International Journal of Applied Management Science

ISSN online: 1755-8921 - ISSN print: 1755-8913
https://www.inderscience.com/ijams

Measuring dynamic capabilities-based synergies using real options in M&A deals: Amazon's acquisition of Whole Foods

Andrejs Čirjevskis

DOI: 10.1504/IJAMS.2023.10053276

Article History:

Received:	12 February 2020
Accepted:	04 July 2020
Published online:	17 January 2023

Measuring dynamic capabilities-based synergies using real options in M&A deals: Amazon's acquisition of Whole Foods

Andrejs Čirjevskis

University RISEBA of Applied Sciences,
Meža iela 3, Rīga, LV-1048, Latvia
Email: andrejs.cirjevskis@riseba.lv

Abstract: Dynamic capabilities have become well established as a new imperative for organising M&A processes. However, understanding the full benefits and possible limits of real options applications to measure a dynamic capability-based (managerial) synergies remains a challenge. The author developed three propositions and justified them by application of dynamic capabilities framework and real options theory to highly strategic and not standard M&A deal: Amazon's acquisition of Whole Foods in 2017. The illustrative case study made it possible to bridge together two streams of research on dynamic capabilities and real options. While the empirical application of the dynamic capabilities' framework makes them more visible, the application of the real options is making dynamic capabilities measurable in the M&A deals. In the end, the author discusses theoretical and managerial contributions, limitations, and future work.

Keywords: merger and acquisition; dynamic capabilities; synergy; real option.

Reference to this paper should be made as follows: Čirjevskis, A. (2023) 'Measuring dynamic capabilities-based synergies using real options in M&A deals: Amazon's acquisition of Whole Foods', *Int. J. Applied Management Science*, Vol. 15, No. 1, pp.73–85.

Biographical notes: Andrejs Čirjevskis is a Full Professor of University RISEBA of Applied Sciences in Riga (Latvia). He is the author of many publications in corresponding scientific fields and participated with reports on international scientific conferences of Strategic Management Society (USA), Academy of International Business (USA), and Academy of Management (USA) within the last six years. He holds a Doctor of Economic Science (Dr.oec.) degree at Riga Technical University (1997). His scientific interests lie in strategy as practice, knowledge and innovations, and financial economics (real options applications).

"*Amazon buying Whole Foods is incredibly interesting, highly strategic, and definitely not standard*" (Clarence-Smith, 2020).

1 Introduction: purpose and motivation

Despite the growing popularity of M&A activity, recent studies have contended that most of the deals do not result in increased value for the acquirer's shareholders. Some authors indicate an unsuccessful rate of 50% (Weber et al., 2014), while others suggest an even

higher rate of 70–90% (Clayton et al., 2011). This paper aims to justify the role of dynamic capabilities as antecedents of success or failures of M&A deals and to demonstrate real options application to measure managerial synergies in M&A deals. In the current paper, the author argues that the intersection between dynamic capabilities frameworks and real options theory enables the acquirer to elect and exercise those options that have a high probability to provide managerial synergies and let expire the options that have low probability.

Even though there are many differences between real options theory and dynamic capability framework like the difference in the origin, in the aims, and the context of usage, there are many similarities within two concepts. Both are necessary for managing changes, both are created by managers, and both are new and growing concepts (Jahanshahi and Nawaser, 2018). Dynamic capabilities are necessary to exploit real options opportunities, whereas real options are necessary to evaluate opportunities (Jahanshahi and Nawaser, 2018).

The paper develops three propositions. First, the probability to exercise a real option in the M&A deal can be measured by exploring similarities and complementarity of the dynamic capabilities of acquirers and targets. Second, the managerial synergies are provided by the successful integration of the dynamic capabilities of an acquirer and a target. Third, such type of synergy can be assessed and measured by real option application.

The motivation for this research is as follows. The majority of papers on the synergetic effects of M&A deals typically focus on a particular type of synergy (Loukianova et al., 2017), while the current paper proposes a model that accounts for the cumulative simultaneous effect of different types of operating, financial, and dynamic capabilities-based synergies. Even though the dynamic capabilities framework and its empirical applications (Teece, 2007, 2011) make dynamic capabilities more *visible*, the application of the real options making dynamic capabilities even *measurable* in the M&A deals.

The paper has the following structure. The literature review introduces the concept of dynamic capabilities as antecedents of synergies of an M&A deal, discusses the applicability of the real options theory for the synergy's assessment, and develops three propositions. Then, the illustrative case study of Amazon's acquisition of Whole Foods justifies developed propositions. The author measures synergies as a shareholders' value added to the acquirer's shareholders through the lenses of real options theory. At the end of the paper, the author discusses theoretical and managerial contributions, highlights the research limitations and future works.

2 Key literature review

The dynamic capabilities (DC) framework analyses the sources and methods of wealth creation and capture by private enterprise firms (Teece et al., 1997). One of the methods to create a shareholder's wealth is to "integrate and reconfigure external competences" (Teece et al., 1997). A real option is a right to take specific future actions at some cost concerning acquiring a target's ownership share (Chi et al., 2019). In the presence of uncertainty about the value of the assets, the option allows the acquirer to take the action if it is beneficial to do so (Chi et al., 2019). The dynamic capabilities framework and real options theory are not mutually exclusive (Jahanshahi and Nawaser, 2018, p.395).

2.1 Exploring dynamic capabilities in merger and acquisition deals

Dynamic capabilities are the firms' abilities to sense new opportunities in its environment, then to seize these opportunities by adapting, integrating, and reconfiguring its key assets and activities and, then, to change their operating processes incrementally and radically (Salvato and Vasselo, 2018; Jahanshahi and Nawaser, 2018). *Sensing* implies that the organisation must constantly scan, recognise new business opportunities, and appraise external competencies that can be transferred and integrated into its business model. Investigating customer needs and managerial capabilities needed to satisfy those needs is typical sensing activity. Once an opportunity has been sensed to bring the new services, products, and activities, the organisation should *seize* the opportunity. *To seize* an opportunity may require the acquisition of new idiosyncratic resources (e.g. specific technologies, specialised knowledge) and establishing new partnerships with advanced partners (e.g. in terms of market expertise and specific skills). Thus*, transforming* is how to organise new and old resources as well as existing and new dynamic capabilities for an organisation's *value maximisation*.

However, there is no consensus, how to measure market value-added created by dynamic capabilities. Stefano et al. (2014) argue that despite the exceptional rise in interest and influence of dynamic capabilities, criticisms of the dynamic capabilities' perspective continue to mount. Common concerns are related to a lack of consensus on limited empirical progress (Stefano et al., 2014). Moreover, there are only a few pieces of research on dynamic capabilities that have been identified and studied involving mergers and acquisitions. Teece argues that it might be "because assets are bundled together often tightly linked inside incumbent firms, it may be difficult to obtain assets in the desired configurations through asset purchase or sale in mergers and acquisitions" (Teece, 2007).

While the similarity is seen as an indicator for efficiency-based synergies (scale and scope), complementarity provides firms with both efficiency synergies and value created from those differences that are mutually supportive (or dynamic capabilities-based). "Studies give clear empirical evidence that complementarities are a significant factor for M&A success" (Bauer and Matzler, 2014, p.272). Complementarity has been studied in terms of top management team complementarity (Kleinbaum and Stuart, 2014), technological complementarity (Makri et al., 2010), strategic and market complementarity (Kim and Finkelstein, 2009), or product complementarity (Wang and Zajac, 2007). There is no research on the complementarity dynamic capabilities and on an application of real options to measure added value created by dynamic capabilities. Recently, scholars adopted a dynamic capabilities framework (Teece 2007, 2011) for the business analyses of the M&A deal to identify similarities and complementarity between the dynamic capabilities of an acquirer and a target (Čirjevskis, 2017, 2019). Therefore,

> Proposition 1: *The higher the degree of similarities and complementarity between the dynamic capabilities of an acquirer and a target, the higher the probability to exercise of a real option on an acquisition of this target*.

2.2 Exploring synergies in M&A as market value-added

In a business, environment synergy can be seen as an increase in combined company's competitive advantage which results in positive cash flows exceeding the cash flows that the two companies were expected to accomplish on their own (Ross et al., 2013, pp.888–889). A combined company can also achieve synergistic benefits by generating

economies of scale and scope through assets consolidation, combining sales operations, sharing information, distribution channels, and eliminating redundant operation sources (Capron, 1999; Alhenawi and Krishnaswani, 2015). Although synergies have been under intense interest and study for decades, there is still no common ground on what appropriate way of for is categorising synergy items. Trautwein's (1990) efficiency theory distinguishes three main categories of synergies: operational, financial, and managerial. To measure synergies quantitatively, Rabier (2017) recommends estimating an operating synergy (e.g., revenue growth through new product offerings or cost savings through economies of scale) which are more likely to result in higher operating profit margin and financial synergies (e.g., diversification of cash flow streams and lowering the cost of capital).

Synergies are mainly analysed by scholars quantitatively, in terms of revenue and cost. Moreover, in practice, it is a much more complicated valuation because some success factors are not quantitatively measurable. Managerial synergies refer to gains that the bidder can achieve in a situation in which the acquiring company's management has super knowledge and acquisition-based capabilities (Bosecke, 2009, p.27; Trautwein, 1990). These knowledge and acquisition-based capabilities can be hugely advantageous regarding the future of the combined company and vital for acquirer management (Goold and Campbell, 1999). Capron and Anand (2007) named those as acquisition-based dynamic capabilities. In this vein, dynamic capabilities (superior knowledge and capabilities of the acquiring company's management) can generate dynamic capabilities based (managerial) synergies which can be measured as a real option.

Synergies in an acquisition are a function of strategic similarity, complementarities, and transferability of dynamic capabilities in the M&A deals. Merging companies generate managerial synergies by working closely together and executing tasks through an iterative knowledge-sharing process. However, there is no single way how to identify, validate, and value the potential of dynamic capabilities-based synergy. If the acquirer wants to ensure a successful value creation process, the application of appropriate measurement tools is essential. Recently scholars provided the practice-driven model that bridges the dynamic capabilities framework with building blocks of the business model canvas (Osterwalder and Pigneur, 2009) to demonstrate the role of dynamic capabilities as drivers of the business model innovation (Čirjevskis 2017, 2019). This approach is encouraging to analyse the importance and strengths of acquisition based dynamic capabilities and to measure the degree of similarities, complementarity, and transferability of dynamic capabilities of an acquirer and a target. Thus,

> Proposition 2: *Managerial synergies in M&A deals are provided by the degree of similarities, complementarity, and transferability of the dynamic capabilities of an acquirer and a target*.

2.3 Measuring dynamic capabilities-based synergies in M&A with a real option

Smith and Triantiset (1995) argue that many acquisitions create valuable options that discounted cash flow models do not capture. To account for managerial flexibility connected with an M&A deal several authors (see, e.g., Baldi and Trigeorgis, 2009; Loukianova et al., 2017) have proposed embedding a real option perspective in the valuation framework. The incorporation of real options into the synergy valuation

measures managerial flexibility arising from M&A deals. The majority of papers on the synergetic effects of M&A deals typically focus on a particular type of synergy (Loukianova et al., 2017), while the current paper proposes a model that accounts for the cumulative simultaneous effect of different types of operating, financial, and dynamic capabilities-based (managerial) synergies.

The dynamic capabilities-based synergies can be viewed as a real option value (market value added) that is created in an M&A process. Moreover, Bruner (2004) emphasised the relevance of real options for M&A practitioners. In this vein, the paper adopted recommendations of Dunis and Klein (2005) regarding input variables for the valuation synergies as real options as follows.

The share price (So) equivalent of the option is the cumulated market value of target and acquirer or their capitalisation before the merger. Data of market capitalisation are usually available on the https://www.reuters.com/; https://www.google.com/finance and other available sources. The exercise price (E) is the combined hypothetical future market value of the target and an acquirer after one year without a merger. The hypothetical future market value of the separated entities forecast can be done with multiples analyses and/or with discounted free cash flow forecasts. Cash flow is, in theory, the free cash flow, but in practice, it is proxied by EBITDA. Therefore, the exercise price is the hypothetical future market value without the merger or theoretical market value calculated by using revenue and EBITDA multiples. The volatility (σ) of share price can be obtained from the V-Lab APARCH Volatility Analysis (NYU Stern, 2019) or by direct observation. Assuming semi-efficient markets that incorporate publicly available new information promptly, the calculation of the standard deviation of the acquirer stock price return is started the week after the announcement. Duration (T) getting synergy is managerial anticipation of when dynamic capabilities-based synergies would be fully realised in terms of the year following completion of the merger or acquisition.

The risk-free rate (rf) is a long-term government bond yield of an acquirer's country (Dunis and Klein, 2005). Therefore, the option of potential M&A benefits to the shareholders is a European or American call option on the market value of the merged company with the expected future stand-alone market value defined as the exercise price. The call option premium as a dynamic capabilities-based synergies results can be calculated using an Excel spreadsheet either European or American type of option. To conclude the theoretical part of this paper, the dynamic capabilities-based (reciprocal) synergy in M&A can be measured with real option application, namely, with Black Scholes Option Pricing Model (European type option) and Real Option Binominal Lattice or Binominal Option pricing model (American type option). Therefore,

> Proposition 3: *Dynamic capabilities-based synergies in M&A deals can be measured by real options application using BSOPM and BOPM.*

To test the internal and external validity of the proposed propositions, it was applied to a recent case of dynamic capabilities-based M&A deal in the grocery retail industry: Amazon's acquisition of Whole Foods in 2017.

3 Illustrative case study Amazon's acquisition of Whole Foods

3.1 Amazon's acquisition of Whole Foods in 2017

On 16 June 2017, Amazon acquired Whole Foods in a US$13.7 billion all-cash transaction. Post-acquisition, Whole Foods continued to operate stores under the Whole Foods Market brand. How to reconcile the similarities, complementarity, and transferability of the dynamic capabilities of both companies? How to successfully unleash the value of the synergies of the merger?

3.2 Illustration of acquisition based dynamic capabilities of Amazon.com

> *Justification of proposition 1*. The higher the degree of similarities and complementarity between the dynamic capabilities of an acquirer and a target, the higher the probability to exercise of a real option on an acquisition of this target.

Zahra et al. (2006) argue that the lack of success to solve a problem with current capabilities triggers the development and use or acquire new dynamic capabilities. The case study has explored the selected dynamic capabilities of the target company and the acquirer's company in terms of their similarities and complementarity. The dynamic capabilities of *sensing and seizing* of two companies are quite similar. Both companies were successful *to sense* an emerging business opportunity, *to seize* them by developing new products and creating platforms and sustaining leadership. However, companies were not always successful in *transformation* or reshaping resources: Amazon's low grocery margins, difficulties to deliver food considering their perishability nature, as well as Amazon Go store's technology, faced problems. Regarding Whole Foods, there is a massive cost disadvantage compared to their traditional grocery competitors.

There are also several *complementarities* of the dynamic capabilities of an acquirer and a target. One of Amazon's weaknesses is the huge cost of losses due to food items becoming bad, a problem which the company had never faced with toys and books. Amazon has high dynamic capabilities in online technology but not in food distribution. Amazon has limited knowledge and experience in the offline retail environment. That is why, for Amazon Fresh to be successful, the company needed to acquire more expertise in perishable grocery procurement. In contrast, Whole Foods becomes an organic supermarket that distinguishes itself by offering "highest quality natural and organic products". However, Whole Foods' recent poor performance stems from a major strategic mistake they made about 4 years ago. Whole Foods in its current incarnation is a niche business that can only profitably sell "food for the 1%" but is trying to sell to everyone (HBS, 2017). Therefore, Amazon can provide resources for future Whole Foods development, and at the same time, Amazon can develop their own offline grocery business. It made the probability to exercise the real option of the acquisition of Whole Foods as very high.

> *Justification of proposition 2*. Managerial synergies in M&A deals are provided by the degree of similarities, complementarity, and transferability of the dynamic capabilities of an acquirer and a target.

The persistence of existing dynamic capabilities depends on the impetus for change (sensing), the strength of the perceived need to change (seizing), and the managerial

capacity to integrate and recombine resources (transforming) as desired (Teece, 2007; Zahra et al., 2006). The acquisition-based dynamic capabilities helped Amazon to provide managerial synergies as follows. Amazon *sensed* new *key activities* and *new customers' segments* for their business: Whole Foods customer has over $1000 per month disposable income. With this big data, it can build analytic models that can predict what these consumers will want, how much they will want, and when they will want it. Amazon *seized* new *key* (*idiosyncratic*) *resources* by acquiring Whole Foods logistic system, customer base, and *a key partners' network*.

To be successful in the offline retail food segment and own-brand grocery stores, Amazon needs to have knowledge of traditional retailing and effective supply chain management in both factories and retail stores. Amazon has limited knowledge and experience in the offline retail environment. The company learned about the food market through Amazon Fresh but now can learn about food stores or grocery manufacturing. Amazon has good supply chain management in a warehouse for online retail orders, but now Amazon is certain whether this experience is transferable to an offline retail store. Hence, Amazon *reconfigured* new *customers' relationships and channels*. Therefore, Amazon *transformed* its *customer value proposition*, delivering new value to the clients of both companies, and capturing new value for shareholders. Put simply, acquisition-based dynamic capabilities contribute to reduce cost, to create a new revenue stream, to deliver a new value proposition, and therefore provide a managerial synergy by adding market value-added of the acquirer.

> *Justification of proposition 3.* Dynamic capabilities-based synergies in M&A deals can be measured by real options application using BSOPM and BOPM.

To measure dynamic capabilities-based (managerial) synergies as a real option of managerial flexibility in a merger, the Black-Scholes option pricing model (BSOPM) and Binominal lattice or Binominal option pricing model have applied accordingly (BOPM). The following data as input variables have been used in valuation. The cumulated market capitalisation of target and acquirer before the announcement (So) is a sum of the market capitalisation of both separate companies. The market capitalisation of Amazon was $478.6 bn; the market capitalisation of Whole Food was $13.8 bn (Pillars of Wall Street, 2017).

The exercise price (E) is the combined hypothetical future market value after one year without a merger. The hypothetical future market value of the separated entities (target and acquirer) after one year has been calculated using EV/ Revenues (Enterprise Value) and EV/EBITDA (Enterprise Value/Earnings before Interest, Taxes, Depreciation, and Amortisation) multiples. Having used Amazon revenues $142.6 bn in 2017 and EV/Revenues multiple 3.3 (Pillars of Wall Street, 2017), the hypothetical future market value of Amazon without the acquisition has been estimated as $ 470.6 bn. Having used Whole Food EBITDA $ 1.3 bn in 2017, and EV/EBITDA multiple 11.1 (Pillar of Wall Street, 2017), the hypothetical future market value of Whole Food without the merger has been estimated as $ 14.3 bn. Therefore, the cumulated hypothetical future market value of the target and the acquirer after one-year equals (E) $ 484.9 bn.

The risk-free rate of return (rf) in 2017 has been defined as Long-Term Government Bond Yields (10-years) for the USA which was 2.16% (YCharts, 2020). Expected volatility (σ) has been determined based on historical volatilities for three years. Following the analytical reports (AlphaQuery, 2020), the volatility (σ) of Amazon after

an announcement of the acquisition was assumed as 25.25%. Time to expiration in years (T) equals one year with five-time steps (one step is about 2 months) for the Binominal Option pricing model.

The option premium as a competence-based synergies result has been calculated using an Excel spreadsheet. Results are given in Tables 1, 2, 3 and 4.

Table 1 Black Scholes option pricing model (in $ bn)

Real options valuation Black-Scholes	
The cumulated market value of target and acquirer before the announcement (So)	478.60
Hypothetical future market of the separated entities forecast before the merger (K)	484.90
The risk-free rate of return (Rf) in 2017	2.16%
Time to expiration in years (T)	1
The volatility of future share price Amazon (σ) in July of 2017 after the announcement	25.50%
d1	0.161
d2	–0.094
Value of the call option (C) = Synergies	50.4

Table 2 Recombining binomial lattice parameters

Real options binomial option pricing model	
time increment (years)	0.20
up factor (u)	1.121
down factor (d)	0.892
risk-neutral probability (p)	0.490

Table 3 Binominal option pricing model: a lattice of the underline values of Amazon after the acquisition (in $ bn) (see online version for colours)

0	*1*	*2*	*3*	*4*	*5*
					846.46
				755.23	
			673.83		673.83
		601.21		601.21	
	536.41		536.41		536.41
478.60		478.60		478.60	
	427.02		427.02		427.02
		380.99		380.99	
			339.93		339.93
				303.30	
					270.61

Table 4 Binominal option pricing model. Real options lattice: a value of Amazon synergies of the acquisition (in $ bn) (see online version for colours)

0	*1*	*2*	*3*	*4*	*5*
					361.56
				272.42	
			193.11		188.93
		130.11		118.40	
	84.19		70.58		51.51
52.7		40.70		25.16	
	22.92		12.29		0.00
		6.00		0.00	
			0.00		0.00
				0.00	
					0.00

According to the Black-Sholes Option pricing model (BSOPM), the value of the real option (call option value as synergies value) equals $ 50 bn. According to the Binominal Option pricing model (BOPM) equals $52.7 bn. When it comes to differences in values given by BSOPM and BOPM, the author assumes that it appeared due to relatively low numbers of time-steps increments producing just five possible investment outcomes in BOPM. Moreover, BOPM provides a straightforward understanding and visualises how M&A uncertainty represented by volatility influences option value during its lifetime. According to BSOPM and BOPM the computation of the value of competence-based synergies evidence that the Amazon, Inc had an average added value equals $52 bn. Therefore, the expected market value of Amazon, Inc is the cumulated future market value of target and acquirer before the announcement (So) $ 478.6 bn plus synergies $52 bn equals $ 530.6 bn.

Takeover premium is the difference between the market price $13.8 billion (or estimated value $14.3 billion) of a company and the actual price paid to acquire it ($13.4 billion), expressed as a percentage (2.8–3.0%). The premium represents the additional value of owning 100% of a company in a merger or acquisition and is also known as the control premium. The control premium is the additional benefit an acquirer receives (compared to an individual shareholder) from having full control over the business. The author found that the option premium significantly exceeded the actual takeover premium suggesting that, from an option-pricing point of view, those acquisitions provided significant dynamic capabilities-based synergies. Put simply, the acquisition was able to generate significant value-added for the acquirer's shareholders. "In most acquisitions, even those where synergy is real and creates value, the acquiring firm's stockholders get little or none of the benefits from synergy, due to biased evaluation process, managerial hubris (pride), and a failure to plan for synergy" (Damodaran, 2005, p.41). But it is not a case of Amazon's acquisition of Whole Foods! Firms that like Amazon are disciplined when "making acquisitions and stay focused are better able to deliver promised synergy benefits. Synergy is difficult to deliver but it is not impossible to create" (Damodaran, 2005, p.44).

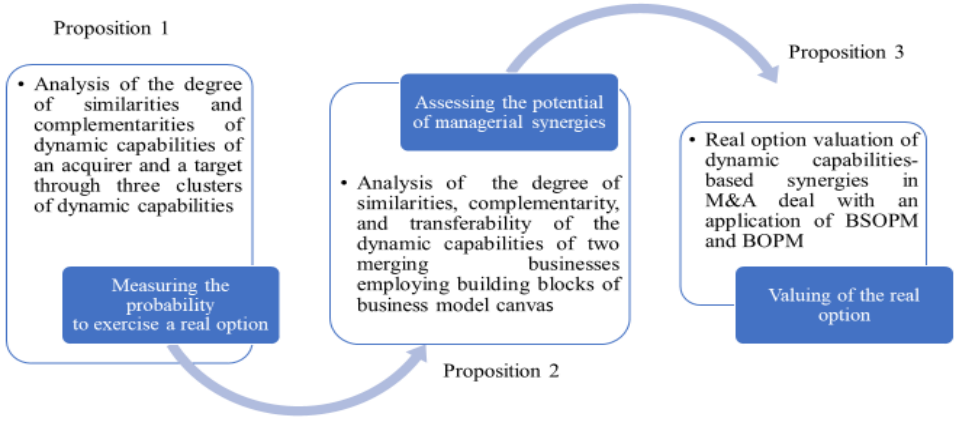
4 Finding and discussion

There are very few research papers that applied the dynamic capabilities' framework as a business analysis tool of the value creation process in M&A deals and the real option application to measure managerial synergy. Jahanshahi and Nawaser (2018) argue that study on a real option and dynamic capabilities suggest future research on many open questions. "Future research can test this relationship in the project and firm-level" (Jahanshahi and Nawaser, 2018, p.400). The current paper contributes to this scientific discussion. The paper justified the role of dynamic capabilities as antecedents of success or failures of M&A deals and to demonstrate real options application to measure managerial synergies in M&A deals. Testing empirically this relationship the paper enriches our knowledge about how organisations can benefit from real options and redefine dynamic capabilities framework to the heart of strategic management. The paper demonstrates how acquisition-based dynamic capabilities provide managerial synergies. This is the first theoretical contribution of the current paper.

Having advanced future research designs for real option valuation, Trigeorgis and Reuer (2017, p.57) argue "we would encourage the use of real option with a greater focus on the individual project level of analysis … on individual real option cases". Having used a real option to value managerial synergy in the real case study, the paper contributes to the real options theory in strategic management. This is the second theoretical contribution of the paper.

Regarding managerial contribution, the proposed approach to value M&A synergy (Figure 1) can be used by firms before an M&A deal in the due diligence process. Figure 1 illustrates the likely relationships among the main construct presented in the paper, with dynamic capabilities shown as an antecedent of managerial synergies. Acquirers need to integrate dynamic capabilities of targets to create a shareholders' value-added which can be measured using real options application. The relationship between develop proposition sums up the theoretical and managerial contribution of the paper and provides opportunities for future works.

Figure 1 The relationship among developed propositions



5 Conclusion, limitation, and future work

The current paper contributes to the theory and practice of strategic management by empirically illustrating how this logic works in the M&A process. Amazon needed to acquire more knowledge of the retail market, improve management of its supply chain for the offline retail store, and continue investing in R&D for the grocery retail business. Dynamic capabilities of Amazon and Whole Foods are aligning and allowing them to improve existing products by sharing experience, advanced technologies, and broad users' base. Whole Food is an attractive platform for Amazon for the transformation of an industry. Amazon also can help Whole Foods buy high-quality products more cost-effectively and thus improve gross margins while keeping customers satisfied. As a result, Amazon can change cost structure as well as potentially increase revenue streams for mobile professional users and this can result in managerial synergies. Therefore, the first and second propositions have been justified empirically. The current research points out that the real option application provides an adequate practical approach for synergy valuation. Therefore, the third proposition has been justified quantitatively with an application of BSOPM and BOPM techniques.

The current paper also demonstrates the limitation of the real option application to measure a dynamic capabilities-based synergy. It is difficult to validate the synergetic effect of one isolated acquisition deal when several acquisitions happen within the anticipation of the duration of getting synergy. Time to maturity one year was assumed for the deal of Amazon-Whole Foods, namely, form the end of June 2017 till the end of June 2018. It was the assumption that efficient markets should have a well anticipated potential long-term merger gain within this period. Real option application provided forecast on the total market capitalisation of Amazon one year after, namely, $ 529.6 bl. However, the real market capitalisation of Amazon after 1 year was $ 805.72 bn on 27.06.2018 (YCharts, 2020). The differences can be explained by exploring several M&A deals of Amazon within this period which would have added much more market value to the Amazon, Inc then one acquisition of Whole Foods. In this vein, more case studies research is needed to justify the developed propositions.

Moreover, the paper, being of an exploratory and interpretive, raises several opportunities for future research, both in terms of theory development and findings validation. The propositions discussed in the paper can be used to generate several hypotheses for further empirical testing using a broader sample and quantitative research methods. Certainly, the testing of the propositions presented here should help determine the applicability of real options valuation to the M&A deals and bring this emerging approach closer to the dynamic capabilities' framework.

References

Alhenawi, Y. and Krishnaswami, S. (2015) 'Long-term impact of merger synergies on performance and value', *The Quarterly Review of Economics and Finance*, Vol. 58, pp.93–118.

AlphaQuery (2020) Amazon.com, Inc (AMZN). Available online at: https://396www.alphaquery.com/stock/AMZN/volatility-option-statistics/90-day/iv-mean (accessed on 28 January 2020)

Baldi, F. and Trigeorgis, L. (2009) 'Assessing the value of growth option synergies from business combinations and testing for goodwill impairment', *Journal of Applied Corporate Finance*, Vol. 21, No. 4, pp.115–124.

Bauer, F. and Matzler, K. (2014) 'Antecedents of M&A success: the role of strategic complementarity, cultural fit, and degree and speed of integration', *Strategic Management Journal*, Vol. 35, No. 2, pp.269–291.

Bosecke, K. (2009) *Value Creation in Merger, Acquisition, and Alliances*, Gabler, Wiesbaden.

Bruner, R. (2004) *Applied Mergers and Applications*, John Wiley & Sons, New York.

Capron, L. (1999) 'The long-term performance of horizontal acquisitions', *Strategic Management Journal*, Vol. 20, No. 11, pp.987–1018.

Capron, L. and Anand, J. (2007) 'Acquisition-based dynamic capability', in Helfat, C.E., Finkelstein, S., Mitchell, W., Peteraf, M., Singh, H., Teece, D. and Winter, S. (Eds): *Dynamic Capabilities: Understanding Strategic Change in Organizations*, Blackwell, London, pp.80–99.

Chi, T., Li, J., Trigeorgis, L.G. and Tsekredos, A. (2019) 'Real options theory in international business', *Journal of International Business Studies*, Vol. 50, No. 4, pp.525–553.

Clarence-Smith, T. (2020) *Amazon vs. Walmart: Bezos Goes for the Jugular with Whole Foods Acquisition*. Available online at: https://www.toptal.com/finance/mergers-and-acquisitions/amazon-vs-walmart-acquisition-strategy (accessed on 28 January 28 2020).

Clayton, C., Alton, R. and Rising, C. (2011) 'The Big Idea: The New M&A Playbook', *Harvard Business Review*, March, pp.1–22.

Čirjevskis, A. (2017) 'Acquisition based dynamic capabilities and reinvention of a business model: bridging two perspectives together', *The International Journal Entrepreneurship and Sustainability Issues*, Vol. 4, No. 4, pp.516–525.

Čirjevskis, A. (2019) 'The role of dynamic capabilities as drivers of business model innovation in mergers and acquisitions of technology-advanced firms', *Journal of Open Innovation: Technology, Market, Complexity*, Vol. 5, No. 12, pp.1–16.

Damodaran, A. (2005) *The Value of Synergy*, New York University - Stern School of Business. Available online at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=841486 (accessed on 16 January 2020).

Dunis, C.L. and Klein, T. (2005) 'Analyzing mergers and acquisitions in European financial services: an application of real options', *European Journal of Finance*, Vol. 11, No. 4, pp.339–355.

HBS Working Knowledge (2017) *Amazon-Whole Foods Deals Is a Big Win for Consumers*. Available online at: https://www.forbes.com/sites/hbsworkingknowledge/2017/06/17/amazon-whole-foods-deal-is-a-big-win-for-consumers/#706c71347232 (accessed on 17 January 2018).

Goold, M. and Campbell, A. (1998) 'Desperately seeking synergy', *Harvard Business Review*, Vol. 76, No. 5, pp.130–143.

Jahanshahi, A.A. and Nawaser, K. (2018) 'Are real options reasoning a cause or consequence of dynamic capability?' *Strategic Change*, Vol. 27, No. 4, pp.395–402.

Kim, J.Y. and Finkelstein, S. (2009) 'The effects of strategic and market complementarity on acquisition performance: evidence from the U.S. commercial banking industry, 1989–2001', *Strategic Management Journal*, Vol. 30, No. 6, pp.617–646.

Kleinbaum, M. and Stuart, T.E. (2014) 'Network responsiveness: the social structural micro-foundations of dynamic capabilities', *The Academy of Management Perspectives*, Vol. 28, No. 4, pp.353–367.

Loukianova, A., Nikulin, E. and Vedernikov, A. (2017) 'Valuing synergies in strategic mergers and acquisitions using the real options approach', *Investment Management and Financial Innovations*, Vol. 14, No. 1, pp.236–247.

Makri, M., Hitt, M.A. and Lane, P.J. (2010) 'Complementary technologies, knowledge relatedness, and invention outcomes in high technology mergers and acquisitions', *Strategic Management Journal*, Vol. 31, No. 6, pp.602–628.

NYU Stern (2019) *Koninklijke Ahold Delhaize NV APARCH Volatility Analysis*. Available online at: https://vlab.stern.nyu.edu/analysis/VOL.AD:NA-R.APARCH (accessed on 30 September 2019).

Osterwalder, A. and Pigneur, Y. (2009) *Business Model Generation*, Self-published.

Pillars of Wall Street (2017) *Deal of the Week: Amazon to Buy Whole Foods for $13.4B*. Available online at: https://pillarsofwallstreet.com/wp-content/uploads/2013/02/6.16.17-Amazon-to-Buy-Whole-Foods-for-13.4B.pdf (accessed on 28 January 2020).

Rabier, M.R. (2017) 'Acquisition motives and the distribution of acquisition performance', *Strategic Management Journal*, Vol. 38, No. 13, pp.2666–2681.

Ross, S., Westerfield, R. and Jaffe, J. (2013) *Corporate Finance*, 10th ed., McGraw-Hill, New York.

Salvato, C. and Vasselo R. (2018) 'The source of dynamism in dynamic capabilities', *Strategic Management Society*, Vol. 39, No. 6, pp.1728–1752.

Smith, K.W. and Triantis, A.J. (1995) 'The value of options in strategic acquisitions', in Trigeorgis, L. (Ed.): *Real Options Capital Investment: Models, Strategies and Applications*, Praeger, Westport Connecticut, London.

Stefano, G.D., Peteraf, M. and Verona, G. (2014) 'The organizational drive train: a road to integration of dynamic capabilities researches', *The Academy of Management Perspectives*, Vol. 28, No. 4, pp.307–327.

Teece, D,J., Pisano, G. and Shuen, A. (1997) 'Dynamic capabilities and strategic management', *Strategic Management Journal*, Vol. 18, No. 7, pp.509–533.

Teece, D.J. (2011) *Dynamic Capabilities: A Guide for Managers*. Available online at: http://iveybusinessjournal.com/publication/dynamic-capabilities-a-guide-for-managers/ (accessed on 29 December 2018).

Teece, D.J. (2007) 'Explicating dynamic capabilities: the nature and micro-foundations of (sustainable) enterprise performance', *Strategic Management Journal*, Vol. 28, pp.1319–1350.

Trautwein, F. (1990) 'Merger motives and merger perspectives', *Strategic Management Journal*, Vol. 11, pp.283–295.

Trigeorgis, L. and Reuer, J.J. (2017) 'Real options theory in strategic management', *Strategic Management Journal*, Vol. 38, No. 1, pp.42–63.

Wang, L. and Zajac, E.J. (2007) 'Alliance or acquisition? A dyadic perspective on interfirm resource combinations', *Strategic Management Journal*, Vol. 28, No. 13, pp.1291–1317.

Weber, Y., Tarba, S.Y. and Sandquist Oberg, C. (2014) *A Comprehensive Guide to Mergers & Acquisitions*, FT Press, Upper Saddle River, NJ.

YCharts (2020) *10 Year Treasury Rate*. Available online at: https://ycharts.com/indicators/10_year_treasury_rate (accessed on 27 January 2020).

Zahra, S.A., Sapienza, H.J. and Davidsson, P. (2006) 'Entrepreneurship, and dynamic capabilities: a review, model, and research agenda', *Journal of Management Studies*, Vol. 43, pp.917–955.