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SECOND-ORDER COMPETENCES AND SCHUMPETERIAN RENTS

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Second-order competences, a type of dynamic capability, enable firms to engage in a process of Schumpeterian competition. This study examines the effects of marketing and R&D second-order competences (the abilities to create new market-related and technological resources) on firm profitability. Based on multiple informant surveys and archival data from U.S. public manufacturing firms, competitive turbulence is found to present contrasting contingencies for the effects of these competences on return on assets (ROA). The effect of marketing competence on ROA was positive under stable and moderate competitive conditions, whereas the effect of R&D competence on ROA was positive under volatile competitive conditions. Copyright © 2012 Strategic Management Society.

As each wave drives on a wave, as each is pressed by that which follows, and must press on that before it, so the moments fly, and others follow, so they are renewed. The moment which moved on before is past, and that which was not, now exists in Time, and every one comes, goes, and is replaced.

Ovid, 2005: Book XV, verse 220

INTRODUCTION

A central tenet of resource-based theory is that superior resources result in superior performance (Barney, 1991; Peteraf, 1993). However, rents accruing from a particular stock of resources are transitory and, therefore, the firm needs to be adept at continuously creating new resources and assembling them into competences (Dierickx and Cool, 1989). As Reed and DeFillippi (1990: 101) argued '. . . sustained competitive advantage is not derived from a fixed stock of competencies. Rather, it arises from a continual competency accumulation.' Conceptual and empirical work has examined the deployment and reconfiguration of the stock of existing resources (e.g., Kor and Mahoney, 2005; Morrow *et al*., 2007; Sirmon, Hitt, and Ireland, 2007; Sirmon *et al*., 2011), however the effect of the ability to create new resources on performance has received much less attention.[1] The ability of a firm to create new resources and competences is referred to as its 'second-order competences' (Danneels, 2002; 2008). Just like 'first-order' (Danneels, 2002) or 'ordinary'

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[1] Sirmon *et al*. (2011; see also Sirmon *et al*., 2007) present a fine-grained framework of resource orchestration to include a broad set of managerial actions involving structuring, bundling, and leveraging. Structuring, in turn, includes acquiring, accumulating, and divesting resources. The current study focuses on resource accumulation, the internal development of resources (Sirmon *et al*. (2011; see also Sirmon *et al*., 2007)). In particular, this study examines the abilities to create new market-related and technological resources and the capture of rents from these abilities.

(Winter, 2003) competences, second-order competences are heterogeneously distributed over firms and, thus, could provide the basis for superior performance. As Markides and Williamson (1994: 164) pointed out, '. . . simply exploiting existing strategic assets will not create long-term competitive advantage. In a dynamic world, only firms who are able to continually build new strategic assets faster and cheaper than their competitors will earn superior returns over the long term.' However, despite their implied benefits for firm prosperity, there is a lack of theory and empirical evidence regarding the effect of second-order competences on firm performance (cf. Kraatz and Zajac, 2001).

In this article, I build on dynamic capabilities theory and the notion of Schumpeterian rents to argue that second-order competences enable firms to engage in a process of Schumpeterian competition, whereby competing firms continually maneuver to outdo and undermine each other (D'Aveni, 1994; Schumpeter, 1942). Firms with second-order competences can create new resources that allow them to imitate and substitute the resources of competing firms, in effect engaging in creative destruction. Firms engaged in Schumpeterian competition endeavor to keep on their feet on ground that is crumbling under them (McCraw, 2007). In language reminiscent of the Ovid quote in the epigraph, Schumpeter (1942: 83) described competition as a '. . . process . . . that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process of creative destruction is the essential fact about capitalism.' In line with this argument, theoretical arguments have suggested that the value of dynamic capabilities depends on the dynamism of the firm's environment (e.g., Eisenhardt and Martin, 2000; Helfat *et al*., 2007).

This study is the first to theorize and examine the effects of second-order competences, a form of dynamic capabilities, on firm profitability. As such, it has both theoretical and empirical contributions. The theoretical contribution of this article is to show how Schumpeterian competition links second-order competences with profitability, contingent on competitive activity. It argues that second-order competences enable firms to engage in a process of Schumpeterian competition, thereby complementing the static view of resource-based theory and Ricardian rents with the dynamic view of dynamic capabilities and Schumpeterian rents. The empirical contribution of this article is to examine how second-order competences relate to profitability under different conditions of competitive activity. Specifically, it examines the effects of marketing and R&D second-order competences on firm profitability based on multiple informant survey and archival data from U.S. public manufacturing firms.

This article proceeds as follows: after explaining the connection between second-order competences and Schumpeterian rents, I provide empirical evidence of the effect on firm profitability of second-order marketing and R&D competences, using data on a sample of U.S. public manufacturing firms. I hypothesize and find that these effects are contingent on the degree of competitive turbulence.

SECOND-ORDER COMPETENCES

Dynamic capability is the ability of a firm to alter its resource base by adding, reconfiguring, and deleting resources or competences (Teece, Pisano, and Shuen, 1997; Eisenhardt and Martin, 2000; Winter, 2003). A second-order competence is the first form of dynamic capability: the ability to add new resources or competences. By adding new resources and competences, second-order competences create 'flow' in the 'stock' of resources and competences of a firm (cf. Ambrosini and Bowman, 2009; Dierickx and Cool, 1989).

I define resources and competences following extensive prior work. A resource is a tangible or intangible asset (or 'factor' in economics lingo) that the firm owns, controls, or has access to and from which it potentially derives rents (Helfat and Peteraf, 2003). 'Rents' refers to the income streams that accrue from the resources. A competence is a configuration of resources that enables the firm to accomplish a particular task (Grant, 1991; Helfat and Peteraf, 2003; McGrath, MacMillan, and Venkataraman, 1995), and it is constituted by a set of resources. Danneels (2002) further distinguished first-order competence from second-order competence, where the former refers to the competence to accomplish a particular task and the latter is the competence to build new competences. Building on organizational learning theory (March, 1991; Levinthal and March, 1993), he conceptualized a second-order competence as a skill at exploration, that is, at building new competences.

The focus of this study is on second-order marketing and R&D competences, which reflect the firm's ability to add new customer and technological competences, respectively (Danneels, 2002). Customer competence

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Table 1. Ricardian versus Schumpeterian rents

	Ricardian rents	Schumpeterian rents
Source	Value and rarity	Imitation and substitution
Interfirm heterogeneity	First-order competences	Second-order competences
Resource portfolio	Stock	Flow
Contingency	Competitive superiority	Competitive activity
Competition	Static	Dynamic
Goal	Protection	Creative destruction
Metaphor	Picture	Video

is the ability of a firm to serve a *particular* group of customers, and it consists of a set of market-related resources such as brands, distribution channels, and knowledge about customers (Danneels, 2002; Mitchell, 1992). Technological competence is the ability to use a *particular* technology to produce output, and it is constituted by a set of technically related resources such as manufacturing facilities and patents (Danneels, 2002; Mitchell, 1992). Technological and customer competences are first-order competences. Second-order marketing and R&D competences are, then, the ability to add new customer or technological competences to the firm's repertoire, respectively. A second-order marketing competence is, thus, a competence at explorative learning by exploring new markets, and a second-order R&D competence is a competence at explorative learning by exploring new technologies (Danneels, 2002; Levinthal and March, 1993; March, 1991). Building a new customer competence involves identifying new customers, developing knowledge about those customers, and gaining access to them through sales and distribution channels. Building a new technological competence involves identifying promising technologies, hiring engineers in new areas, setting up new development and production facilities, and so on.

Firms with second-order competences may build new resources or competences that are distinct from or even undermine those of their competitors. Next, I will develop the rationale regarding the capture of rent from second-order competences, thereby supplementing the resource-based theory of Ricardian rents with the dynamic capabilities-based theory of Schumpeterian rents.

SCHUMPETERIAN RENTS

In this section, I develop theory about the effects of second-order competences on profitability and why these effects are contingent on competitive activity (cf. Table 1). I do so by arguing that firms with heterogeneous dynamic capabilities are engaged in Schumpeterian competition, creating a dynamic market process in which rent is earned in disequilibrium (Lewin and Phelan, 1999).

First, it is important to consider how resources (and the competences they constitute) are theorized to lead to rent in resource-based theory (RBT). In RBT, possession of scarce resources has been the key explanation of interfirm differences in performance, building on the notion of Ricardian rents (Montgomery, 1995). According to the Ricardian logic, heterogeneity in performance is due to ownership of resources that have differential productivity (Rumelt, 1987). Ricardian rents accrue to these superior resources (also called 'productive factors' in economics terminology), as they are scarce, that is, not equally available to competing firms (Peteraf, 1993).

While the Ricardian logic has provided a solid basis for theorizing about causes for differential performance in resource-based theory, it does have its limitations. As stated cogently by Montgomery (1995: 262–263), 'the analysis of Ricardian rents has added considerable sophistication to our understanding of resources and competitive advantage. It is regrettable, however, that these developments have not been balanced by a closer consideration of Schumpeterian rents, and resources and advantages that erode through time.' There are three key omissions in RBT.

First, RBT has taken a rather static view by simply stating that the possession of superior resources leads to rents. Ricardian rents result from a desirable 'resource position' (Peteraf, 1993), a phrase that has a static connotation. However, Ricardian rents persist only in 'equilibrium' or static distribution of those resources (Montgomery, 1995). As Jacobson stated (1992: 803), 'the resource-based perspective

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does not focus on the market process but rather makes use of equilibrium concepts and analysis.' Hence, the RBT accounts for rents accruing to a stock of resources, but not for rents resulting from their flow.

Second, RBT does not account for the causes of resource heterogeneity, beyond initial endowments. In RBT, the existence of resources is taken for granted; their emergence is not examined. However, firm heterogeneity is an endogenous creation of economic actors (Lewin and Phelan, 1999; Mahoney and Pandian, 1992). RBT has not recognized the agency of firms in creating and disturbing the distribution of resources and their rents.

Third, RBT fails to address the dynamics of competition (Montgomery, 1995). As stated, Ricardian rents result from possession of superior (and, hence, scarce) resources. The very notions of 'superiority' or 'scarcity' of resources refer to the relative status of competitors *at a point in time*. However, scarcity need not be a long-lived condition (Peteraf and Barney, 2003). Competition causes disequilibrium in the distribution and value of resources (Schumpeter, 1942).

I propose that linking dynamic capability theory with the notion of Schumpeterian rents addresses these gaps in resource-based theorizing. Dynamic capability theory explicates that higher-level capabilities are the firm-level source of changes in resource distributions (i.e., heterogeneity) over time. According to dynamic capability theory, firms are heterogeneous not just in their stock of resources, but also in their ability to produce flow of resources (Dierickx and Cool, 1989); that is firms differ in their ability to change their set of resources (Eisenhardt and Martin, 2000; Teece *et al*., 1997). Because dynamic capabilities are heterogeneously distributed across firms, they can also be a source of rents.

However, dynamic capability theory has lacked a theory of rent, as evidenced by the lack of discussion of rents in the classic articles (Eisenhardt and Martin, 2000; Teece, Pisano, and Shuen, 1997; Winter, 2003). Teece *et al*. (1997: 524) do recognize that rents flow not just from the resources of the firm, but also from its 'ability to reconfigure and transform.' Teece *et al*. (1997: 527) then link dynamic capabilities to Schumpeterian rents in a table, but not do not discuss this connection in their text.

In the next paragraphs, I will further develop the connection between dynamic capabilities (and second-order competences in particular) and Schumpeterian rents. In this view, the heterogeneity of resources and rents across firms are explained as an outcome of an endogenous process of Schumpeterian competition.

Resource heterogeneity allows for Ricardian rents. However, firms themselves upset this equilibrium by engaging in Schumpeterian competition (Grimm, Lee, and Smith, 2006; Mahoney and Pandian, 1992; Teece *et al*., 1997). Schumpeterian competition refers to firms competing by innovating in both their factors (resources) and outputs (products), 'the competition from the new commodity, the new technology, the new source of supply, the new type of organization' (Schumpeter, 1942: 84; see also Schumpeter, 1934: 66). These innovations entail 'creative destruction' of both resources and products. Dynamic capabilities, and second-order competences in particular, enable a firm to engage in Schumpeterian competition. Just like first-order competences, second-order competences are heterogeneously distributed across firms.

Second-order competences of competing firms bring new resources into play and cause disequilibrium in the distribution of resources over time. They enable firms to imitate and substitute competitors' resources (Dierickx and Cool, 1989). Some resources will be rendered useless or obsolete (Conner, 1991) and others will lose their scarcity. The new resources may lead to products with superior benefits and/or lower cost (Danneels, 2002; Lee *et al*., 2000; Peteraf and Barney, 2003).

The emergence of new types of factors and outputs results in Schumpeterian rents for the innovating firm (Galunic and Rodan, 1998). Whereas Ricardian rents emanate from the stock of first-order competences and their constituent resources, Schumpeterian rents emanate from the flow of the first-order competences, which is enabled by second-order competences.

Competitive dynamics constantly upset the rents accruing to firm resources. Hence, the extraction of Schumpeterian rents is contingent on competitive activity. As Grimm *et al*. (2006: 100) proposed, 'any resource position will erode in an environment where competition is active.' Thus, the extraction of rents from second-order competences depends on competitive turbulence. Competitive turbulence consists of competitive moves (entry, exit, and change of strategy). The notion of competitive turbulence portrays a dynamic, rather than static, view of competition (cf. Jacobson, 1992; Kirzner, 1997). It integrates entry and exit barriers, commonly associated with a

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static (snapshot) view of competitive conditions (Porter, 1980) rather than a process view (video). The theory of Schumpeterian rents suggests that the degree of competitive turbulence should have a moderating effect on the capture of profits from second-order competences, as detailed in the Hypotheses section. In contrast with Sirmon, Gove, and Hitt (2008), who study the use of existing resource stocks in competitive engagements, the focus of this study is on the use of new resources in competitive rivalry (see also Chen, Su, and Tsai, 2007).

HYPOTHESES

As discussed, second-order competences reflect the ability of a firm to renew its resources and, therefore, they lead to Schumpeterian rents. In this study, rents are assessed by return on assets. ROA is a measure of current term performance. It is unknown how long the conversion of resources into cash flows takes. However, a window of three years seems reasonable and is used in this study. For the medical instruments industry, for instance, Kor and Mahoney (2005: 495) suggested that 'R&D investments convert into revenue-generating products typically within a period of three years.'

Building on the Schumpeterian framework of the generation and erosion of rents, I predict that the ability to extract returns from second-order competences depends on competitive activity. Competition decreases the value and rarity of resources or competences and hence their rent-earning potential. As Sirmon *et al*. (2010: 1386) argued, 'the erosion of advantage occurs routinely as a result of dynamic and interactive rivalry.' Hence, competitive turbulence is expected to moderate the impact of second-order competences on profitability. Competitive turbulence refers to the rate of changes in the firm's competitive environment (cf. Dess and Beard, 1984; Lawrence and Lorsch, 1967; Miller and Friesen, 1983).

I hypothesize that the effects of the two types of second-order competence on financial performance is moderated by competitive turbulence in distinct ways. Unfortunately, very little is known about the nature of resource accumulation, despite its central role in resource-based and dynamic capability theories (Pacheco-de-Almeida, Henderson, and Cool, 2008). However, it seems market-related versus technological resources differ in terms of imitability (cf. Grimm *et al*., 2006). Technological resources are harder to imitate because they are less observable and more easily protected. Technology moves are less visible and more ambiguous than market moves (such as pricing, branding, and distribution) and are 'confusing for other firms to interpret' (Chen *et al*. 2010: 1531). It takes time for news about the use of new technology to get out to competitors (Mansfield, 1985). It takes even more time to invent around patents or find out technology secrets, to develop prototypes, and to alter or build plant and equipment (Mansfield, 1985). Also, the patent protection available for technological resources (e.g., patents) imposes a legal barrier to imitation, whereas the intellectual property protection via trademarks (e.g., brands) and copyrights (e.g., advertising copy) applicable to marketing resources is weaker. Based on these insights into the relative ease and speed of imitation of market-related versus technological resources, I now hypothesize distinct effects of the two types of second-order competence on financial performance.

I expect that the positive effect of marketing competence on profitability will be reduced in competitively turbulent conditions. Under competitive turbulence, competitors move in and out of markets and shift their strategies. The value of new market-related resources may be quickly undermined as competitive actions imitate or substitute them (cf. Barney, 1991; Grimm *et al*., 2006). As mentioned, the competence to serve a new market (i.e., a new customer competence) is less amenable to protection by secrecy and intellectual property and market moves are quite observable by competitors (Chen *et al*., 2010). A firm that has discovered how to serve a particular market segment (e.g., what needs to appeal to, what price to set, where to distribute) may find its approach readily imitable. For instance, a competitor may observe the focal firm address a new market segment and, in turn, open a new distribution channel and launch a brand extension to address the same segment (cf. D'Aveni, 1994; Chen *et al*., 2007). In contrast, if competitors are inactive, a firm can extract higher rents from its new market-related resources. Therefore, I expect that in a volatile competitive environment, the effects of superior second-order marketing competence on performance will be reduced, while under stable competition, it will be higher.

Hypothesis 1 (H1): The effect of marketing competence on ROA is negatively moderated by the level of competitive turbulence.

Technological resources, on the other hand, are relatively more shielded from imitation and substitu-

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tion. As mentioned, they are less easily observed and more highly protected by intellectual property rights. Hence, firms that are able to create new technological resources by virtue of their higher R&D competence will prosper relative to other firms that are not able to do so. The ability to create new technological resources provides a range of options to counter competitive threats or preempt competitive moves. Hence, I expect R&D competence to be more strongly related to profitability in competitively turbulent conditions. In contrast, a stable competitive situation does not call for superior abilities to build new technological resources and doing so may provide limited benefits. Hence, I expect that in environments characterized by fast changes in competitive conditions, firms with higher R&D competences will perform better.

Hypothesis 2 (H2): The effect of R&D competence on ROA is positively moderated by the level of competitive turbulence.

METHODOLOGY

Sampling frame

Survey and archival data were collected on public manufacturing firms headquartered in the U.S. The sampling frame was drawn from the Compustat database. Single business dominant manufacturing firms (2000–3999 SIC codes) were selected for the study to minimize intrafirm heterogeneity regarding organizational and environmental characteristics (cf. Barringer and Bluedorn, 1999; Daft, Sormunen, and Parks, 1988; Garg, Walters, and Priem, 2003; Graham, Lemmon, and Wolf, 2002; Lang and Stulz, 1994; Zahra and Covin, 1993). Even though these firms are relatively undiversified, they may be involved in various markets and technologies. The comparability among firms in the sample was further enhanced by eliminating the following from the sampling frame: service firms or distributors, firms that outsource all manufacturing, contract manufacturers, and firms without commercial products. This screening led to a sampling frame of 302 firms which were sent questionnaires in the year 2007.

Survey data collection procedures

Respondents were identified from the list of company officers in the firm's annual report or proxy filings or from company Web sites. The titles and biographies of officers were examined to identify the most appropriate and knowledgeable potential respondents. Three waves of questionnaires were mailed to each respondent. Personalized cover letters explaining the purpose of the study and assuring confidentiality were sent. Respondents received preaddressed stamped envelopes to return the completed questionnaires directly to the author. Additionally, each respondent was telephoned twice with the request to return the survey. Respondents could also fill out the questionnaire on the Web (43% of responses were received via the Web). Study summaries, charity donations, and gift certificates were used as incentives to increase the response rate. Questionnaires were received from 154 respondents from the population of 302, yielding a response rate of about 51 percent. At those companies that responded, a second informant was pursued. Consequently, 76 questionnaires were received from a second informant, for about 49 percent (two of these were omitted because of lack of informant qualifications).

On average, the respondent firms had 4,305 employees (median = 1,397, σ = 8,375) and $1,023 million annual sales (median = $327 million, σ = $1.858 billion). Their mean age was 34.8 years since incorporation (median = 24, σ = 26.2 years). Of the firms in the sample, 67.5 percent were traded on NASDAQ and 32.5 percent on the NYSE. All respondents were top managers in their corporation (vice president or above). First respondents had, on average, 11.4 years of experience with their firm and 19.7 years of experience in their firm's industry (second respondents: 10.9 and 19.8), and scored 6.0 and 6.3 on seven-point scales measuring confidence in the survey responses and level of involvement with strategic decisions (second respondents: 6.1 and 6.1). Thus, respondents were quite competent to report about their organizations and environments. Of the respondents, 47 percent were general managers (second respondents: 21%), 19 percent had a commercial function such as vice president of marketing, sales, or new business development (second respondents: 28%), and 32 percent had a technical function such as vice president of engineering, R&D, or manufacturing/operations (second respondents: 49%).

The responding firms were compared against nonrespondents on four key firm characteristics: annual sales, total assets, number of employees, and age (number of years since incorporation). No significant differences in the means were found. In addi-

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tion, there were no significant differences on study variables between early and late respondents. These checks suggest that nonresponse bias is not a serious concern (Armstrong and Overton, 1977). Also, there were no significant differences between the responses via mail and those that were obtained on the Web. Responses did not differ significantly by functional area of the respondents, nor were there differences among respondents according to firm or industry experience.

Measures

I use two sources of data: accounting data (drawing on net income from the income statement and value of assets from the balance sheet) and survey data on the level of second-order competences in a firm and on competitive turbulence.

The survey measures are partly based on published scales and partly on newly developed items. For the newly developed measures, a large pool of items was created based on the existing literature. All scales were presented in a trial questionnaire and pretested with six academic experts and six practitioners, which led to refinement of item wording. All items are measured on seven-point Likert-type scales, and scale scores are calculated by simple summation of item scores (see Appendix A for scale items and Table 2 for descriptive properties). To reduce the potential for social desirability bias, respondents were given explicit instructions to reflect the actual situation in their firm (see Notes to Appendix A).

Marketing competence

This eight-item scale assesses the ability of the firm to identify and access new markets. This involves skills in such areas as: assessing the potential of new markets, building relationships in new markets, setting up new distribution and sales channels, leveraging brand/company reputation to new markets, researching new competitors and new customers, developing new advertising or promotion strategies, and developing new pricing strategies. This newly developed scale is akin to the one used by Conant, Mokwa, and Varadarajan (1990) to measure marketing competence; however the present scale focuses on the marketing competence involved in building new resources. Similar to the Conant *et al*. (1990) scale, the second-order marketing competence scale asked respondents to rate how well or poorly they

Table 2. Simple correlations and descriptive statistics*

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Marketing competence	4.3 (0.9)								
2. R&D Competence	0.470**	4.7 (1.0)							
3. Competitive turbulence	0.039	−0.038	3.5 (1.1)						
4. Size	0.058	−0.119	−0.067	0.40 (1.55)					
5. Age	−0.167*	−0.140*	0.014	0.453**	35.8 (25.9)				
6. ROA 07–09	0.208**	0.112	0.035	0.247**	0.216**	0.003 (0.124)			
7. ROA 02	−0.008	−0.091	0.104	0.358**	0.261**	0.479**	−0.019 (0.170)		
8. Customer Competence	0.709**	0.273**	0.086	0.028	0.022	0.226**	0.129	4.8 (1.0)	
9. Technological Competence	0.241**	0.544**	−0.029	−0.011	0.009	0.094	−0.010	0.435**	5.3 (0.9)

*Means and standard deviations are listed on the diagonal. Means and standard deviations of perceptual scales are expressed on seven-point scale metric. Calculations based on regression sample (n = 130).
*Significant at $p < 0.05$ (two tailed).
**Significant at $p < 0.01$ (two tailed).

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perceive their organization performing specific marketing activities relative to competitors. Self-report measures that ask respondents to rate their firm's competences relative to competitors have become well accepted in the literature (e.g., Denrell, Arvidsson, and Zander, 2004; DeSarbo *et al*., 2005). This relative measure is consistent with recommendations in the literature to view resources and competences through a comparative lens (Sirmon *et al*., 2010). The reliability of this scale is $\alpha = 0.86$.

R&D competence

This six-item scale assesses the ability of the firm to identify and incorporate new technologies. This involves skills in such areas as: setting up new types of manufacturing facilities and operations, identifying and learning about new technologies, assessing the feasibility of new technologies, and recruiting engineers in new technical areas. This newly developed scale had the same format as the marketing competence scale. Its reliability is $\alpha = 0.86$.[2]

Competitive turbulence

I developed a new measure for competitive turbulence that assesses changes in competitors and their strategies. Three areas are covered in the content domain of the competitive turbulence construct: the entry of new competitors, the exit of existing ones, and the change of strategy of competitors. The competitive turbulence scale is a seven-point, five-item, Likert-type scale ($\alpha = 0.72$).

ROA

ROA is calculated by dividing earnings before special items by total firm assets (Jacobson, 1987), culled from Compustat (WRDS variables ib and at). ROA measures size-adjusted income. The three calendar year ROAs (for 2007, 2008, and 2009) were averaged to obtain the dependent variable. Because all firms in the sample are of a similar nature, single-segment firms that have their own manufacturing operations, the ROA performance metric is comparable across firms.

[2]R&D competence is related to R&D spending, but only slightly so. The bivariate correlation of R&D competence and R&D intensity (R&D divided by sales) is 0.126 ($p = 0.059$, one tailed). In contrast, the correlation between marketing competence and R&D intensity is –0.076 ($p = 0.176$, one tailed), evidencing discriminant validity of the two competences.

Control variables

I control for firm size, age, industry, competitive turbulence, and first-order competences. Firm size is measured in terms of the log of the number of employees. The number of employees was recorded from Compustat. Age is measured as the number of years since the firm was incorporated. Year of incorporation was recorded from Marketguide.com or from the company Web site. Regarding firm size and age, the dominant view holds that larger and older firms are less adaptive and flexible and, thus, likely to have lower second-order competences (Abernathy and Utterback, 1978; Chandy and Tellis, 2000; Sorensen and Stuart, 2000). However, small and young firms are likely to suffer from the liabilities of smallness and newness, which may depress their performance (Aldrich and Auster, 1986). Since performance is likely to differ by industry, I include five industry dummies. Based on the business descriptions in Compustat and Hoovers, I inductively derived six industry categories: electronic equipment (13% of sample), consumer nondurables (7.1% of sample), capital and process equipment (21.4% of sample), consumer durables (7.1% of sample), biomedical devices (24.7% of sample), and industrial supplies and components (26.6% of sample). Hence, five dummy variables were included as control for the industry of the firm. Competitive turbulence may have a main effect on firm performance and, therefore, should be controlled. Finally, I control for first-order customer and technological competences. These four-item scales assess the strength of the firm's current market-related resources and the strength of its current technological resources, respectively. The reliabilities of these scales are $\alpha = 0.77$ and $\alpha = 0.85$.

Survey scale testing

Scales were assessed using the first informant responses ($n = 154$). Principal component analyses with Varimax rotation were performed on all scales separately as well as jointly. The joint factor analysis revealed the anticipated factor structure. The items loaded highly on the constructs they were intended to measure and without substantial cross-loadings; these things support discriminant and convergent validity, respectively. The expected pattern of five factors—marketing competence, R&D competence, competitive turbulence, customer competence, and technological competence—with eigenvalues

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greater than 1 was found. The factor analyses on each scale separately showed they were all unidimensional (i.e., had a single eigenvalue greater than 1). Subsequently, each scale was subjected to reliability analysis. Based on these analyses, no items were dropped.

It was also verified that the five constructs are distinct by examining pairs of scales in a series of two-factor confirmatory factor models (Bagozzi, Yi, and Phillips *et al*., 1991). The confirmatory factor analysis was run twice for each pair, once freeing the correlation between the constructs, and once setting the parameter to 1. The results indicate that the difference in chi-square between the two models for each pair was significant ($p < 0.05$), supporting discriminant validity.

To assess interrater reliability, the correspondence between the responses from the first and the second informant was examined. First and second informant data on the three focal scales (the two second-order competences and competitive turbulence) were correlated, flagging standardized residuals of greater than two. In only six out of the 222 total predictions (74 firms with two responses times three) was the absolute value of the standardized residual higher than 2. The interrater correlations were 0.397 ($p < 0.001$) for marketing competence, 0.367 ($p < .001$) for R&D competence, and 0.361 ($p < 0.001$) for competitive turbulence.

For the purpose of the regression analyses, I averaged the informant scores for the firms from which I received two responses (about half of the sample). These averaged scores have very high correlations with the scores from the individual respondents (r ranges from 0.809 to 0.940). This evidences that the average scores represent a good summary of the informants' perspectives.

FINDINGS

Table 2 presents the correlations among all variables as well as summary statistics. Table 3 contains results of the regressions. I used OLS regression to test the hypotheses. Inspection of variance inflation factors among the explanatory variables indicates the highest VIF in Model 1 was 1.92, and the highest VIF in Model 3 was 3.41. This indicates no problematic multicollinearity is present (Neter, Wasserman, and Kutner, 1990). As time progressed after the survey in 2007, some firms disappeared from the sample because they went out of business or were acquired. Hence, the performance data are not available for all years and for all firms, and the sample size was reduced to 132 from 154 firms that participated in the survey. To eliminate the undue influence of outliers, two observations were eliminated after examining standardized residuals (cf. King and Lenox, 2002). These two outliers involved extremely low values of ROA and for each case, the predicted value was in the expected direction. The variance explained by the independent variables in ROA is 13 percent ($p < 0.005$).

For the test of the moderator effects, I followed the procedures suggested by Aiken and West (1991). To minimize multicollinearity among interaction terms and their constituent variables, all independent variables were mean centered (Aiken and West, 1991; Jaccard, Wan, and Turrisi, 1990). The interactions were examined through both multiplier terms (Table 3) and simple slope analysis (Table 4). The simple slope analysis technique overcomes the need to create subgroups from continuous moderator variables (Aiken and West, 1991). Jaccard, Wan, and Turrisi (1990) recommended the use of simple slope analysis to gain deeper insight into the nature of interaction effects. The simple slopes were estimated using SPSS, following the procedure outlined by Aiken and West (1991). The effects of the moderated predictors (the two competences) were calculated at one standard deviation below and above the mean of competitive turbulence (Aiken and West, 1991; Jaccard *et al*., 1990). The simple slope beta coefficients are presented in Table 4. These coefficients represent the effects of the competences at respectively one standard deviation below and one standard deviation above the mean of the moderator variable (competitive turbulence).

Figures 1a and 1b depict the effects of the second-order competences on ROA under each of the three levels of competitive turbulence. The moderator term of marketing competence by competitive turbulence is negative, whereas the moderator term of R&D competence by competitive turbulence is positive (cf. Table 4). In other words, the effect of marketing competence on ROA is diminished by competitive turbulence, while the effect of R&D competence is enhanced, supporting both H1 and H2.

As indicated by simple slope analyses, when competitive turbulence increases, the slope of the term capturing the effect of marketing competence progressively decreases (Table 4 and Figure 1a). The

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Table 3. Regression of competences on ROA 2007–2009

Variables in the equation	Model 1 (Beta)	Model 2 (Beta)	Model 3 (Beta)
Independent variables			
Marketing competence	0.177*		0.182†
R&D competence	0.083		0.049
Interaction terms			
Marketing competence * competitive turbulence	–0.188*		–0.196*
R&D competence * competitive turbulence	0.195*		0.177*
Control variables			
Competitive turbulence	0.055	0.001	0.006
Size	0.098	0.000	–0.024
Age	0.189†	0.093	0.156†
Industry dummies[a]			
– electronic equipment	0.010	0.046	0.026
– consumer nondurables	–0.251*	–0.176†	–0.183*
– capital and process equipment	–0.048	–0.069	–0.090
– consumer durables	–0.054	–0.036	–0.051
– biomedical devices	–0.050	–0.151†	–0.125
ROA 2002		0.427**	0.446**
Customer competence		0.181*	0.015
Technological competence		0.006	0.014
N (df)	130 (117)	130 (118)	130 (114)
Adjusted R^2	13.0%	25.8%	28.7%
F-statistic	2.606**	4.464**	4.464**

[a]Reference category is industrial supplies and components.
Significance tests are one tailed for hypothesized relations and two tailed for controls.
†Significant at $p < 0.10$.
*Significant at $p < 0.05$.
**Significant at $p < 0.01$.

Table 4. Simple slope analysis

Beta at various levels of competitive turbulence			
ROA	Low	Moderate	High
Marketing competence	0.338***	0.182†	0.034
R&D competence	–0.085	0.049	0.231*

†Significant at $p < 0.10$.
*Significant at $p < 0.05$ (one tailed).
**Significant at $p < 0.01$ (one tailed).
***Significant at $p < 0.005$ (one tailed).

effect of marketing competence on ROA is not significant under high competitive turbulence, whereas it is very strong under low competitive turbulence (Table 4). The simple slope analyses also show that R&D competence has nonsignificant effects on ROA in case of stable and moderate competitive conditions, while it has a significant positive effect on ROA in high competitive turbulence (Table 4 and Figure 1b). Looking across the simple slopes for the various conditions shows that as competitive turbulence gets higher, R&D has an increasingly positive effect on ROA.

Overall, the findings for the two types of competence are clearly distinct. While marketing

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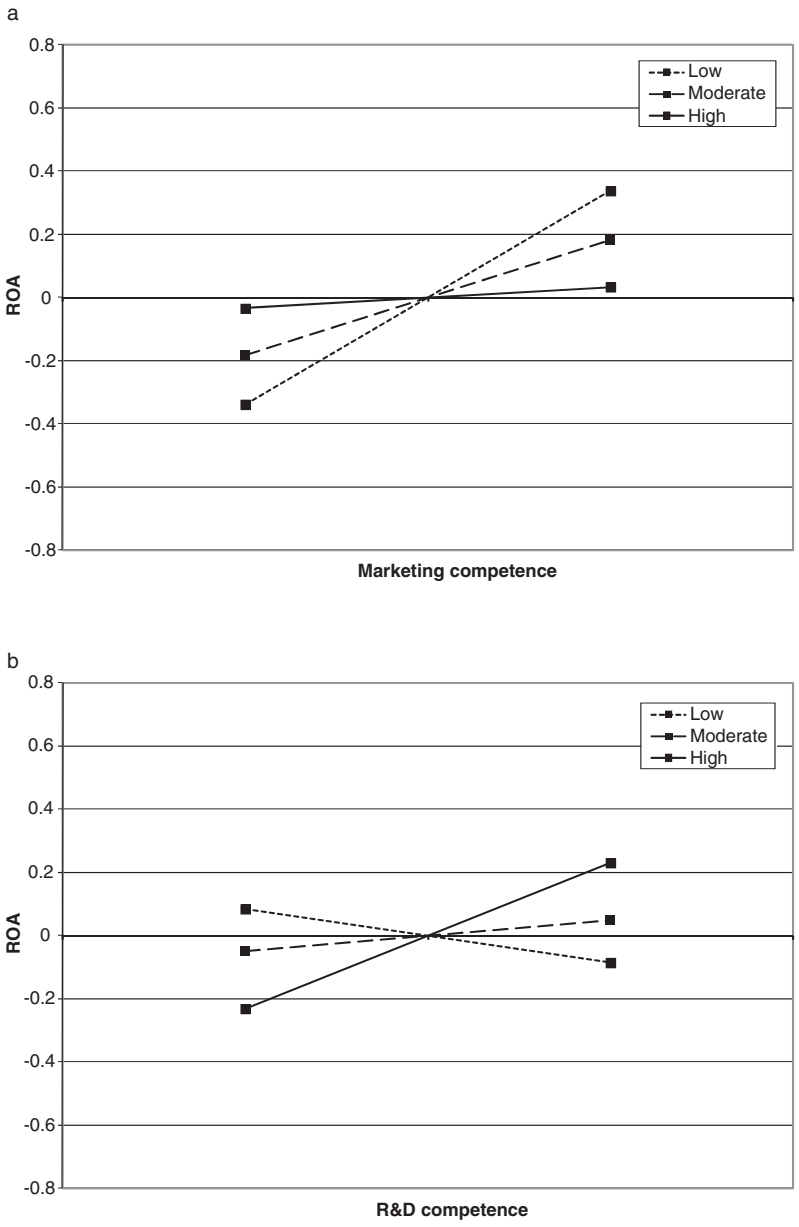

Figure 1 a. Moderation of marketing competence by competive turbulence; b. Moderation of R&D competence by competive turbulence

competence has a strong positive effect under low competitive turbulence, R&D competence has a strong positive effect under high competitive turbulence. There are no significant negative effects of the second-order competences under any of the conditions. Of the control variables, age has a (marginally significant) effect and consumer nondurables show a lower ROA. Firm size, on the other hand, is not significantly related to ROA.

Tests of alternative model specifications and rival explanations

Since the dependent variable was collected from a different source (financials filed with the SEC versus key informants) and through a different method (archival data versus survey), common method variance cannot provide an alternative explanation of the findings.

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In two additional regression models (Models 2 and 3 in Table 3), two additional controls—lagged ROA and first-order competences—were added to test for alternative explanations. First, it is important to examine whether reverse causality could explain the findings: for instance, that more profitable firms would develop higher second-order competences. The models presented in Table 3 use the temporal precedence of the independent variables to the dependent variables for causal inference. The temporal lags between the second-order competences measured in 2007 and ROA measured in 2007 and the next two years make reserve causation implausible. Reverse causality, where competences result from performance, also does not seem plausible on conceptual grounds. Second-order competences depend on a complex set of organizational antecedents (Danneels, 2008). The organizational conditions necessary for second-order competences make it implausible that they simply result from prior performance. However, the use of lagged dependent variables allows for stronger causal inference. 'Granger causality' is established when a lagged independent variable has an effect on the dependent variable, after the lagged effect of the dependent variable has been partialed out (Granger, 1969; Menard, 2002). An additional measurement and inference benefit achieved from including the lagged dependent variable is that it controls for unobserved heterogeneity (Menard, 2002). If any stable firm-specific characteristics impact the dependent variable, they should do so in both periods, therefore including the lagged dependent variable controls for such omitted factors. Lagged ROA serves as a proxy for omitted firm-specific factors and, thus, reduces the possibility of spurious correlation (Jacobson, 1988).

Model 3 presents the regression with the full set of controls, including lagged ROA and customer and technological first-order competences. For comparison, Model 2 has the full set of controls only. Adding lagged ROA did not change the results. A five-year lag was chosen to reduce multicollinearity, because ROA has a high serial correlation. Adding ROA 2002 to the model resulted in similar coefficients (compare Models 1 and 3). Therefore, there is strong evidence that the direction of causality runs from second-order competences to ROA and that omitted stable firm-specific characteristics did not bias the results. Second, to test whether the effects of the second-order competences on profitability are distinct from those of the first-order competences, Model 3 also contains customer competence and technological competence as controls. As mentioned, the coefficients in this model are very similar. Interestingly, only customer competence has a significant effect on ROA, which disappears when the second-order competences and their moderator terms are added (compare Models 2 and 3).

To rule out higher-order interaction among marketing competence, R&D competence, and competitive turbulence, I reestimated all models including this three-way interaction term. This moderator term was not significant ($p > 0.10$).

To test whether the results were sensitive to type of respondent, I also ran the regression models using functional area (general management, commercial, and technical) of the respondent, respondent firm experience, and industry experience as controls. These functional area and experience-level control variables were not significant, nor did their inclusion materially alter the coefficients for the model variables. Therefore, I conclude that respondent type did not affect the results. As a final robustness check, the regression was rerun using only the first informant responses. The findings were essentially the same.

CONCLUSION AND DISCUSSION

This article theorized that second-order competences, a type of dynamic capability, enable Schumpeterian rents. Despite the assumed importance of second-order competences to the success and fate of firms over time, theoretical rationale and evidence regarding their effects on firm profitability was lacking. I focused on two second-order competences, called marketing and R&D competences, which enable the firm to build new resources necessary to serve new customers and to use new technologies, respectively. While other studies have examined the effects of superior resources on performance (for overviews, see Crook *et al.*, 2008; Newbert, 2007) by Ricardian rents, this study examined the capture of Schumpeterian rents from the ability to create new resources. The theory of Schumpeterian competition links second-order competences with profitability, contingent on competitive activity. Since these competences relate to profitability in different ways, they are not tautological and, hence, overcome a critique leveled at resource-based theory (cf. Priem and Butler, 2001a; 2001b; Williamson, 1999). It can also be concluded that managers do not simply infer their firm's

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competences from its performance and, therefore, that assessment of competences, as distinct from performance, is feasible. As Peteraf and Barney (2003: 320) argued, 'the surest route out of the tautology trap is a relentless commitment to operationalizing the theory.' This study offered such operationalization and empirical findings.

This study offered a look inside the black box between competences and performance. I theorized an intervening process of Schumpeterian competition and I empirically tested it by using competitive turbulence as a moderating variable. Recent theoretical and meta-analytic work has called for attention to the environmental context in order to understand how resources and capabilities create and maintain value and ultimately affect performance (Crook *et al*., 2008; Sirmon *et al*., 2007). In particular, this study contributes to 'integrating the RBV, which has been focused on internal firm attributes, with theories on a firm's competitive environment' (Sirmon *et al*., 2007: 274).

The empirical study found that these second-order competences affect profitability, contingent on competitive activity. Based on data from 130 U.S. public manufacturing firms, distinct effects of these competences on financial performance were found. The effect of the competences on ROA was contingent on competitive turbulence in opposite ways: the effect of marketing competence on ROA was positive under stable and moderate competitive conditions, whereas the effect of R&D competence on ROA was positive under volatile competitive conditions. Interestingly, while it has been assumed that the value of dynamic capabilities is higher in dynamic environments (e.g., Eisenhardt and Martin, 2000; Helfat *et al*., 2007), this study provides a more nuanced picture. On the one hand, the findings support this assumption for second-order R&D competence. On the other hand, firms are less likely to earn rents from their ability to generate new market-related resources in a turbulent competitive landscape.

Contrary to the common association of exploration with long-term returns (Levinthal and March, 1993; March, 1991), the findings showed that the returns from an ability to engage in exploration can be quite proximate. These second-order competences, which are competences at exploring new markets and new technologies, respectively, had effects on firm financial performance noticeable in the three-year time frame of the data. Under low and moderate competitive turbulence, firms can reap rewards from their ability to explore new markets within a few years, while the ability to explore new technologies has a short-term return under high competitive turbulence. Notwithstanding the limitation of the data to a three-year window, the findings suggest that the two second-order competences have differing effects on performance (cf. Ravenscraft and Scherer, 1982).

This study is the first to theorize and examine the effects of second-order competences, a form of dynamic capabilities, on firm performance. As such, it has its limitations, some of which were mitigated with the present data, while others need to be addressed in further research. This study was limited by its one-time measure of the independent variables, even though the time series of the dependent variables helped establish causality. To get stronger evidence of the causal relation between competences and performance, and especially its lag structure, a long time series of measures of both would be needed. Unfortunately, a long time series may be hard to come by because of the difficulty of obtaining repeated survey measures and the disruptions in the population by mergers and acquisitions and firm mortality. The difficulty in maintaining a survey panel would make it problematic to measure second-order competences with a fixed periodicity.

In sum, this article offered conceptual and empirical contributions to the understanding of the effects of dynamic capabilities—in particular marketing and R&D second-order competences—on profitability. Clearly, understanding second-order competences and the contingencies of their effects on firm performance is a rich area for research and can provide helpful insights to managerial practice.

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APPENDIX A

Measurement of Survey Variables

Construct	Items
Marketing competence*	Assessing the potential of new markets. Building relationships in new markets. Setting up new distribution channels. Setting up a new sales force. Leveraging its brand reputation or company image to new markets. Researching new competitors and new customers. Developing new advertising or promotion strategies. Developing new pricing strategies.
R&D competence*	Setting up new types of manufacturing facilities and operations. Learning about technology it has not used before. Assessing the feasibility of new technologies. Recruiting engineers in technical areas it is not familiar with. Identifying promising new technologies. Implementing new types of production processes.
Competitive turbulence	It seems that we get new competitors all the time. Competitors change their strategy constantly. Our competitors have been the same for years. (reversed) Competition sometimes emerges from unexpected places. New entrants come and go.
Customer competence**	Knowledge about its customers and competitors. Brand reputation or company image. Distribution channels or sales force. Advertising/promotion resources or skills.
Technological competence**	Production operations or facilities. Technological expertise. Technical skills and resources. Engineering skills and resources.

All items were measured on seven-point scales, where 7 = strongly agree and 1 = strongly disagree. Respondents were asked to indicate for each statement the extent to which it described his/her firm.
*These items were preceded by the statement: 'Different companies are good at different things. The following questions ask you to assess your company's skills in various areas, relative to your competitors. Relative to our competitors, my company is good at . . .'
**These items were preceded by the statement: 'The following questions ask you to assess your company's resources and competences to support its current activities. Please rate your firm's current resources and competences relative to its competitors (much worse—much better).'

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