Strat. Change **25**: 441–466 (2016)
Published online in Wiley Online Library
(wileyonlinelibrary.com) **DOI:** 10.1002/jsc.2073

RESEARCH ARTICLE

Small Firm Adaptive Capability, Competitive Strategy, and Performance Outcomes: Competing Mediation vs. Moderation Perspectives[1]

George Chryssochoidis
University of Kent, Kent Business School, UK

Dimitrios Dousios
University of East Anglia, Norwich Business School, UK

Nikolaos Tzokas
Plymouth University, Faculty of Business, University of Plymouth

Besides exercising a handling grip on competitive strategy, adaptive capability is more important than competitive strategy per se for superior performance.

Adaptive capability simultaneously undertakes additional secondary roles, reinforcing innovation competitive strategy for innovation-related outcomes.

Adaptive capability reflects managerial proficiency for competitive actions, which is why it may offset, through attenuation, the adverse impact of small firm limited resources.

In small firms, adaptive capability exercises a handling grip on competitive strategy for superior performance (primarily acting as a mediator) and may offset, through attenuation, the adverse impact of limited availability of resources.

Competitive strategy influences performance (e.g., Hitt *et al.*, 2003; McGee and Rubach, 2011), but there is a gap in knowledge of how this influence takes place (Porter, 1991). Dynamic capabilities (Teece *et al.*, 1997; Ambrosini *et al.*, 2009) offer a conceptual bridge, however, as they address the missing connection between resource possession and resource exploitation (Zahra *et al.*, 2006; Newbert, 2007). We cannot assume, though, that all dynamic capabilities operate similarly in different sized firms, nor that they have a similar role in the competitive strategy–performance relationship. Wang and Ahmed (2007, p. 37) suggest that it is 'adaptive capability' that matters for this purpose – yet its important role in the small firm competitive strategy–performance relationship has neither received adequate treatment nor been empirically studied. Our work provides a remedy and we make two contributions. First, we explain and empirically assess the importance and role of adaptive capability in the small firm competitive strategy–performance relationship. Second, we clarify the causal pathway through which adaptive capability exercises this role by juxtaposing two conceptually different explanations, namely mediation versus moderation.

[1] JEL classification code: M10. This research has been supported by the Greek State Scholarship Foundation (IKY) through a grant to one of the authors.

Our research question is therefore: How does small firm adaptive capability alter the relationship between small firm competitive strategy and performance outcomes in terms of

(a) strength (i.e., when adaptive capability is considered, does the relative importance of competitive strategy, in its relationship with performance outcomes, change?) and
(b) nature (i.e., when adaptive capability is considered, what is the causal pathway through which competitive strategy exercises its influence?)

Our theoretical framework is explained, followed by the results and conclusions of our empirical study.

Theoretical framework

Adaptive capability

A firm possesses adaptive capability when it prominently 'adapts, responds and reacts' (Grewal and Tansuhaj, 2001; Krohmer *et al.*, 2002). This happens because adaptive capability focuses on 'effective search and balancing exploration and exploitation strategies' (Staber and Sydow, 2002; Wang and Ahmed, 2007) through flexible resource adjustment, application, and renewal (Sanchez, 1995; Wang and Ahmed, 2007: 37; Ambrosini *et al.*, 2009: S15). Adaptive capability is able to do so because it resides at the highest level of the hierarchy of firm dynamic capabilities, being empowered therefore to utilize multiple other lower-level dynamic capabilities for its own function and aims.

To view dynamic capabilities through a hierarchy lens is important. Dynamic capabilities were introduced as an efficiency platform – an extension to the resource-based view of the firm (Wernefelt, 1984) – and defined as the assets by which firms 'integrate, build and reconfigure internal and external competencies to address rapidly changing environments' (Teece *et al.*, 1997: 516) (see also Barreto, 2010 for a review of other definitions; also see Teece, 2007; 2010). The view that dynamic capabilities operate as a hierarchy is rooted in Collis (1994), who assigned firm resources and capabilities at four layers. The first layer represented the resource base of the firm itself; the second layer represented the modification of existing resources; the third layer represented the extension of current capabilities; while the fourth layer regarded a higher-order capacity, seen as a meta-routine. Subsequently, Danneels (2002) dichotomized dynamic capabilities in 'first order' (representing a firm's capacity to achieve individual tasks) and 'second order' (tapping into the firm's ability to renew through the creation of new 'first-order' capabilities); Winter (2003) argued similarly that dynamic capabilities operate to extend, modify, or create ordinary capabilities. Zahra *et al.* (2006: 947) argue 'an infinite spiral of capabilities to renew capabilities could be conceived' (see also Brady and Davis, 2004). Moreover, Ambrosini *et al.* (2009) proposed a three-level view of dynamic capabilities. The first level represents incremental repeatable capabilities (see also Helfat and Peteraf, 2003; Helfat *et al.*, 2007), which become embedded in the firm's structures and stabilize as firm patterns (Zollo and Winter, 2002). The second level adjusts the resource mix by improving existing and developing new resources (see also Makadok, 2001; Maritan, 2001, Helfat *et al.*, 2007). The third level recreates, however, the physiognomy of the firm components themselves and it allows the firm as a whole to change toward new states and practices (Ambrosini *et al.*, 2009: 19). Recreation occurs through grasping of market needs by the establishment of a 'dialogue' throughout the firm to 'translate' this knowledge for action – an organizational renewal process (see also Barr *et al.*, 1992; Tripsas and Gavetti, 2000). Such a recreation is also specific to each firm, as dynamic capabilities are built within each firm's boundaries. The repercussion is that even if some base-layer resources may be similar, top-layer capabilities are not and these function in firm-unique and firm-distinct ways.

Adaptive capability is located at the top level and is a higher-importance dynamic capability operating in each

DOI: 10.1002/jsc

firm uniquely and distinctly. Important to all firms but even more for small ones, adaptive capability rests on entrepreneurial competences and refers to clusters of small firm activities and adjustments for sensing, seizing, and transforming (Teece, 2012: 1396). Adaptive capability allows the small firm to adeptly do so (e.g., Wang and Ahmed, 2007: 37) and in doing so, it profoundly affects the small firm competitive strategy–performance relationship.

Small firm competitive strategy, adaptive capability, and performance outcomes

Strategy echoes a pattern in a stream of decisions (Steiner and Miner, 1977; Certo and Peter, 1991; Whittington, 1993), and competitive strategy helps realize performance objectives (e.g., Miller, 1992; Sheth and Sisodia, 2002; Lamberg *et al.*, 2009). Researchers discussed the interface between competitive strategy and resource-based thinking (e.g., Barney, 1991; Conner, 1991; Peteraf, 1993; McGahan and Porter, 1997). Researchers also discussed the importance of managerial action for leveraging key firm resources and resource orchestration (e.g., Helfat *et al.*, 2007; Sirmon *et al.*, 2011) so to achieve superior performance (e.g., Sirmon *et al.*, 2007; Ndofor *et al.*, 2011). Few works have, however, empirically studied the influence of dynamic capabilities upon performance *per se*. Among them, Song *et al.* (2005) studied large US firms and found that marketing and technological capabilities matter in highly turbulent environments. Zúñiga-Vicente and Vicente-Lorente's (2006) study of Spanish banks also found that firm ability to move strategically allows survival. Lin and Wu's (2014) study of large Taiwanese firms also identified that dynamic capabilities have positive effects on return on assets over three years. In contrast, Wilden *et al.*'s (2013) study of large Australian firms found that dynamic capabilities have a negative effect on sales growth.

Focusing on the link between dynamic capabilities, performance outcomes, and competitive strategy, Ortega's (2010) study of Spanish information and telecommunication technology firms suggested that the theoretical prescriptions of competitive strategy and dynamic capabilities effectively combine for maximum effect. Makkonen *et al.* (2014) provided an important clarification though. Their study of Finnish firms identified a direct effect of dynamic capabilities on organizational change issues, which in turn positively affects innovation performance. They argued that these are applicable to all sectors, including low-tech and traditional ones (p. 2715), explicitly naming such change aspects 'organizational adaptive behavior' (p. 2707). A small firm case study they further focused on succeeded by exploitation of its renewing and regenerative capabilities by constantly adapting its actions (p. 2714), much in alignment with Teece's (2012) comment that capabilities resting on 'competences' matter most. These findings form the basis for our arguments regarding the intervention of adaptive capability in the small firm competitive strategy–performance outcome relationship, which are as follows.

1. We know that the relationship between competitive strategies and performance outcome is not static (Porter, 1991; Mintzberg and Westley, 1992; Shay and Rothaermel, 1999; also see Hutzschenreuter and Israel, 2009: 454), and internal organizational elements are relevant. We also know that these internal organizational elements specifically refer to dynamic capabilities (e.g., Rindova and Kotha, 2001; Zahra *et al.*, 2006; Wang and Ahmed, 2007; Makkonen *et al.*, 2014). Yet the extent of dynamic capabilities' influence in the competitive strategy performance outcomes relationship is unclear. Barreto's review (2010) concluded that conceiving dynamic capabilities as a single overarching entity yielded competing premises regarding their effects on performance (pp. 263 and 271). Eriksson's (2014) meta-analysis also does not mention past works on the link between dynamic capabilities and competitive strategy foci (p. 67). However, Makkonen *et al.*'s (2014) study clarified that it is not dynamic capabilities *per se* but

DOI: 10.1002/jsc

instead (constant) adaptive behavior of the organization that positively and directly affects performance [in line with Rindova and Kotha (2001), who name this adaptive behavior 'constant morphing'].

2. Dynamic capabilities' impact is pronounced in small firms. Zahra *et al*. (2006) explicitly comment that the link between dynamic capabilities and outcomes is primarily investigated only in larger and well-established firms (p. 942). This is not useful when Eriksson (2014) identified, in her review of the literature on dynamic capabilities, that resource scarcity (inherent in small firms) is a crucial element for dynamic capabilities' existence, function, and performance outcomes (p. 71). Furthermore, Døving and Gooderham (2008) and Spanos and Lioukas (2001) identified that dynamic capabilities are affected by the existence of limited internal assets and Gurisatti *et al*. (1997) also found that success for small firms depends on developing new competences of 'a cumulative character.' Wiklund and Shepherd (2003) demonstrated that the challenges facing small firms are different from the challenges facing larger firms. Their study also showed the importance of dynamic capabilities in small firms for performance outcomes. Neither can we assume dynamic capabilities to exist, operate similarly, nor treat them as such, in large and small firms (Baretto, 2010: 276–277).
3. The importance of adaptive capability in small firms is not only pronounced but also has an extended and dual role. The idiosyncrasies of the decision-makers and their proficiency matters (e.g., Cyert and March, 1963; Papadakis *et al*., 1998). Such idiosyncrasies and proficiency are especially relevant for small firms, as their decision-makers constantly need to reconfigure resources in new ways (e.g., Sirmon and Hitt, 2003; Winter, 2003). Adaptive capability encompasses, as a dynamic top-level process, the capacity to regenerate and reconfigure existing small firm assets for competitive acts but, in doing so, simultaneously attenuates the impact of the limited availability of small firm resources. This means that adaptive capability in small firms offsets at the same time (as competitive acts) through attenuation, the adverse impact of their limited resources. Therefore, in a small firm context, the connection between resource possession and exploitation is invigorated though both concurrently weakening the impact of limited resources and making more effective/efficient use of extant resources through adapting actions, responding to market opportunities, and quickening the pace of small firms' reactions to such opportunities.
4. Adaptive capability functions in a similar way with respect to small firm competitive strategy. While reducing the impact of resource limitations, adaptive capability unfolds effectively and efficiently outward-oriented actions attenuating, withholding, stimulating, or altering strategy formation and implementation. Powered from its position at the top of the hierarchy of dynamic capabilities, drawing upon and using lower-layer ones as needed, proficiently and singularly manages in itself competitive strategy. Learning is also central to this (Porter; 1991: 109; Teece *et al*., 1997) as it leads to accumulation, integration, and management of organizational knowledge (Senge, 1990; Kogut and Zander, 1992), improved practices (Lumpkin and Lichtenstein, 2005), and detection of misalignments (Argyris, 1990). Makkonen *et al*. (2014) provide evidence for the above when they comment that their small firm case 'monitors and constantly develops its internal efficiency' … 'continuously reconfiguring its resource base' but also 'constantly monitoring consumer behavior' and 'creating new products and processes' (p. 2716). These interface well with Eisenhardt and Martin's (2000) comment that time is central to strategy for performance outcomes (p. 1118) – adaptive capability calibrates and handles the time dimension. Next, these concur with Teece's (2012) view regarding chief individuals' own skills around sensing, seizing, and transforming that matter most. In our case, they regard strategizing

DOI: 10.1002/jsc

and good strategy execution. Last, but not least, these also align with Zahra *et al.*'s (2006) comment that the management of dynamic capabilities is critical in gaining organizational performance-related benefits (p. 924).

In conclusion, the inherent nature of adaptive capability is about proficient management of the organization and here this proficiency refers to the management of both other dynamic capabilities and competitive strategies for organizational performance-related benefits. Our stance is therefore different from Ortega's (2010). We conceptualize that in small firms adaptive capability generates, together with competitive strategy, superior performance outcomes but it does so through managing (i.e., handling, acting on, and overseeing) competitive strategy – adding on top its own increased influence to generate a combined maximum effect. By doing so, it may become more important than competitive strategy.

5. Adaptive capability's proficiency should likely function to serve its aims irrespective of the environment. Song *et al.* (2005) and Wilden *et al.* (2013) identified the moderating effects of firm environment in support of Eisenhardt and Martin's (2000) earlier argument that the potential gain from dynamic capabilities is greater in dynamic or moderately dynamic environments. Yet, this may not be a necessary condition (Zahra *et al.*, 2006: 922) or depends on the context (Makkonen et *al.*, 2014: 2715) – e.g., Ortega's (2010) positive moderating effect of a dynamic environment may be due to the nature of the studied sector (high technology). Makadok (2001) also does not acknowledge external environmental conditions, implicitly assuming the irrelevance of such conditions. These also appear to play a lesser role in other studies (Barreto, 2010: 262, 276).
6. In a valuable effort, Hughes *et al.* (2007) looked at drivers of response performance. Our stance complements and extends assertions in their work regarding both the nature and conceptual positioning of adaptive capability. They suggested that the construct represents a measure for response performance in emerging young firms. We agree that adaptive capability may represent a performance reflection when the context of inquiry involves startups and emerging small firms (Hughes *et al.*, 2007), but as Meyer *et al.* (1993) clearly suggest, this becomes instead an organizational imperative as firms mature (pp. 1177–1178). Hughes *et al.*'s (2007) findings also fully complement Teece (2012). Their findings suggest that entrepreneurial orientation in young small firms is configured to dimensions and ideal profiles to *reach* response performance, in other words to acquire adaptive capability *per se* so as to become competitive and sustain competitiveness. This is an important issue, explained next.

When the inquiry refers to organizations that reach a stage of maturity, adaptive capability reflects a small firm dynamic capability about constant renewal and regeneration, an organizing imperative that also relates to strategy implementation (Chen and Hambrick, 1995). Based on past works including Makkonen *et al.* (2014), adaptive capability and its dimensions reflect in mature small firms the process for action and action execution speed, respectively. What is an initial indicator of performance in emerging young firms becomes a way of life in mature small firms, reflecting entrepreneurial competences for acting and also doing so fast. Next, Zahra *et al.* (2006) also argue that younger firms seek to upgrade dynamic capabilities (thus this becomes a dependent), while 'established firms are likely to be more deliberate in their approach to thinking about, developing, and reconfiguring such capabilities – reflecting an organizational element (p. 938). In conclusion, and in light of the comments above, adaptive capability in mature small firms is an utterly important dynamic capability; an organizational element central for reaching superior performance, but not a performance reflection *per se*. Based upon our six arguments, we have our first hypothesis.

DOI: 10.1002/jsc

H1: Adaptive capability is positively associated with small firm performance.

Furthermore, we isolate and test two competing causal pathway explanations (Baron and Kenny, 1986; Durand and Vaara, 2009) regarding the intervention of adaptive capability in the competitive strategy–performance relationship, which we explain next.

Adaptive capability mediates the path-competitive strategy–performance outcomes

This stance argues that adaptive capability transforms and transmutes the effects of competitive strategy for performance while, as a unique dynamic capability, simultaneously acts on its own for additional performance (see **Figure 1**). In doing so, the direct influence of competitive strategy on performance diminishes or dissipates. Adaptive small firms, through a deeply embedded masked effect of learning, generate new knowledge essential to manage competition initiatives and reconfigure effectively and efficiently limited resources. Drawing upon constant learning, they subsequently use multiple lower-order other dynamic capabilities to enable organizational adaptive behavior, which in turn positively affects performance (Makkonen *et al.*, 2014). Adaptive capability exercises its direct effect on performance, but at the same time, uniquely and distinctly, exercises a handling grip on competitive strategy through the proficient management of competitive strategy. In this view, competitive strategy's influence on performance becomes subsided under proficiency of managerial action. Thus, we have our second hypothesis.

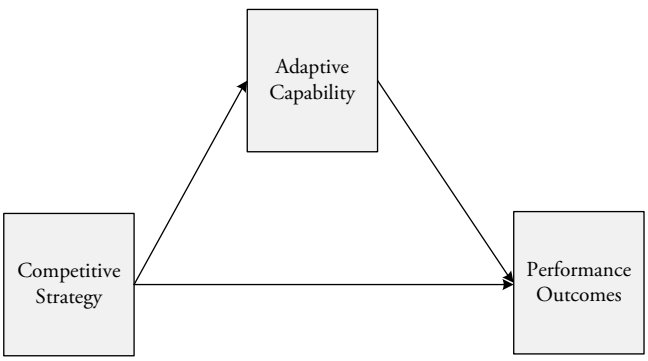

Figure 1. Path competitive strategy → performance is mediated by adaptive capability.

H2: Adaptive capability mediates the relationship between competitive strategies and performance.

Adaptive capability moderates the path-competitive strategy–performance outcomes

The hypothesis is that competitive strategy positively influences performance, but adaptive capability accelerates and multiplies the influence of competitive strategy on performance (see **Figure 2**). In other words, irrespective of its own direct influence on performance, adaptive capability complements competitive strategy, decision-making reinforcing the strength of competitive strategy and its own independent influence on performance outcomes. Small firms fast and flexibly adjust their scarce resources and capabilities, and manage to strategically leverage these to capitalize on emerging opportunities. Leveraging re-compensates for stressed resources, but also importantly reinforces the impact of small firms' competitive strategy in its new product, market, and financial performance (Ortega, 2010; Kandemir and Acur, 2012). Ortega's (2010) argument that competitive strategy and dynamic capabilities combine for maximum effect offers clear support to this stance. Ortega's (2010) study showed that differentiation and low-cost competitive strategy, together with marketing, technological and managerial capabilities, explained 39% of performance variance. Managerial capabilities reflected firm climate, organizational structure efficiency, efficient coordination, knowledge and skills of employees, and managerial competences. Although adaptive capability may have its own impact on performance, it simultaneously effectively acts by 'overclocking the processor speed' of competitive strategy. This stance implies therefore that adaptive capability acts by 'squeezing every last ounce' of performance power out of competitive strategy *per se*. Thus, we have our third hypothesis.

DOI: 10.1002/jsc

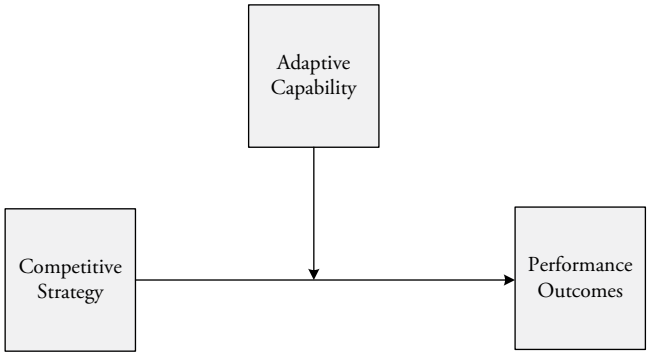

Figure 2. Path competitive strategy → performance is moderated by adaptive capability.

H3: Adaptive capability moderates the influence of competitive strategies on performance.

Methodology

Research setting

We collected the data in Greece using four selection criteria, which yielded an initial population of 748 small firms. These criteria were: (1) small firms belonging to diverse sectors (e.g., retail, manufacturing, professional, and other services); (2) having 10–49 employees, in line with the European Union definition of small firms; (3) owned by individuals (so they are not part of larger multinationals – and thus assumed independent in their resources and competitive strategy); (4) be registered for at least 5 years. We used the last criterion to exclude start-ups/young firms, as dynamic capabilities take time to materialize (Zahra *et al.*, 2006) and because the strategy–performance link becomes more stable and salient over time (Wiklund and Shepherd, 2005). The data collection effort took place sequentially in three parts (each with N = 250 randomly allocated small firms) over about 6 weeks each, for manageability and quality control purposes. Given the nature of the target population (small firms) and size, we used the single respondent method. We solicited and collected the data from CEOs/small firm owners. We contacted the small firm CEO/owner by telephone to check if they matched the study specifications and their willingness to participate; in total, 710 accepted receiving the survey, a cover letter with details and instrument completion instructions, and a prepaid return envelope. We subsequently contacted each participating small firm twice by telephone. Once, a week after sending the postal pack, to confirm that they had received the questionnaire; second, a week later, to prompt for instrument completion and posting. We eventually collected 143 responses, reflecting an effective response rate of 20%. Non-response bias tests used an extrapolation method (Armstrong and Overton, 1977) and two objective measures (namely firm age and firm performance) via one-way analysis of variance across early and late respondents, and respondents versus non-respondents, but these tests yielded insignificant F-values.

Participant self-reports, though a frequent method of studying decision-making, have inherent limitations (Huber and Power, 1985), and multiple informants reduce the impact of these limitations (Kumar *et al.*, 1993). Nonetheless, in our case, the size of target firms suggests that CEO/small firm owners have a predominant, unique, and non-substitutable role. This role refers to their ability to assess the firm's salient characteristics, an ability referring to their experience and longevity, round, deep, and comprehensive knowledge of the focus of the small firm.

Biases may exist. Social desirability bias is a source of error when utilizing self-reports as it introduces a systematic variance bias into assessing the constructs in question (Spector, 2006). Common method bias (CMB) can be a serious problem (Podsakoff *et al.*, 2003: 879), reflecting variance attributable to the measurement method itself rather than to the measured constructs (Bagozzi and Yi, 1990; Bagozzi *et al.*, 1991), and it contains both a random and a systematic component (Spector, 2006), probably pronounced on specific performance measures (such as growth indicators). We used two procedures at the design stage to ensure minimal impact of such biases. Following Podsakoff *et al.* (2003), the first procedure aimed to assure respondent anonymity. As second procedure, we separated

DOI: 10.1002/jsc

items and construct measures within the research instrument, thus replicating procedural remedies undertaken elsewhere (Parkhe, 1993; Krishnan *et al.*, 2006). Scale anchors also varied, and we reversed some to reduce and compensate for the formation of response patterns (Papadakis *et al.*, 1998). We also used four procedures post-hoc. First, we employed Harman's one-factor test and found no one single factor. Second, we correlated subjective and objective measures of performance. A positive association of sufficient strength is apparent (see the Appendix for details). Third, we checked whether respondents reporting relative firm performance consistently responded that their firm possesses adaptive capability. Fourth, and most important of all, is our post-hoc test for endogeneity, which captures the effect of a potential CMB (CMB is a sub-case of endogeneity) (Antonakis *et al.*, 2010: 1096–1097). The results diminish concern for CMB issues (see the Appendix for details).

Measures

Small firm performance outcomes used financial/sales turnover-related performance indicators (market/financial performance: *MFP*) and new product performance (*NPP*) compared with the small firm's immediate competitors in their principal market over the last three years to capture longer-term/more permanent outcome effects. Ten-point Likert scales were employed. The *MFP* aspects represent widely utilized performance indicators in entrepreneurship research (e.g., Wiklund and Shepherd, 2005), as reinvestment of financial resources into resource and capability development is possible. The items used were net and gross profit. Sales turnover is the third indicator of the *MFP* measure, capturing firm market performance (e.g., Hoy *et al.*, 1992; Weinzimmer *et al.*, 1998; Brush *et al.*, 2000). Without market or financial performance, small firms cannot fulfil their ambitions – illustrating the dimension's integral nature but also enabling the demonstration of the impact of competitive strategy. *NPP* explicitly addresses small firm innovative activity (Kandemir and Acur, 2012). *NPP* items captured new product development performance in terms of market share, sales, customer use, and profit objectives. These imply a proactive stance in anticipating emerging opportunities (Hughes *et al.*, 2007).

Adaptive capability

(*Adapt*) (compared with the small firm's immediate competitors in their principal market over the last three years, to capture specific and permanent practices) was measured using Hughes *et al.*'s (2007) three-indicator construct using 10-point Likert scales. These reflect whether the firm adapts adequately to changes in the business environment; reacts to market and environmental changes in a quick and satisfactory way; and responds promptly to new market opportunities. As explained in a previous section, our measure is not a performance reflection variable as in Hughes *et al.*'s (2007) start-up companies, but an organizational element in our sampled mature small firms.

Competitive strategy

This is measured using Chandler and Hanks' (1994) three generic competitive strategy (including innovation, cost leadership, and differentiation) construct. Seven-point Likert scales were employed. Innovation strategy (*Innov*) items capture the firm's capacity to have new products available and emphasize new product development and novel marketing techniques. Cost leadership (*CL*) items capture cost reduction in operations, employee productivity and operation efficiency, and lower production costs via process innovation. Differentiation (*Diff*) items capture emphasis on having high-quality products and customer service in terms of strict quality control, meeting customer requirements, superior customer service, producing the highest-quality goods, and meeting customer needs.

Environmental variables

We incorporated two control variables that attempt to capture the effects of the wider (principal industry level) technological and market environment effect (Porter, 1980; Miller and Chen, 1986). Lack of identifying an

DOI: 10.1002/jsc

effect thereof indicates, on the contrary, that strategy and adaptive capability operate at within-firm level and only in close proximity to immediate competitors in the principal markets, irrespective of the divergence in the wider higher-abstraction-level environments that firms face. We did this to distinguish between the wider and proximal environment. To increase the validity of the measures, we drew upon Miller's (1988: 291) assertion that managerial action is directed toward specific issues, and therefore we developed controls that capture narrowly defined aspects of the wider environment, applicable to the examination of small firms. Seven-point Likert scales were employed.

Technological environment (*Techno*) incorporates two items of Miller's (1988) environmental uncertainty scale and one item of the environmental dynamism scale, so as to capture the small firm's principal industry's rate of obsolescence, modes of production change, and rate of innovation of new operating processes and new products or services.

Market environment (*Market*), based on Miller's (1988) environmental heterogeneity and dynamism scales, comprised two items of environmental heterogeneity and one item of the environmental dynamism scale, so as to capture the small firm's principal industry's unpredictability for competitors' activities, customer tastes and preferences, downswings and upswings.

Measurement models

We first investigated the measurement model for the dependent latent constructs. Then, we investigated the measurement model for the independent latent constructs. We used the Exploratory Structural Equation Modeling (ESEM) procedure in Mplus (6.12). This procedure (Asparouhov and Muthén, 2009) simultaneously utilizes an exploratory (EFA) and confirmatory factor (CFA) analysis to avoid the numerous problems associated with the traditional two-step process (see Fornell and Yi, 1992 for these problems). Important advantages exist. The geomin-based rotation allows for cross-loadings and produces accurate estimates of underlying structures, as it benefits from the simultaneous estimation of both EFA and CFA scores. The analysis produced a two first-order factors model for performance (*MFP* and *NPP*) and a six first-order factors model (*Techno*, *Market*, *Innov*, *CL*, *Diff*, *Adapt*) for the independent latent constructs (see the Appendix). Cross-loadings were also small. The performance model indices are: $\chi^2 = 5.351$; $df = 4$; $p = 0.2531$ (baseline model $\chi^2 = 2576.258$; $df = 15$); RMSEA = 0.049 (90% CI = 0.000–0.143); $p = 0.420$; CFI = 0.999. The independent latent constructs' model fit indices are: $\chi^2 = 69.968$; $df = 60$; $p = 0.1777$ (baseline model $\chi^2 = 7534.562$; $df = 153$); RMSEA = 0.034 (90% CI = 0.000–0.064); $p = 0.783$; CFI = 0.999. All items load high and significantly on the designated constructs, and small cross-construct loadings are reflected in high average variance extracted (AVE) and construct reliability (CR) estimates. AVE (and CR in parentheses) were: *MFP* = 0.64(0.83); *NPP* = 0.72(0.88); *Innov* = 0.66(0.85); *CL* = 0.59(0.80); *Diff* = 0.63(0.83); *Adapt* = 0.83(0.93). The AVE and CR scores for the environmental variables scored lower: *Techno* = 0.31(0.56); *Market* = 0.45(0.70), but this was attributed to the diversity of the wider environments faced by the target small firms in their own respective industry sectors. SIC (squared inter-construct correlation) estimates were also small (0.34 for the performance and 0.01–0.14 for the independent constructs). The above and the theoretical support for the scales suggest convergent, discriminant, face, and nomological validity of the measures (Fornell and Larcker, 1981).

We subsequently constructed eight new measurement error-free variables (two dependent and eight independent factors) in line with Papadakis *et al*. (1998), using the items loading high on each construct weighted by their respective loading. Interaction terms were subsequently also computed after centering the respective error-free variables. We subsequently proceeded to our structural models using multivariate regression (Stata 13.0). Scanning electron microscopy (SEM) estimation is not advisable due to the small sample size (see note in the Appendix though). **Table 1** provides descriptive statistics,

DOI: 10.1002/jsc

Table 1. Means, standard deviations, and factor correlations

	M	SD	MFP	NPP	Adapt	Techno	Market	Innov	CL	Diff
MFP	56	14	0.64 (0.83)							
NPP	63	14	0.59***	0.72 (0.88)						
Adapt	71	19	0.68***	0.65***	0.83 (0.93)					
Techno	34	12	0.03 (n.s.)	0.02 (n.s.)	0.01 (n.s.)	0.31 (0.56)				
Market	36	13	0.17*	0.28***	0.29***	0.31***	0.45 (0.70)			
Innov	73	19	0.37***	0.43***	0.63***	0.22**	0.42***	0.66 (0.85)		
CL	69	13	0.30***	0.34***	0.46***	−0.04 (n.s.)	0.07 (n.s.)	0.43***	0.59 (0.80)	
Diff	81	12	0.34***	0.31***	0.42***	−0.11 (n.s.)	−0.04 (n.s.)	0.32***	0.49***	0.63 (0.83)

* $p<0.05$; ** $p<0.01$; *** $p<0.001$.
On the matrix diagonal are AVE and CR coefficients (the latter in parentheses). The scale for the mean and standard deviation is 1–100%.

correlation coefficients, AVE and CR scores (factor analysis results are in the Appendix). Our sampled firms have employed a combination of competitive strategies usually termed 'hybrid' (e.g., Pertusa-Ortega *et al.*, 2009) (see note in the Appendix).

Structural models

To test:

(a) the influence of competitive strategies/adaptive capability → performance, we estimated

Model M1A (controls only)

$$MFP = \beta_0 + \beta_1 \cdot Techno + \beta_2 \cdot Market + e_1$$

$$NPP = \beta_{10} + \beta_{11} \cdot Techno + \beta_{12} \cdot Market + e_2$$

Model M1B (controls and competitive strategies)

$$MFP = \beta_{20} + \beta_{21} \cdot Techno + \beta_{22} \cdot Market + \beta_{23} \cdot Innov + \beta_{24} \cdot CL + \beta_{25} \cdot Diff + e_3$$

$$NPP = \beta_{30} + \beta_{31} \cdot Techno + \beta_{32} \cdot Market + \beta_{33} \cdot Innov + \beta_{34} \cdot CL + \beta_{35} \cdot Diff + e_4$$

Model M1C (controls and adaptive capability)

$$MFP = \beta_{40} + \beta_{41} \cdot Techno + \beta_{42} \cdot Market + \beta_{43} \cdot Adapt + e_5$$

$$NPP = \beta_{50} + \beta_{51} \cdot Techno + \beta_{52} \cdot Market + \beta_{53} \cdot Adapt + e_6$$

(b) the influence of control factors and competitive strategies → adaptive capability, we estimated

Model M2A (controls only)

$$Adapt = \beta_{60} + \beta_{61} \cdot Techno + \beta_{62} \cdot Market + e_7$$

Model M2B (controls and competitive strategies)

$$Adapt = \beta_{70} + \beta_{71} \cdot Techno + \beta_{72} \cdot Market + \beta_{73} \cdot Innov + \beta_{74} \cdot CL + \beta_{75} \cdot Diff + e_8$$

(c) the influence of control factors, competitive strategies, and adaptive capability → performance, we estimated

Model M3

$$MFP = \beta_{80} + \beta_{81} \cdot Techno + \beta_{82} \cdot Market + \beta_{83} \cdot Innov + \beta_{84} \cdot CL + \beta_{85} \cdot Diff + \beta_{86} \cdot Adapt + e_9$$

DOI: 10.1002/jsc

$$NPP = \beta_{90} + \beta_{91} \cdot Techno + \beta_{92} \cdot Market + \beta_{93} \cdot Innov + \beta_{94} \cdot CL + \beta_{95} \cdot Diff + \beta_{96} \cdot Adapt + e_{10}$$

(d) the influence of control factors, competitive strategies, adaptive capability, and interaction effects → performance, we estimated

Model M4

$$MFP = \beta_{100} + \beta_{101} \cdot Techno + \beta_{102} \cdot Market + \beta_{103} \cdot Innov + \beta_{104} \cdot CL + \beta_{105} \cdot Diff + \beta_{106} \cdot Adapt + \beta_{107} \cdot Adapt * Innov + \beta_{108} \cdot Adapt * CL + \beta_{109} \cdot Adapt * Diff + e_{11}$$

$$NPP = \beta_{110} + \beta_{111} \cdot Techno + \beta_{112} \cdot Market + \beta_{113} \cdot Innov + \beta_{114} \cdot CL + \beta_{115} \cdot Diff + \beta_{116} \cdot Adapt + \beta_{117} \cdot Adapt * Innov + \beta_{118} \cdot Adapt * CL + \beta_{119} \cdot Adapt * Diff + e_{12}$$

See **Table 2**.

Results

H1 is confirmed. Adaptive capability accounts for a proportion of variance of performance outcomes which is either close to or greater than double that for competitive strategy (adjusted R^2 for adaptive capability versus competitive strategy are: 46% vs. 17% for *MFP*; 42% vs. 23% for *NPP*) (see Models M1B and M1C in Table 2). The standardized beta regression coefficients also become statistically non-significant for cost leadership (*CL*) or only a third (0.16–0.24 for differentiation (*Diff*) or innovation (*Innov*)) of the strength of the respective coefficient for adaptive capability (*Adapt*: 0.61–0.69). Wider environmental influences on the effect of adaptive capability on performance outcomes were not statistically significant (see Model M1C), in line with expectations.

H2 is confirmed. As noted elsewhere (e.g., Kenny *et al.*, 1998; Simsek and Heavey, 2011: 92), to test mediation using the Baron and Kenny (1986) procedure includes five steps. Specifically, Step 1 requires that the competitive strategy is significantly related to our performance variable; Step 2 requires that the competitive strategy is significantly related to our adaptive capability; Step 3 requires that the adaptive capability affects performance while controlling for the effect of competitive strategy. Finally, when these conditions are satisfied, Step 4 requires that the effect of the competitive strategy on performance decreases or becomes non-significant when controlling for adaptive capability in order to indicate mediation. We estimate the effects in both Steps 3 and 4 in the same regression equation. Step 5 tests weaknesses of the procedure.

The analysis has shown Steps 1–4 to be satisfied (see Models M1B, M1C, M2A, M2B, M3 in Table 2), providing a base for accepting *H2*. Competitive strategy explained between 17% for *MFP* and 23% for *NPP* (adjusted R^2 – see Model M1B in Table 2). Note that *CL* significantly influences adaptive capability but its direct influence on *MFP* and *NPP* is statistically non-significant. This is not surprising; in fact, these results are in line with Campbell-Hunt's (2000: 148) meta-analysis findings. Including *Adapt* almost doubled the explanation of variance for both performance outcomes (to 46% for *MFP* and 42% for *NPP*), simultaneously rendering the influence of competitive strategy (*Innov*; *Diff*) statistically non-significant (see Model M3). Furthermore, adaptive capability's standardized beta regression coefficient ranged between 0.58 and 0.74 for *NPP* and *MFP*, respectively (see Model M3), practically inferring that the explained performance is almost singularly affected by adaptive capability. Calculation of the indirect effect (ie)/direct effect (de)/total effect (te) for competitive strategy channeled through adaptive capability also showed these to be: (a) innovativeness ie/de/te = 0.35/–0.08/0.27; (b) cost leadership ie/de/te = 0.34/–0.01/0.32; differentiation ie/de/te = 0.31/0.07/0.39. As our findings refer to a three-dimensional (3D) competitive strategy, our interpretation is that the strength of any single competitive strategy's causal influence channeled through adaptive capability is in fact conditional on the influence of the other two studied competitive strategies.

DOI: 10.1002/jsc

Table 2. Multivariate regression results (standardized beta coefficients)

		Model 1						Model 2		Model 3		Model 4	
Independent variables	Models:	Controls M1A		Controls & strategy M1B		Controls & adaptive capability M1C		Controls M2A	Controls & strategy M2B	Full model M3		Full model (moderation) M4	
	Dependent:	*MFP*	*NPP*	*MFP*	*NPP*	*MFP*	*NPP*	*Adapt*	*Adapt*	*MFP*	*NPP*	*MFP*	*NPP*
Controls	*Techno*	−0.02	−0.06	−0.01	−0.06	0.03	−0.01	−0.08	−0.10	0.06	−0.00	0.05	0.02
		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
	Market	0.17	0.31	0.08	0.20	−0.04	0.10	0.32	0.12	−0.00	0.13	−0.02	0.05
		*	***	n.s.	*	n.s.	n.s.	***	n.s.	n.s.	n.s.	n.s.	n.s.
Strategy	*Innov*			0.22	0.24				0.47	−0.13	−0.03	−0.09	0.02
				*	*				***	n.s.	n.s.	n.s.	n.s.
	CL			0.09	0.14				0.15	−0.02	0.05	−0.03	0.04
				n.s.	n.s.				*	n.s.	n.s.	n.s.	n.s.
	Diff			0.22	0.16				0.18	0.09	0.05	0.10	0.04
				*	*				**	n.s.	n.s.	n.s.	n.s.
Adaptive capability	*Adapt*					0.69	0.61			0.74	0.58	0.76	0.62
						***	***			***	***	***	***
Interaction effects	*Adapt*Innov*											0.02	0.27
												n.s.	**
	*Adapt*CL*											0.08	−0.14
												n.s.	n.s.
	*Adapt*Diff*											0.06	−0.06
												n.s	n.s.
	R^2	0.02	0.08	0.20	0.26	0.46	0.43	0.09	0.48	0.48	0.44	0.50	0.48
	Adjusted R^2	0.01	0.07	0.17	0.23	0.46	0.42	0.08	0.47	0.46	0.41	0.47	0.44
	F	n.s.	***	***	***	***	***	***	***	***	***	***	***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

DOI: 10.1002/jsc

Step 5 investigates weaknesses of the Baron and Kenny (1986) procedure. Hayes (2009) has raised power-related concerns which are specific to mediation or moderation. The lower the power, the higher the probability of a Type II error occurring (Cohen, 1988). We calculated the power and did additional Monte Carlo simulations, but the results largely appease any power-related reservations in our study. We also tested for endogeneity effects (see Antonakis *et al.*, 2010). Contrary to common belief, standard exogeneity assumptions are insufficient for identifying causal mechanisms. This applies to the Baron and Kenny (1986) mediation approach too (Imai *et al.*, 2011a,b). We conducted additional analyses to quantify the effects of ignored potential confounders and a sensitivity analysis to probe the extent of our assumptions. These results show that irrespective of which competitive strategy we test, the average percentage of mediation (= indirect effect) compared with the total effect substantially outperforms (by 77–131%) direct effects. These lend firm support to the initial results, so we deem our *H2* as confirmed. Step 5's test details are in the Appendix.

H3 is largely refuted. Data do not generally support the notion that adaptive capability accelerates and multiplies the influence of competitive strategy on performance outcomes through *leveraging* and 'overclocking.' Adding interaction terms (see Model M4 in Table 2) increased explained variance but this impact was small (from 46% to 47% for *MFP* and from 41% to 44% for *NPP*). Our findings identify, however, a weak and partial moderation. Only the *Adapt*Innov* moderator has a single (beta coefficient of 0.27 for *Adapt*Innov* on *NPP*) leveraging influence. The direct influence of competitive strategy has also dissipated. Adaptive capability's power is not reinforcing/'overclocking' the power of competitive strategy *per se*. The leveraging only singly relates to an innovation-related conditional mechanism on *NPP* outcomes, explaining merely an additional 1% of *MFP* and 3% of *NPP* (from 0.46 to 0.47 and from 044 to 0.47, respectively) explained variance.

Discussion

We contribute to the ongoing debate and propose an enriched view of small firm adaptive capability. In doing so, we highlight the importance of small firm adaptive capability *per se* for superior performance and explain that this occurs through adaptive capability's dual-role function and aim. We also shed light on the causal pathway of small firm competitive strategy's impact on performance outcomes, exercised in the presence of adaptive capability. These have important implications for theory and practice. We review them below, together with limitations and avenues for future research.

First, by answering our research question, we advance the ongoing debate on dynamic capabilities (e.g., Slater *et al.*, 2006; Wang and Ahmed, 2007; Ambrosini *et al.*, 2009; McKelvie and Davidsson, 2009), and their relationship with competitive strategy (Pertusa-Ortega *et al.*, 2009; Ortega, 2010; Makkonen *et al.*, 2014). We also complement Eriksson (2014) and Barreto (2010) on the links between antecedents and outcomes of small firm dynamic capabilities. In doing so, the articulation of dynamic capabilities as a theoretical platform for competitive edge (Zahra *et al.*, 2006) and higher-importance ones like adaptive capability (Wang and Ahmed, 2007; Teece, 2012) is substantiated in our results. Our findings support the 'resource orchestration' perspective (Helfat *et al.*, 2007; Sirmon *et al.*, 2011) and adaptive capability appears to uplift the imprint of company assets and capabilities on performance (in line with Danneels, 2002, 2008, 2012: 42) and organizational adaptive behavior (in line with Makkonen *et al.*, 2014). In doing so, we purposefully expose the functioning of adaptive capability, confirming Teece (2012) and also Makkonen *et al.* (2014) who argue that specific dynamic capabilities, namely of an adaptive nature, are very influential for success. Our work also provides an empirical test of our theoretical framework, in contrast to much of the previous literature, which is only conceptual in nature (e.g., Teece *et al.*, 1997; Eisenhardt and Martin, 2000; Winter, 2003; Zahra *et al.*, 2006; Wang and Ahmed, 2007; Ambrosini *et al.*, 2009; Teece, 2012).

DOI: 10.1002/jsc

Second, our findings suggest that small firm adaptive capability explains why specific dynamic capabilities create differences in the impact of competitive strategy on performance outcomes (Pertusa-Ortega *et al.*, 2009). It may not be the competitive strategy, but specific higher-importance top-layer dynamic capabilities at the heart of small firm renewal and success. In doing so, our findings reflect that proficiency of managerial – specifically entrepreneurial – competence-type action, in line with Teece (2012), matters most. Competitive strategy's influence on performance does not take place in vacuum – it is intertwined with the proficiency of decision-makers. This links adaptive capability back to the findings of several authors such as Papadakis *et al.* (1998). As a top-layer dynamic capability, adaptive capability proficiently connects competitive strategy matters resources' possession and exploitation (Zahra *et al.*, 2006; Newbert, 2007). Furthermore, as one or few chief individuals can make the difference (Teece, 2012: 1395), this has substantial repercussions in small firms. It is the combined, interwoven, complementary, and polarizing effect of adaptive capability at the heart of small firm renewal and success. In small firms, the one/few chief individuals who are entrepreneurially competent, effectively and efficiently simultaneously attenuate the resilient and negative impact of resource-based limits (e.g., McKelvie and Davidsson, 2009). In other words, adaptive capability regenerates, reconfigures, and determines the way a firm adjusts to proximal business environment changes while simultaneously offsetting the impact of resource limits. Then, the small firm affirms augmented capability to adapt, respond, and react, and the impact of actions is amplified, yielding enlarged performance outcomes (Grewal and Tansuhaj, 2001; Krohmer *et al.*, 2002; Wang and Ahmed, 2007). In doing so, adaptive capability liberates and enacts incrementally the small firm to achieve its transitory market competitive acts by proficiently implementing elements of competitive strategy, altering states, practices, routines, and meta-routines, depending on the task and the resources at hand. This happens irrespective of the firm's much wider environment. In line with Barreto (2010), Makadok (2001), Makkonen *et al.* (2014), and Zahra *et al.* (2006), the mechanism at work is a within-firm one that refers to proximal competition and principal markets only, and not a between-firm one within a wider industry level. In small firms, this mechanism is enforced internally rather than being externally driven, operating as a self-governing apparatus. Adaptive capability acts from within the firm fabric, eventually providing small firms with an organizing prism toward the market and a mind-set for growth through constant 'morphing' (Rindova and Kotha, 2001).

Third, our work extends that of Makkonen *et al.* (2014). Their work used a measure for organizational change mostly capturing how to get organized (p. 2711). It is how proficient, effective, and efficient the management action is when doing so that matters. This links back to the comment that the development of adaptive capability is often accompanied by the evolution of organizational forms (Wang and Ahmed, 2007: 37). Future research should test if our findings persist under multiple firm and industry variations – inter- and intra-firm, variability and firm size. Studies should also look at the interface between adaptive capability and other proposed important dynamic capabilities (Wang and Ahmed, 2007). Our work advances that of Ortega (2010), who postulate that dynamic capabilities and strategy converse, combining their effects to generate maximum impact. Adaptive capability actually alters both the conversing and exercising of competitive strategy on performance outcomes. Acting beyond and above the impact of competitive strategy on performance outcomes, adaptive capability handles and manages competitive strategy while adding its own denser weight. It transmutes the strength, and alters how small firm competitive strategy influences performance outcomes; strategy effectively subsides under proficiency of managerial action, although it simultaneously undertakes an additional secondary role reinforcing innovation strategy for specific performance outcomes (*NPP*) only. Future research should likewise examine this under multiple contexts and using longitudinal research designs.

DOI: 10.1002/jsc

Fourth, the channeling of strategy through adaptive capability to performance implies the masked effects of learning and knowledge capitalization. Although outside our present scope of interest, this effect appears embedded in our findings and should be explicit. Makkonen *et al.* (2014) clearly mention that their focused small firm case study kept working with universities and monitoring consumer behavior (p. 2716). Learning enables us to identify and flexibly change practices, routines, and meta-routines. Extending Sirmon *et al.* (2010), future work may unfold the underlying link between foci of learning, learning processes, knowledge capitalization, and adaptive capability.

Fifth, the study isolated particular mechanisms and manifested their simultaneous, causal impact advancing the pertinent theoretical and limited empirical knowledge (Anderson and Eshima, 2013). We have attempted to answer whether adaptive capability weakens/strengthens the influence of competitive strategy on performance, or alternatively channels and transmutes competitive strategy. Surprisingly, the theoretical and empirical knowledge of causal mechanisms explaining dynamic capabilities' functioning, but also adaptive capability in small firms, has been limited (e.g., Anderson and Eshima, 2013). Eriksson (2014) also commented that the mechanisms by which dynamic capabilities influence outcomes are unclear (p. 73). Our work identified two simultaneous causal pathways exercised by adaptive capability (albeit the second pathway has only partial and weak effects). Our moderation findings align with past work (e.g., Song *et al.*, 2005; also Ortega, 2010) favoring the moderating role of innovation-related (marketing/technology) dynamic capabilities. Yet, we find that this is very small compared with its overarching mediation effect – in support of Makkonen *et al.* (2014). Clarifying further the causal mechanisms at work substantively clarifies the theory.

A separate investigation is needed if we are interested in the influence of the environment, occurring through the formation of competitive strategies but dissipating later in the process. Unarguably, the use of a causal language here may also raise methodological questions. By embracing a relevant analytical procedure, we made a modest effort to measure endogeneity effects (Antonakis *et al.*, 2010). Multiple competing viewpoints exist though, and research should identify best practice.

Sixth, small firm management practices appear able to reap increased success by focusing on adaptive capability skills and abilities to make the most of the resources they already have in hand, rather than single-mindedly focusing on success stemming from the choice of competitive strategy *per se*. Adaptive capability enables small firms to defend and aim to grow market niches (Wiklund, 1998) through effectiveness and efficiency, irrespective of their wider environment, by building a mind-set for proficient management. In small firms this allows high returns, much higher than choice of competitive strategy alone.

Appendix

Factorial analysis

Table 3 provides the results of the ESEM procedure.

Competitive strategies adopted by our sample firms

To better understand what competitive strategies our sampled firms reported, we plotted the scores of the SEM-based factors. The surface plot (not included here) indicated that our sampled firms employed a combination of competitive strategies, understood to be termed 'hybrid' (Pertusa-Ortega *et al.*, 2009). Based on Chandler and Hanks' (1994) definition, we also clarify that our definition of the competitive strategy of the sampled firms captures direction of strategy rather than realized strategy (e.g., Mintzberg and Waters, 1985).

Common-method bias concerns

We also randomly selected 20% of our sample (N = 28) and sought firms' publicly published performance indicators for three years prior to our data collection. Yet, we were mindful that such figures may be distorted due to

DOI: 10.1002/jsc

Table 3. Exploratory SEM results (geomin rotation – standardized loadings)

Items	Market performance (*MFP*)	NP performance (*NPP*)	Adaptive capability (*Adapt*)	Innovation strategy (*Innov*)	Cost leadership strategy (*CL*)	Differentiation strategy (*Diff*)	Market turbulence (*Market*)	Technological turbulence (*Techno*)	Item explained R^2 (two-tailed)
mfp1	0.95***	−0.01							0.89***
mfp2	0.87***	0.02							0.78***
mfp3	0.52***	0.29***							0.54***
npp1	−0.08	0.99***							0.89***
npp2	0.03	0.87***							0.80***
npp3	0.24**	0.65***							0.67***
a1			0.92***	0.05	−0.03	0.00	−0.00	−0.01	0.89***
a2			0.96***	−0.03	0.01	0.05	−0.00	0.06	0.98***
a3			0.85***	0.07	0.05	−0.01	−0.01	−0.03	0.83***
i1			0.02	0.95***	−0.04	−0.01	−0.06	−0.03	0.85***
i2			0.03	0.87***	0.03	0.03	0.03	0.02	0.88***
i3			0.16**	0.57***	0.08	0.05	0.14	0.01	0.62***
c1			−0.04	0.00	0.79***	−0.04	0.02	−0.05	0.57***
c2			0.02	0.02	0.89***	0.11	−0.05	0.04	0.97***
c3			0.11	−0.01	0.60***	0.03	0.01	0.00	0.45***
d1			0.00	0.05	0.10	0.79***	0.01	−0.29*	0.90***
d2			0.00	0.02	−0.01	0.69***	−0.24	0.08	0.56***
d3			0.04	−0.08	0.01	0.89***	−0.00	−0.05	0.80***
m1			−0.01	−0.00	0.06	−0.02	0.85***	−0.06	0.69***
m2			0.14	−0.03	−0.03	−0.09	0.58***	0.08	0.40***
m3			−0.05	0.14	−0.10	0.19	0.55***	0.08	0.42***
t1			−0.08	0.33**	0.01	−0.05	−0.01	0.55***	0.48***
t2			0.03	−0.00	−0.01	0.20	0.12	0.68***	0.56***
t3			0.14	0.10	0.06	−0.04	0.00	0.42***	0.29***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Fit indices: Dependent factors model $\chi^2 = 5.35$; $df = 4$; $p = 0.25$; baseline model $\chi^2 = 2576.258$; $df = 15$; RMSEA = 0.049; 90% CI = 0.000–0.143; $p = 0.42$; CFI = 0.999.

Fit indices: Independent factors model χ^2 = model fit = 69.96*; $df = 60$; $p = 0.17$; baseline model $\chi^2 = 7534.56$; $df = 153$; RMSEA = 0.034; 90% CI = 0.000–0.064; $p = 0.78$; CFI = 0.99.

Explanation of coding:

Competitive strategies [all items (7-point Likert scale): In our firm… (disagree/agree) (principal market)]

- ***Innovation (Innov)*:** i1: we strive to be the first to have new products available; i2: we stress new product development; i3: we engage in novel and innovative marketing techniques.
- ***Cost leadership (CL)*:** c1: we emphasize cost reduction in all facets of business operation; c2: we strongly emphasize improvement in employee productivity/operations efficiency; c3: we have developed lower production costs via process innovation.
- ***Differentiation (Diff)*:** d1: we will go to almost any length to meet customer requirements; d2: we focus on producing only the highest-quality products; d3: we emphasize that customer needs always come first.

Environment [all items (7-point Likert scale) refer to principal industry]

- ***Techno*:** t1: the rate of obsolescence is very high; t2: the modes of production change often and in major ways; t3: the rate of innovation of new operating processes and new products or services has increased dramatically.
- ***Market*:** m1: market activities of your key competitors have become less predictable; m2: the tastes and preferences of your customers have become much more hard to forecast; m3: downswings and upswings have become far less predictable.

Adaptive capability (Adapt) [all items (10-point Likert scale): Our firm's response… (much worse; much better) compared with that of our immediate competitors in our principal market]: a1: adapts adequately to changes in the business environment; a2: reacts to market and environmental changes in a quick and satisfactory way; a3: responds promptly to new market opportunities.

Performance

- ***Market financial performance (MFP)*** [all items (10-point Likert scale) refer to firms' performance over the last three years, with that of the firm's immediate competitors in the firm's principal market]: mfp1: net profit; mfp2: gross profit; mfp3: sales turnover.
- ***New product performance (NPP)*** [all items (10-point Likert scale) refer to firms' new product development performance over the last three years, with that of the firm's immediate competitors in the firm's principal market]: npp1: our new products/services achieve their market share objectives; npp2: our new products/services achieve their sales and customer use objectives; npp3: our new products/services achieve their profit objectives.

DOI: 10.1002/jsc

Greek small firm active tax-evasion practices, that distortions may vary per sector, and that distortions may primarily center on reported profitability. We used a specific type of correlation analysis which caters for non-equidistant observations, namely MIC (maximum information coefficient), focusing on the strength of the association between self-reported *MFP* and a ratio based on small firms' past three years of publicly reported *MFP* figures (we computed this ratio as log Year3 turnover/log Year1 turnover). MIC belongs to a novel family of correlation coefficients and is suitable for graphically complex associations (see Reshef *et al.*, 2011, 2013). Our MIC estimation for the association between *MFP* and our computed ratio (using the MINE algorithm available for R) was 0.32, which for $N = 28$ we interpreted following Reshef *et al.*'s (2011, 2013) guidance as denoting sufficient strength of a positive association. We treat this correlation between 'subjective' and 'objective' data as reflective of diminishing concerns for CMB. It is our post-hoc test for endogeneity (see further below) which captures the effect of a potential CMB (Antonakis *et al.*, 2010: 1096–1097). The method of obtaining data from different sources to minimize CMB is satisfactory as long as the focus variables are exogenous. If the focus variables are endogenous, as in our case, even data from different sources are not immune to CMB. Only an endogeneity test caters for biases – including CMB, because it quantifies the effects of ignored potential confounders. Note that these objective data cannot replace our subjective measures as they are only the publicly available figures for the companies, and do not confirm what operations they refer to and what accounting rules they obey.

In parallel, we also wanted to check whether respondents reporting relative firm performance consistently responded that their firm possesses adaptive capability, another aspect of CMB. We considered that such CMB would likely be captured as a progressive linear surface between *MFP*/*NPP* and adaptive capability (the greater *MFP*/*NPP*, the greater the adaptive capability). We visually examined the 3D plot of their relationship, but clear lack of a progressive linear surface was evident. These and the results of our tests for endogeneity (see further below) seem to lend support to our belief that CMB is minimal.

Mediation-analysis power concerns

Power-related concerns, specific to mediation analysis, exist and merit specific investigation (e.g., Hayes, 2009). Given our small sample size, similar to much extant research in the area (e.g., Simsek and Heavey, 2011), some of the mediational influences we detect may suffer from power consideration issues. We employed the Sobel–Goodman (see Sobel, 1982) mediation test, and it showed in all our cases any mediation of adaptive capability influence to be statistically significant and complete ($p > |Z|$ values < 0.000). Yet, power analysis (at 0.80 level) (Cohen, 1988), with specific reference to Sobel's test (this is a complete mediation case, $\tau' = 0$), indicates that the influence of innovation competitive strategy mediated through adaptive capability is detectable with any sample above approximately $N = 138$ for beta coefficients of small to medium size for the independent and large for the mediator.

This is our case ($b_{Innovation} \rightarrow$ Adaptive capability $= 0.22$–0.24 and $b_{Adaptive\ capability} \rightarrow MFP/NPP = 0.61$–$0.69$), and the same occurs for the impact of differentiation on *MFP* ($b_{differentiation} = 0.22$). The figures are characterized by less power regarding the detection of differentiation on *NPP* ($b_{differentiation} = 0.16$) given this smaller beta coefficient, but in contrast they benefit from small measurement error (see Fritz and MacKinnon, 2007: 8). The above power consideration estimates refer to the entire mediated path. As power increases, the chances of a Type II error occurring decrease. The probability of a Type II error occurring is referred to as the false negative rate (β) (Cohen, 1988). Therefore, power is equal to $1 - \beta$ regarding the proportion of a condition in a sample testing positive for it. Thus, the influence of all competitive strategies as detected in the initial results indicates a varying probability of detection given different degrees of power due to sample size constraints. These initial results are not sensitive enough to

DOI: 10.1002/jsc

confirm the detection of all mediation influences. The mediated impact of innovation (on *MFP* and *NPP*) and differentiation (on *MFP*) is being detected with greater certainty than that of cost leadership on both *MFP* and *NPP*, and differentiation on *NPP*.

To remedy this and further examine potential implications, including questions that some researchers answer through bootstrapping, we conducted a Monte Carlo-based simulation using the regression coefficients of Model M3 for estimation. Results indicated that for over N = 100,00 replications the coefficients converge for all variables to the same values as those in Model M3 ($p < 0.001$; 95% coverage) for both *MFP* and *NPP*, and reflect power > 0.80. This may permit us to infer that the mediation effects may also attain strong power, which in turn may allow us to decrease such reservations in our study.

Actual impact and power considerations of the interaction term(s)

There is an additional issue, namely what is the *actual* impact of the interaction *Adapt*Innov*? Since at least one interaction ≠ 0, the direct effect of the *Adapt*Innov* specific interaction on performance is carried out; in fact, the influence of the *intercept* of the competitive strategies' influence on adaptive capability (= that is, the *intercept* of the regression of adaptive capability on each competitive strategy) plus, importantly, the influence of *each* competitive strategy on adaptive capability channeled to performance outcomes through the *Adapt*Innov* interaction's direct effect on performance. Model M2B gives an indication of the strength of the influence of *each* competitive strategy on adaptive capability. Related to this, the standardized coefficient $b_{Adapt*Innov} = 0.27$ for the interaction *Adapt*Innov* compared with $b_{adaptive\ capability} = 0.62$ for adaptive capability (see Model M4 in Table 2). The power of $b_{Adapt*Innov}$ is ∼0.52 using as base for the estimation: nine predictors; standardized values; VIF = 2.51; $p < 0.05$, which is of medium strength. To test this, we conducted an additional Monte Carlo simulation using Model M4 figures. Similar results were exhibited; for instance, the power of findings in the simulation for *H3* is > 0.80.

Endogeneity concerns

Much of the past research implicitly assumes 'causal independence' (Imai *et al.*, 2009, 2011a,b; Pearl, 2009), an issue also discussed under endogeneity (see Antonakis *et al.*, 2010). Standard exogeneity assumptions are insufficient to identify the causal mechanisms, and this also applies for the traditional Baron and Kenny (1986) mediation analysis (Imai *et al.*, 2009). Importantly, the traditionally used instrumental variable approaches (e.g., Bascle, 2008) do not apply in a mediation framework (Pearl, 2009). Methods to deal with endogeneity in mediation models are, at present, in progress, but we use the latest thinking, holding the view that future progress will provide further guidance on best practice. In doing so, we test our results assuming 'sequential ignorability' in a mediation modeling framework, to identify the causal mechanisms, identify the strength of potential confounders, and conduct a sensitivity analysis to probe the extent of our assumptions.

The critical sequential ignorability criterion refers to more than one aspect. First, as noted above, it refers to the possible existence of non-measured mediators which may affect both the adaptive capability and *MFP/NPP*. Our mediator (adaptive capability) was *not* randomly selected and we should not preclude the possibility of other mediators. Next, the selected '*treatment*' (each competitive strategy) encountered in our observational study may not be random, *given the covariates* (Imai *et al.*, 2009, 2011a,b). A competitive strategy can essentially be treated as random only after adjusting for observed pre-treatment covariates, and the assignment of the mediator values is also essentially random once both the observed competitive strategies and the set of observed pre-treatment covariates are adjusted for (Imai *et al.*, 2009, 2011a,b). Furthermore, even when the competitive strategy (*treatment*) and adaptive capability (*mediator*) are randomized, we cannot identify the mediation effects unless an

DOI: 10.1002/jsc

additional assumption, namely a no-interaction effect between treatment and mediator constraint, is imposed (Robins, 2003; Imai *et al.*, 2009, 2011a,b).

For this purpose, we employed Imai *et al.*'s (2009, 2011a,b) *medeff* and *medsens* procedures (implemented in Stata). These procedures require an independent variable that can be used for the estimation of confounding. We selected three separate variables, namely *Market* and *Techno* (which may be of primary importance) plus a third variable in our dataset (which can be of secondary importance) so as to also investigate the range of divergence of estimates. The latter variable, namely firm location (*Location*) (question item = your performance in your main market against your direct competitors is due to your location) is conceptually outside the current framework. We expected location to be correlated with all factors in our framework, but also to be of peripheral importance. We considered these three factors equivalent to Imai *et al.*'s (2009, 2011a,b) '*pre-treatment*' confounders, and thus they may be understood as what happens regarding the mediation and outcome when a competitive strategy is assigned to be the one observed. We employed the original treatment factor as a continuous variable and the procedures predict the mediator M_i ($Adapt_i$) for treatment case values $T_i = 0$ and $T_i = 1$ (e.g., 1 = very innovative/cost leadership/differentiation; 0 = not innovative/cost leadership/differentiation), and Y_i with $T_i = 1$ and $\hat{M}_i(0)$. Imai *et al.*'s (2009, 2011a,b) procedure quantifies the (degree of) sequential ignorability violation as the correlation of mediator-outcome error terms. Then, it calculates the values of the ACME for values of a sensitivity parameter, *rho* (the correlation in error terms). Findings are deemed *sensitive* if the effects vary widely as a function of *rho* computed for ACME = 0. In addition, the product of R^2 for the mediator and the outcome model at which ACME = 0 is also assessed using the proportions of residual or total variance in the mediator, as the hypothesized unobserved confounder explains. The sensitivity procedure also creates the low and high bounds using a 95% confidence interval for ACME (**Table 4**).

Adjusted R^2 for the mediation regression is 45–46% for *MFP* and 41–42% for *NPP*. The regression coefficient for adaptive capability spans 0.46–0.57 for *MFP* and 0.45–0.49 for *NPP*; like in the original analysis, competitive strategies do not retain statistical significance. ACME spans 28–35% (95% confidence intervals spanning 18–49%). *Rho* at ACME = 0 spans 50–64%; *R^2_M*R^2_Y** (the upper bound of sensitivity) at which ACME = 0 spans 25–41%, and *R^2_M~R^2_Y~* (the lower bound of sensitivity) at which spans 7–17%.

Sensitivity is reflected by *rho* (see *Rho@ACME* = 0 in Table 4), but the results also show that *even* for the lower bound of sensitivity, mediation effects are produced. The lower bounds of sensitivity specifically regard the original variance as *unexplained* by the confounder(s) which, in reverse, is actually the *most conservative* estimation of the model variance explained by the model variables. On *average*, and after having tested for confounder effects, the percentage of mediation compared with the total effect spans 79–131%, much in favor of the argument that adaptive capability does indeed act as a mediator.

It is important to add that these positive mediation effects occur irrespective of *which* competitive strategy is tested and irrespective of the confounder employed, even though the strength of the mediation and confounder influences does vary. These lend firm support to the initial results, so it appears that our *H2* is eventually indeed confirmed.

Using a SEM framework

We have not used SEM because of the small sample size (N = 143) which may distort SEM results. Nonetheless, for the sake of completeness we also subjected our main models (Model 3 and 4) to an MLR-based estimation using Mplus 7.3. The fit was excellent: $\chi^2 = 312.130$; $df = 224$; $p = 0.0001$ (baseline model $\chi^2 = 2053.544$; $df = 276$); RMSEA = 0.052; (90% CI = 0.038–0.066; $p = 0.376$; CFI = 0.95 but also SRMR = 0.061). The coefficients were stronger than what we reported in the main body of our article for Model 3, namely *MFP* and *NPP* for adaptive

DOI: 10.1002/jsc

Table 4. Model M3 – confounding and sensitivity analysis results (unstandardized coefficients; variables scaled on a 0–100% scale) (negative signs denote negative effects)

	Confounder: Techno						Confounder: Market						Confounder: Location					
Dependent:	MFP			NPP			MFP			NPP			MFP			NPP		
Innovation	−0.09			0.01			−0.07			−0.00			−0.07			0.03		
	n.s.			n.s.			n.s.			n.s.			n.s.			n.s.		
Cost leadership		−0.01			0.06			−0.01			0.07			−0.01			0.05	
		n.s.			n.s.			n.s.			n.s.			n.s.			n.s.	
Differentiation			0.07			0.05			0.06			0.08			0.07			0.05
			n.s.			n.s.			n.s.			n.s.			n.s.			n.s.
Adaptive capability	0.57	0.52	0.46	0.49	0.48	0.48	0.57	0.53	0.50	0.48	0.45	0.45	0.55	0.51	0.48	0.46	0.47	0.47
	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
Confounder	0.06	0.02	0.03	0.19	0.02	0.03	−0.00	−0.03	−0.02	0.12	0.12	0.13	0.02	0.03	0.03	0.05	0.45	0.04
	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Adjusted R^2	0.46	0.45	0.46	0.41	0.41	0.41	0.46	0.45	0.46	0.42	0.42	0.42	0.46	0.46	0.46	0.41	0.41	0.41
ACME	0.38	0.34	0.32	0.32	0.31	0.31	0.35	0.33	0.33	0.29	0.28	0.29	0.35	0.32	0.29	0.29	0.29	0.28
95% CI low	0.28	0.23	0.20	0.22	0.20	0.19	0.25	0.22	0.21	0.20	0.18	0.19	0.25	0.20	0.18	0.19	0.18	0.17
95% CI high	0.49	0.47	0.45	0.43	0.44	0.44	0.46	0.46	0.46	0.40	0.40	0.42	0.45	0.44	0.42	0.39	0.41	0.41
Direct effect	−0.09	−0.01	0.08	0.02	0.06	0.06	−0.07	−0.01	0.07	−0.00	0.07	0.08	−0.07	−0.01	0.07	0.04	0.05	0.05
Total effect	0.28	0.33	0.40	0.34	0.38	0.37	0.27	0.32	0.40	0.29	0.36	0.38	0.27	0.30	0.37	0.33	0.35	0.34
% of total effect mediated	131	103	79	93	82	83	88	104	82	102	79	77	125	104	79	87	83	83
Rho@ACME = 0	0.62	0.64	0.63	0.53	0.58	0.59	0.62	0.63	0.61	0.54	0.55	0.55	0.60	0.62	0.61	0.50	0.57	0.58
*R^2_M*R^2_Y**	0.39	0.41	0.39	0.28	0.34	0.35	0.39	0.39	0.37	0.29	0.30	0.30	0.36	0.39	0.38	0.25	0.33	0.34
R^2_M~R^2_Y~	0.11	0.17	0.17	0.09	0.15	0.16	0.12	0.15	0.14	0.09	0.12	0.12	0.10	0.15	0.15	0.07	0.14	0.15

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

DOI: 10.1002/jsc

capability standardized beta coefficients of 0.82*** and 0.61***, respectively, all others remaining statistically non-significant. In Model 4, the effect of innovativeness on *NPP* was also almost the same and significant (0.29**), confirming our extant analysis.

References

Ambrosini V, Bowman C, Collier N. 2009. Dynamic capabilities: An exploration of how firms renew their resource base. *British Journal of Management* **20**: 9–24.

Anderson B, Eshima Y. 2013. The influence of firm age and intangible resources on the relationship between entrepreneurial orientation and firm growth among Japanese SMEs. *Journal of Business Venturing* **28**: 413–429.

Antonakis J, Bendahan S, Jacquart P, Lalive R. 2010. On making causal claims: A review and recommendations. *The Leadership Quarterly* **21**: 1086–1120.

Argyris C. 1990. *Overcoming Organizational Defenses*. Prentice-Hall: Englewood Cliffs, NJ.

Armstrong JS, Overton TS. 1977. Estimating nonresponse bias in mail surveys. *Journal of Marketing Research* **14**: 396–402.

Asparouhov T, Muthén B. 2009. Exploratory structural equation modeling. *Structural Equation Modeling* **16**: 397–438.

Bagozzi RP, Yi Y. 1990. Assessing method variance in multitrait-multimethod matrices: The case of self-reported affect and perceptions at work. *Journal of Applied Psychology* **75**: 547–560.

Bagozzi RP, Yi Y, Phillips LW. 1991. Assessing construct validity in organizational research. *Administrative Science Quarterly* **36**: 421–458.

Barney JB. 1991. Firm resources and sustained competitive advantage. *Journal of Management* **17**: 99–120.

Baron RM, Kenny DA. 1986. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* **51**: 1173–1182.

Barr PS, Stimpert JL, Huff AS. 1992. Cognitive change, strategic action, and organizational renewal. *Strategic Management Journal* **13**: 15–36.

Barreto I. 2010. Dynamic capabilities: A review of past research and an agenda for the future. *Journal of Management* **36**: 256–280.

Bascle G. 2008. Controlling for endogeneity with instrumental variables in strategic management research. *Strategic Organization* **6**(3): 285–327.

Brady T, Davies A. 2004. Building project capabilities: From exploratory to exploitative learning. *Organization Studies* **25**: 1601–1621.

Brush TH, Bromiley P, Hendrickx M. 2000. The free cash flow hypothesis for sales growth and firm performance. *Strategic Management Journal* **21**: 455–472.

Campbell-Hunt C. 2000. What have we learned about generic competitive strategy? A meta-analysis. *Strategic Management Journal* **154**: 127–154.

Certo SC, Peter JP. 1991. *Strategic Management: Concepts and application*. McGraw-Hill: New York.

Chandler G, Hanks SH. 1994. Market attractiveness, resource-based capabilities, venture strategies and venture performance. *Journal of Business Venturing* **9**: 331–349.

Chen MJ, Hambrick DC. 1995. Speed stealth and selective attack: How small firms differ from large firms in competitive behavior. *Academy of Management Journal* **38**: 453–482.

Child J. 1972. Organizational structure, environment and performance: The role of strategic choice. *Sociology* **6**: 1–22.

Cohen J. 1988. *Statistical Power Analysis for the Behavioral Sciences*. Erlbaum: Hillsdale, NJ.

Collis DJ. 1994. How valuable are organizational capabilities? *Strategic Management Journal* **24**: 143–152.

Conner K. 1991. A historical comparison of resource-based theory and five schools of thought within industrial economics: Do we have a new theory of the firm? *Journal of Management* **17**: 121–154.

Cyert RM, March JG. 1963. *A Behavioral Theory of the Firm*. Prentice-Hall: Englewood Cliffs, NJ.

Danneels E. 2002. The dynamics of product innovation and firm competences. *Strategic Management Journal* **23**: 1095–1121.

Danneels E. 2008. Organizational antecedents of second order competences. *Strategic Management Journal* **29**: 519–543.

Danneels E. 2012. Second-order competences and Schumpeterian rents. *Strategic Entrepreneurship Journal* **58**: 42–58.

Døving E, Gooderham PN. 2008. Dynamic capabilities as antecedents of the scope of related diversification: The case of small

DOI: 10.1002/jsc

firm accountancy practices. *Strategic Management Journal* **9**: 841–857.

Durand R, Vaara E. 2009. Causation, counterfactuals, and competitive advantage. *Strategic Management Journal* **30**: 1245–1264.

Eisenhardt KM, Martin JA. 2000. Dynamic capabilities: What are they? *Strategic Management Journal* **21**: 1105–1121.

Eriksson T. 2014. Processes, antecedents and outcomes of dynamic capabilities. *Scandinavian Journal of Management* **30**: 65–82.

Fornell C, Larker DF. 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research* **18**: 39–50.

Fornell C, Yi Y. 1992. Assumptions of the two-step approach to latent variable modeling. *Sociological Methods and Research* **20**: 291–320.

Fritz M, MacKinnon D. 2007. Required sample size to detect the mediated effect. *Psychological Science* **18**(3): 233–239.

Grewal R, Tansuhaj P. 2001. Building organizational capabilities for managing economic crisis: The role of market orientation and strategic flexibility. *Journal of Marketing* **65**: 67–80.

Gurisatti P, Soli V, Tattara G. 1997. Patterns of diffusion of new technologies in small metalworking firms: The case of an Italian region. *Industrial and Corporate Change* **6**: 275–312.

Hayes AF. 2009. Beyond Baron Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs* **76**: 408–420.

Helfat CE, Peteraf M. 2003. The dynamic resource based view: Capability lifecycles. *Strategic Management Journal* **24**: 997–1010.

Helfat CE, Finkelstein S, Mitchel W, Peteraf M, Singh H, Teece DJ, Winter S. 2007. *Dynamic Capabilities: Understanding Strategic Change in Organizations*. Blackwell: London.

Hitt MA, Ireland RD, Hoskisson RE. 2003. *Strategic Management: Competitiveness and Globalization*, 5th edn. Thomson/South-Western College Publishing: Cincinnati, OH.

Hoy F, McDougall PP, D'Souza DE. 1992. Strategies and environments of high growth firms. In Sexton DL, Kasarda JD (eds), *The State of the Art of Entrepreneurship*. PWS-Kent Publishing: Boston, MA; pp. 341–357.

Huber GP, Power DJ. 1985. Retrospective reports of strategic-level managers: Guidelines for increasing their accuracy. *Strategic Management Journal* **6**: 171–180.

Hughes M, Hughes P, Morgan RE. 2007. Exploitative learning and entrepreneurial orientation alignment in emerging young firms: Implications for market and response performance. *British Journal of Management* **18**: 359–375.

Hutzschenreuter T, Israel S. 2009. A review of empirical research on dynamic competitive strategy. *International Journal of Management Reviews* **11**: 421–461.

Imai K, Tingley D, Yamamoto T. 2009. Experimental designs for identifying causal mechanisms. Technical report, Department of Politics, Princeton University. Available at: imai.princeton.edu/research/Design.html.

Imai K, Keele L, Tingley D, Yamamoto T. 2011a. Unpacking the black box of causality: Learning about causal mechanisms from experimental and observational studies. *American Political Science Review* **105**: 765–789.

Imai K, Jo B, Stuart EA. 2011b. Commentary: Using potential outcomes to understand causal mediation analysis. *Multivariate Behavioral Research* **46**: 861–873.

Kandemir D, Acur N. 2012. Examining proactive strategic decision-making flexibility in new product development. *Journal of Product Innovation Management* **29**: 608–622.

Kenny DA, Kashy DA, Bolger N. 1998. Data analysis in social psychology. In Daniel GD, Fiske ST, Lindzey G (eds), *Handbook of Social Psychology*, Vol. **1**, 4th edn. McGraw-Hill: New York; pp. 233–265.

Kogut B, Zander U. 1992. Knowledge of the firm, combinative capabilities and the replication of technology. *Organization Science* **3**: 383–397.

Krishnan R, Martin X, Noorderhaven NG. 2006. When does trust matter to alliance performance? *Academy of Management Journal* **49**: 894–917.

Krohmer H, Homburg C, Workman JP. 2002. Should marketing be cross-functional? *Journal of Business Research* **55**: 451–465.

Kumar N, Stern L, Anderson JC. 1993. Conducting interorganizational research using key informants. *Academy of Management Journal* **36**: 1633–1651.

DOI: 10.1002/jsc

Lamberg JA, Tikkanen H, Nokelainen T, Suur-Inkeroinen H. 2009. Competitive dynamics, strategic consistency and organizational survival. *Strategic Management Journal* **30**: 45–60.

Lin Y, Wu L-Y. 2014. Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of Business Research* **67**: 407–413.

Lumpkin GT, Lichtenstein BB. 2005. The role of organizational learning in the opportunity recognition process. *Entrepreneurship Theory and Practice* **29**: 451–472.

Makadok R. 2001. Toward a synthesis of the resource-based dynamic-capability views of rent creation. *Strategic Management Journal* **22**: 387–401.

Makkonen H, Pohjola M, Olkkonen R, Koponen A. 2014. Dynamic capabilities and firm performance in a financial crisis. *Journal of Business Research* **67**: 2707–2719.

Maritan C. 2001. A capital investment as investing in organizational capabilities: An empirically grounded process model. *Academy of Management Journal* **44**: 513–531.

McGahan AM, Porter ME. 1997. How much does industry matter, really? *Strategic Management Journal* **18**: 15–30.

McGee JE, Rubach MJ. 2011. Responding to increased environmental hostility: A study of the competitive behaviour of small retailers. *Journal of Applied Business Research* **13**: 83–94.

McKelvie A, Davidsson P. 2009. From resource base to dynamic capabilities: An investigation of new firms. *British Journal of Management* **20**: 63–80.

Meyer AD, Tsui AS, Hinning CR. 1993. Configurational approaches to organizational analysis. *Academy of Management Journal* **36**: 1175–1195.

Miller D. 1988. Relating Porter's business strategies to environment and structure: Analysis and performance implications. *Academy of Management Journal* **31**: 280–308.

Miller D. 1992. The generic strategy trap. *Journal of Business Strategy* **13**: 37–42.

Miller D, Chen MJ. 1996. The simplicity of competitive repertoires: An empirical analysis. *Strategic Management Journal* **17**: 417–439.

Mintzberg H, Waters JA. 1985. Of strategies, deliberate and emergent. *Strategic Management Journal* **6**(3): 257–272.

Mintzberg H, Westley F. 1992. Cycles of organizational change. *Strategic Management Journal* **13**(S2): 39–59.

Ndofor H, Sirmon DG, He X. 2011. Firm resources, competitive actions and performance: Investigating a mediated model with evidence from the in-vitro diagnostics industry. *Strategic Management Journal* **32**: 640–657.

Newbert SL. 2007. Empirical research on the resource based view of the firm: An assessment and suggestions for future research. *Strategic Management Journal* **28**: 121–146.

Ortega MJR. 2010. Competitive strategies and firm performance: Technological capabilities' moderating roles. *Journal of Business Research* **63**: 1273–1281.

Papadakis VM, Lioukas S, Chambers D. 1998. Strategic decision-making processes: The role of management and context. *Strategic Management Journal* **19**: 115–147.

Parkhe A. 1993. Strategic alliance structuring: A game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal* **36**: 794–829.

Pearl J. 2009. *Causality: Models, Reasoning, and Inference*, 2nd edn. Cambridge University Press: New York.

Pertusa-Ortega EM, Molina-Azorín JF, Claver-Cortés E. 2009. Competitive strategies and firm performance: A comparative analysis of pure, hybrid and stuck-in-the-middle strategies in Spanish firms. *British Journal of Management* **20**: 508–523.

Pertusa-Ortega EM, Molina-Azorín JF, Claver-Cortés E. 2010. Competitive strategy, structure and firm performance: A comparison of the resource-based view and the contingency approach. *Management Decision* **48**: 1282–1303.

Peteraf MA. 1993. The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal* **14**: 179–191.

Podsakoff PM, MacKenzie SB, Lee JY, Podsakoff NP. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology* **88**: 879–903.

Porter ME. 1980. *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press: New York.

Porter ME. 1991. Towards a dynamic theory of strategy. *Strategic Management Journal* **12**: 95–118.

DOI: 10.1002/jsc

Reshef DN, Reshef YA, Finucane HK, Grossman SR, McVean G, Turnbaugh PJ, Lander ES, Mitzenmacher M, Sabeti PC. 2011. Detecting novel associations in large data sets. *Science* **334**(6062): 1518–1524.

Reshef D, Reshef Y, Mitzenmacher M, Sabeti P. 2013. Equitability analysis of the maximal information coefficient, with comparisons. arXiv: 1301.6314.

Rindova V, Kotha S. 2001. Continuous 'morphing': Competing through dynamic capabilities, form, and function. *Academy of Management Journal* **44**: 1263–1280.

Robins JM. 2003. Semantics of causal DAG models and the identification of direct and indirect effects. In Green PJ, Hjort NL, Richardson S (eds), *Highly Structured Stochastic Systems*. Oxford University Press: Oxford; pp. 70–81.

Sanchez R. 1995. Strategic flexibility in product competition. *Strategic Management Journal* **16**: 135–159.

Senge PM. 1990. *The Fifth Discipline: Mastering the Five Practices of the Learning Organization*. Doubleday: New York.

Shay JP, Rothaermel FT. 1999. Dynamic competitive strategy: Towards a multi-perspective conceptual framework. *Long Range Planning* **32**: 559–572.

Sheth JN, Sisodia RJ. 2002. *The Rule of Three: Surviving and Thriving in Competitive Markets*. Free Press: New York.

Simsek Z, Heavey C. 2011. The mediating role of knowledge-based capital for corporate entrepreneurship effects on performance: A study of small- to medium-sized firms. *Strategic Entrepreneurship Journal* **5**: 81–100.

Sirmon DG, Hitt MA. 2003. Managing resources: Linking unique resources, management, and wealth creation in family firms. *Entrepreneurship Theory and Practice* **27**: 339–358.

Sirmon DG, Hitt MA, Ireland RD. 2007. Managing firm resources in dynamic environments to create value: Looking inside the black box. *Academy of Management Review* **32**: 273–292.

Sirmon DG, Hitt MA, Arregle JL, Campbell JT. 2010. The dynamic interplay of capability strengths and weaknesses: Investigating the bases of temporary competitive advantage. *Strategic Management Journal* **31**: 1386–1409.

Sirmon DG, Hitt MA, Ireland RD, Gilbert BA. 2011. Resource orchestration to create competitive advantage: Breadth, depth and life cycle effects. *Journal of Management* **37**: 1390–1412.

Slater SF, Olson EM, Hult GT. 2006. The moderating influence of strategic orientation on the strategy formation capability–performance relationship. *Strategic Management Journal* **27**: 1221–1231.

Sobel ME. 1982. Asymptotic confidence intervals for indirect effects in structural equation models. In Leinhardt S (ed.), *Sociological Methodology*. American Sociological Association: Washington, D.C.; pp. 290–312.

Song M, Droge C, Hanvanich S, Calantone R. 2005. Marketing and technology resource complementarity: An analysis of their interaction effect in two environmental contexts. *Strategic Management Journal* **26**: 259–276.

Spanos YE, Lioukas S. 2001. An examination into the causal logic of rent generation: Contrasting Porter's competitive strategy framework and the resource-based perspective. *Strategic Management Journal* **22**: 907–934.

Spanos YE, Zaralis G, Lioukas S. 2004. Strategy and industry effects on profitability: Evidence from Greece. *Strategic Management Journal* **25**: 139–165.

Spector PE. 2006. Method variance in organizational research: Truth or urban legend? *Organizational Research Methods* **9**: 221–223.

Staber U, Sydow J. 2002. Organizational adaptive capacity: A structuration perspective. *Journal of Management Inquiry* **11**(4): 408–424.

Steiner GA, Miner JB. 1977. *Management Policy and Strategy: Text, Readings and Cases*. Macmillan: New York.

Teece DJ. 2007. Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal* **28**: 1319–1350.

Teece DJ. 2010. Technological innovation and the theory of the firm: The role of enterprise-level knowledge, complementarities and (dynamic) capabilities. *Handbook of the Economics of Innovation* **1**: 679–730.

Teece DJ. 2012. Dynamic capabilities: Routines versus entrepreneurial action. *Journal of Management Studies* **49**: 1395–1401.

Teece DJ, Pisano G, Shuen A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* **18**: 509–533.

Tripsas M, Gavetti G. 2000. Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal* **21**: 1147–1161.

DOI: 10.1002/jsc

Wang CL, Ahmed PK. 2007. Dynamic capabilities: A review and research agenda. *The International Journal of Management Reviews* **9**: 31–51.

Weinzimmer L, Nystrom P, Freeman S. 1998. Measuring organizational growth: Issues, consequences and guidelines. *Journal of Management* **24**: 235–262.

Wernerfelt B. 1984. A resource-based view of the firm. *Strategic Management Journal* **5**: 171–180.

Whittington R. 1993. *What is Strategy and Does It Matter*? Routledge: London.

Wiklund J. 1998. Small firm growth and performance: entrepreneurship and beyond. PhD thesis, Jonkoping International Business School, Jonkoping, Sweden.

Wiklund J, Shepherd D. 2003. Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Strategic Management Journal* **24**: 1307–1314.

Wiklund J, Shepherd D. 2005. Entrepreneurial orientation and small business performance. *Journal of Business Venturing* **20**: 71–91.

Wilden R, Gudergan SP, Nielsen BB, Lings I. 2013. Dynamic capabilities and performance: Strategy, structure and environment. *Long Range Planning* **46**: 72–96.

Winter SG. 2003. Understanding dynamic capabilities. *Strategic Management Journal* **24**: 991–995.

Zahra SH, Sapienza HJ, Davidsson P. 2006. Entrepreneurship and dynamic capabilities: A review, model and research agenda. *Journal of Management Studies* **43**: 917–955.

Zollo M, Winter S. 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization Science* **13**: 339–351.

Zúñiga-Vicente JÁ, Vicente-Lorente JD. 2006. Strategic moves and organizational survival in turbulent environments: The case of Spanish banks (1983–97). *Journal of Management Studies* **43**: 485–519.

DOI: 10.1002/jsc

BIOGRAPHICAL NOTES

George Chryssochoidis is currently Professor of Marketing at Kent Business School, University of Kent. Having worked in the areas of new product launch and innovation, he is essentially a modeler concentrating on choices/decision-making and development of innovative quantitative methodologies. His work has benefited public policy and marketing action and has had important societal and public policy impact.

Dimitrios Dousios is Lecturer in Entrepreneurship at Norwich Business School. His work investigates the linkages between entrepreneurship, dynamic capabilities, and small business growth, and is fully funded by the Greek State Scholarship Foundation (IKY). His research and teaching interests revolve around entrepreneurship and enterprise creation, with particular focus on high-technology start-ups, born-global firms, and early-stage entrepreneurship.

Nikolaos Tzokas is currently Executive Dean, Faculty of Business, University of Plymouth. His research portfolio consists of three areas, namely new product development, relationship marketing, and sales management. The common denominator, which navigates and focuses this research portfolio, is the development of our understanding of how the competitiveness of contemporary firms can be enhanced by means of joint value creation – i.e., knowledge created and used through close collaboration among firms, customers, suppliers, and other stakeholders.

Correspondence to:
George Chryssochoidis
University of Kent, Kent Business School
Canterbury CT2 7PE, UK
email: g.chryssochoidis@kent.ac.uk

DOI: 10.1002/jsc