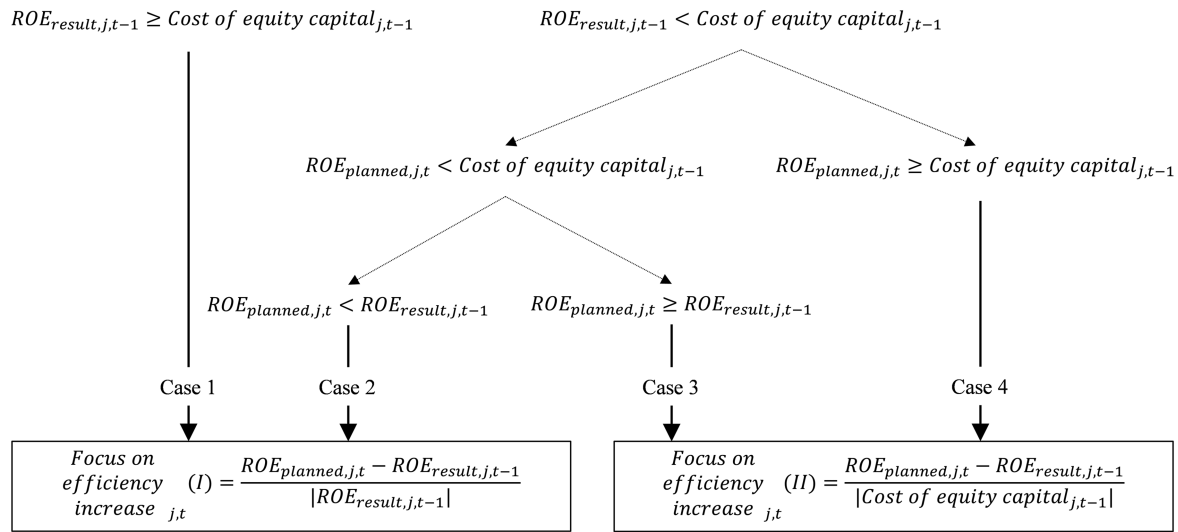
$$\Delta \text{sales}_{\text{planned},j,t} = \frac{\text{sales}_{\text{planned},j,t} - \text{sales}_{\text{result},j,t-1}}{\text{sales}_{\text{result},j,t-1}} \quad (\text{A3})$$

$$\Delta \text{sales}_{\text{potential},j,t} = \frac{\text{sales}_{\text{potential},j,t} - \text{sales}_{\text{result},j,t-1}}{\text{sales}_{\text{result},j,t-1}} \quad (\text{A4})$$

$$\text{sales}_{\text{potential},j,t} = \sum_{\text{market } i=1}^4 (\text{sales}_{\text{result},j,t-1,i} \times (1 + \text{growth}_{t,i})) + \text{sales}_{\text{potential,new market,t}} \quad (\text{A5})$$

$$\text{Focus on efficiency increase}_{j,t} = \begin{cases} \frac{\text{ROE}_{\text{planned},j,t} - \text{ROE}_{\text{result},j,t-1}}{|\text{ROE}_{\text{result},j,t-1}|} & \text{Case 1,2} \\ \frac{\text{ROE}_{\text{planned},j,t} - \text{ROE}_{\text{result},j,t-1}}{|\text{Cost of equity capital}_{j,t-1}|} & \text{Case 3,4} \end{cases} \quad (\text{A6})$$

Graphical illustration of the cases



Cost of equity capital_{j,t-1} = (A7)

$$\frac{WACC_{j,t-1} - (\text{interest rate with tax shield}_{j,t-1} \times \text{debt ratio}_{j,t-1})}{\text{equity ratio}_{j,t-1}}$$

Debt ratio_{j,t-1} = $\frac{\text{total debt}_{j,t-1}}{\text{balance sheet total}_{j,t-1} - \text{pension provision}_{j,t-1}}$ (A8)

Equity ratio_{j,t-1} = $\frac{\text{shareholder's equity}_{j,t-1}}{\text{balance sheet total}_{j,t-1} - \text{pension provision}_{j,t-1}}$ (A9)

Interest rate_{j,t-1} = $\frac{\text{interest expenses}_{j,t-1}}{\text{total debt}_{j,t-1}} \times (1 - \text{tax quota})$ (A10)

A.3 | Calculation of independent variable

Firm profitability (compared to its past profitability)_{j,t-1} = $\frac{ROE_{result,j,t-1} - ROE_{result,j,t-2}}{|ROE_{result,j,t-2}|}$ (A11)

A.4 | Calculation of moderating variables

Competitors' price change_{j,t-1} = $\frac{\text{Competitors' price}_{primary,t-1} - \text{Competitors' price}_{primary,t-2}}{\text{Competitors' price}_{primary,t-2}}$ (A12)

$$\text{Competitors' } \emptyset \text{ price}_{\text{primary},t-1} = \frac{\sum_{j=1}^{N-1} (\text{price}_{\text{primary},j,t-1} \times \text{sales}_{\text{primary},j,t-1})}{\sum_{j=1}^{N-1} (\text{sales}_{\text{primary},j,t-1})} \quad (\text{A13})$$

$$\text{Competitors' } \emptyset \text{ promotion change}_{j,t-1} = \frac{\sum_{j=1}^{N-1} (\# \text{salespeople}_{j,t-1}) - \sum_{j=1}^{N-1} (\# \text{salespeople}_{j,t-2})}{\sum_{j=1}^{N-1} (\# \text{salespeople}_{j,t-2})} \quad (\text{A14})$$

$$\text{Competitors' } \emptyset \text{ quality change}_{j,t-1} = \frac{\sum_{j=1}^{N-1} (\text{R\&D spending}_{j,t-1}) - \sum_{j=1}^{N-1} (\text{R\&D spending}_{j,t-2})}{\sum_{j=1}^{N-1} (\text{R\&D spending}_{j,t-2})} \quad (\text{A15})$$

A.5 | Calculation of control variables

$$\text{Change of firm scope}_{j,t-1} = \frac{(\text{normalized firm scope}_{j,t-1}) - (\text{normalized firm scope}_{j,t-2})}{(\text{normalized firm scope}_{j,t-2})} \quad (\text{A16})$$

$$\text{Firm scope}_{j,t-1} = \sum_{i=1}^4 \left(\left(\frac{\text{sales}_{\text{result},i,j,t-1}}{\sum_{i=1}^4 (\text{sales}_{\text{result},i,j,t-1})} \right) \times \ln \left(\frac{\sum_{i=1}^4 (\text{sales}_{\text{result},i,j,t-1})}{\text{sales}_{\text{result},i,j,t-1}} \right) \right) \quad (\text{A17})$$

$$\text{Change of firm slack}_{j,t-1} = \frac{\text{cash}_{\text{result},j,t-1} - \text{cash}_{\text{result},j,t-2}}{\text{cash}_{\text{result},j,t-2}} \quad (\text{A18})$$

$$\text{Change of firm leverage}_{j,t-1} = \frac{\left(\frac{\text{total debt}_{\text{result},j,t-1}}{\text{total assets}_{\text{result},j,t-1}} \right) - \left(\frac{\text{total debt}_{\text{result},j,t-2}}{\text{total assets}_{\text{result},j,t-2}} \right)}{\left(\frac{\text{total debt}_{\text{result},j,t-2}}{\text{total assets}_{\text{result},j,t-2}} \right)} \quad (\text{A19})$$

$$\text{Change of market concentration}_{t-1} = \frac{\left(\sum_{j=1}^N \left(\frac{\sum_{i=1}^4 (\text{sales}_{\text{result},i,j,t-1})}{\sum_{i=1}^4 \sum_{j=1}^N (\text{sales}_{\text{result},i,j,t-1})} \right)^2 \right) - \left(\sum_{j=1}^N \left(\frac{\sum_{i=1}^4 (\text{sales}_{\text{result},i,j,t-2})}{\sum_{i=1}^4 \sum_{j=1}^N (\text{sales}_{\text{result},i,j,t-2})} \right)^2 \right)}{\left(\sum_{j=1}^N \left(\frac{\sum_{i=1}^4 (\text{sales}_{\text{result},i,j,t-2})}{\sum_{i=1}^4 \sum_{j=1}^N (\text{sales}_{\text{result},i,j,t-2})} \right)^2 \right)} \quad (\text{A20})$$

APPENDIX B: ADDITIONAL INFORMATION ON THE DESIGN OF THE BUSINESS GAME

B.1 | Causal effects of competitive actions as programmed in the software

B.1.1 | Product prices

Individual company demand (i.e., potential sales) is influenced by the product prices set by the firm. A double-bend price-demand function

is applied. This means that there are three zones in which the price-demand function has different slopes. The slope in the middle zone is larger than the one in the upper and lower zone (i.e., high price ranges vs. low price ranges). Before the start of the simulation (i.e., period 0), all companies start in the middle zone, and a current price of 3,000 monetary units is associated with a demand of 43,000 copy machines. Furthermore, they know that an increase (decrease) in prices *ceteris paribus* reduces (increases) demand.

B.1.2 | Product promotion

The number of salespeople employed influences demand (i.e., potential sales) and follows an S-shaped relationship. Before the start of the simulation, participants are positioned approximately in the middle of the curve with a sales force of 100 people. Due to the shape of the relationship curve, there is a decreasing marginal benefit when adding further salespeople relative to the initial position.

B.1.3 | Product quality

The amount of R&D spending determines the company-specific technology index that has an influence on demand (i.e., potential sales). The relationship between the technology index and demand follows an S-shaped relationship. Before the start of the simulation, participants are positioned about in the middle of the curve with a technology index of 100 and a current R&D spending of 2.1 million monetary units. The technology index itself can only increase or stagnate (but not decrease) depending on the level of R&D spending. Therefore, if a firm decides not to invest in the development of its products any further, the technology index will remain at its current level. Consequently, an increase in R&D spending *de facto* always has a decreasing marginal benefit in terms of demand.

However, we want to emphasize that all of these effects only relate to individual company demand *ceteris paribus*. The overall market demand is set by the facilitator. Thus, the actual sales that a firm realizes in a particular period are also influenced by the decisions that its competitors make at the same time (competitive element). Consequently, the firm cannot know for sure whether its changes in product prices, promotion, and quality also materialize in the form of actual sales.

B.2 | Debriefings

As participants did not know the precise parameters of the causal relationships, we conducted debriefings after each period to support the learning process. We presented competitive action decisions as well as key results for each company. Specifically, we focused on the following indicators: (1) product prices (per product and market), (2) demand (i.e., potential sales per product and market), (3) actual sales (in number of units per product and market), (4) total revenue per company, (5) utilization of machines

and personnel, (6) operating income, (7) net income, and (8) share prices. This information was accompanied by a detailed discussion of the factors that influenced these figures as well as guidelines on how to best interpret them.

The presentation of the figures was complemented by a discussion of selected strategic management concepts. First, we introduced Porter's concept of competitive advantage and discussed

how customers base their purchase decision on the value-price ratio of the offerings of each company. Second, we explained Porter's generic strategies (i.e., price or cost leadership and quality leadership) and analyzed which strategy each company applied. Third, we introduced the concept of path dependency and discussed how current decisions influence the scope of possible actions in the future.